

Predictors of quality of life among individuals with schizophrenia

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Purpose: The study reported here aimed to evaluate both biological and psychosocial factors as predictors for quality of life as well as to examine the associations between the factors and quality of life in individuals with schizophrenia.

Methods: Eighty individuals with schizophrenia were recruited to the study. The Thai version of the World Health Organization Quality of Life-BREF was utilized to measure the quality of life. The five Marder subscales of the Positive and Negative Syndrome Scale were applied. Other tools for measurement included the Calgary Depression Scale for Schizophrenia and six social support deficits (SSDs). Pearson/Spearman correlation coefficients and the independent *t*-test were used for the statistical analysis to determine the associations of variables and the overall quality of life and the four domain scores. A multiple linear regression analysis of the overall quality of life and four domain scores was applied to determine their predictors.

Results: The Positive and Negative Syndrome Scale total score, positive symptoms, negative symptoms, disorganized thought, and anxiety/depression showed a significant correlation with the overall quality of life and most of the four domain scores. Depression, SSDs, and adverse drug events showed a significant correlation with a poorer overall quality of life. The multiple linear regression model revealed that negative symptoms, depression, and seeing a relative less often than once per week were predictors for the overall quality of life (adjusted $R^2=0.472$). Negative symptoms were also found to be the main factors predicting a decrease in the four domains of quality of life – physical health, psychological, social relationships, and environment.

Conclusion: Negative symptoms, depression, and poor contact with relatives were the foremost predictors of poor quality of life in individuals with schizophrenia. Positive symptoms, negative symptoms, disorganized thought, anxiety/depression, SSDs, and adverse events were also found to be correlated with quality of life.

Keywords: adverse events, depression, negative symptoms, positive symptoms, social support

Background

The assessment of quality of life (QOL) has become a crucial outcome measure in individuals with severe mental disorders both in research and clinical practice. The evaluation of improvement in QOL, rather than a complete cure, encompasses a wide range of aspects associated with daily living.¹ QOL has been related to functioning, access to resources, sense of well-being, and life satisfaction.²

QOL in individuals with schizophrenia has been measured from both subjective and objective points of view. Subjective measures of QOL include general indicators of life satisfaction and a number of life domains such as satisfaction with work, family, social relations, finances, and housing situation. In addition, the objective measures of QOL usually include indicators of external life conditions, sociodemographic items, and a functioning role in society.² The World Health Organization, however, focused

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on the subjective aspect and defined QOL as the “individual’s perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns”.³

Biological factors, such as abnormal metabolic profiles, have also been of interest in individuals with schizophrenia. The prevalence of metabolic syndrome in individuals with schizophrenia was found to be higher than in the general population, at 40%–60% and 27%, respectively.⁴ Vancampfort et al reported that an increased body mass index and lack of leisure-time physical activity were significantly related to impaired health-related quality of life (HRQOL).⁵ Our previous study found that metabolic syndrome had a significant association with depression, which is one of the most predictive factors for poor QOL in individuals with schizophrenia.⁶ Nevertheless, the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) schizophrenia trial reported no significant difference in QOL between individuals with schizophrenia and metabolic syndrome and those with schizophrenia without metabolic syndrome.⁷

Antipsychotics are essential in the treatment of schizophrenia; however, the use of antipsychotics is associated with numerous side effects including drowsiness, sexual adverse events, dry mouth, insomnia, and extrapyramidal side effects. Atypical antipsychotics are believed to have fewer adverse effects than typical antipsychotics and, therefore, may lead to a better QOL.⁸ Additionally, drug-induced extrapyramidal side effects were reported to be negatively associated with QOL in individuals with schizophrenia.⁹

Several studies have evaluated the associations between psychosocial factors and QOL among individuals with schizophrenia. Negative symptoms were found to have a high correlation with QOL in most studies,^{2,10–13} while positive symptoms were found to be significantly associated with QOL in only some studies.^{10,11} Also, depression was found to be one of the most important factors in predicting a poor subjective QOL.¹⁴ Previous studies using depressive factors from the Positive and Negative Syndrome Scale (PANSS) and the Brief Psychiatric Rating Scale reported an association between depression and a poor QOL.^{15,16} However, one study compared QOL between individuals with schizophrenia with and without depression but did not find any significant differences.¹⁷

Social support may also act as a predictor for QOL in individuals with schizophrenia. Cohen et al found that the absence of loneliness and reliable social contacts were predictors for subjective well-being in individuals with schizophrenia.¹⁸ Another study reported that subjective

social support accounted for life satisfaction.¹⁹ Our previous studies also found that social support deficits (SSDs) were significantly associated with depression and nonadherence in individuals with schizophrenia.^{20,21} Additionally, social support was reported to increase self-esteem, coping skills, and resilience as well as decreasing stigma.²²

To the best of our knowledge, there has not been any study which has assessed both biological factors (eg, metabolic syndrome, type of antipsychotic, adverse events) and psychosocial factors (eg, psychopathology, social support, depression) as predictive factors of QOL in the same analysis. The study reported here aimed to evaluate the biopsychosocial factors as predictors for QOL as well as examining the correlations between the factors and QOL in individuals with schizophrenia.

Methods

Sampling and data collection

The study was approved by the Ethics Committee of the Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand. Eighty participants were recruited from the outpatient clinic of the Maharaj Nakorn Chiang Mai Hospital, Thailand. The inclusion criteria were Thai-speaking, age 18 years or over, and a diagnosis of schizophrenia according to the *Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition; Text Revision*.²³ The exclusion criterion was suffering from a neurological disorder that would interfere with the assessment. The details of the study were fully explained and written informed consent was obtained from all participants before the study.

Measures

Dependent variable

QOL

We used the Thai version of the World Health Organization Quality of Life (WHOQOL)-BREF to measure the QOL, in which four domains are taken into account in rating the overall QOL: physical health, psychological, social relationships, and environment.^{24,25}

Independent variables

Metabolic profiles

The metabolic measures were assessed based on an updated definition of metabolic syndrome derived from the modified National Cholesterol Education Program Adult Treatment Panel III criteria, those being: waist circumference, blood pressure (systolic and diastolic), triglyceride level, high-density lipoprotein cholesterol, and fasting blood sugar.²⁶

Psychopathology

Psychopathology was measured using the PANSS. The PANSS is a 30-item, clinician-rated instrument covering psychotic and other psychiatric symptoms commonly found in individuals with schizophrenia.^{27,28} Each item is accompanied by a complete definition as well as detailed anchoring criteria for all seven rating points (from “absent” to “extremely severe”). Its rating is based on all information pertaining to a specified period during the previous week. The total PANSS score ranged from 30 to 210. As proposed by Marder et al, the five subscales of the PANSS were applied: positive symptoms, negative symptoms, disorganized thought, uncontrolled hostility/excitement, and anxiety/depression.²⁹

Depression

Depression was evaluated using the Thai version of the Calgary Depression Scale for Schizophrenia (CDSS-Thai). The CDSS-Thai was validated and tested for the evaluation of depression in Thai individuals with schizophrenia with high internal consistency. The inter-rater reliability and the test–retest reliability were also high, with an intra-class correlation coefficient of 0.979 and 0.861, respectively.³⁰

Social support

Social support was derived from a scale of six SSDs.²⁰ The six SSDs were defined as living alone, seeing a relative less often than once a week, lack of reciprocity with neighbors, lack of reciprocity between extended family members, difficulty in relationship(s) with one or more relatives, and dissatisfaction with support from family. Each item was scored as zero (deficit not present) or one (deficit present).

Data analysis

The IBM SPSS Statistics for Windows (version 22.0; IBM Corporation, Armonk, NY, USA) was used for all analyses. The normality of distribution of continuous data was checked with the Kolmogorov–Smirnov test. Correlations for normally distributed data were tested with Pearson’s correlation coefficient while the correlations for non-normally distributed data were tested with Spearman’s correlation. An independent *t*-test was used to evaluate the associations between sex, type of antipsychotic, adverse events, SSDs, and the overall QOL as well as the four domains.

Forward-selection multiple linear regression analyses of the overall QOL and four domain scores were applied to determine their predictors (*P*-value for entry <0.05). Adjusted

*R*²s were analyzed to evaluate the ratio of the sum of squares explained by regression models. Coefficient values were used to quantify the strength of the associations. Statistical significance was defined as a *P*-value <0.05.

Results

Data collected from 80 (34 male and 46 female) participants with schizophrenia were analyzed. The mean values (standard deviations [SDs]) of age and duration of illness were 42.7 (14.1) years old and 13.6 (9.3) years, respectively (Table 1). Over 50% of the participants were prescribed with atypical antipsychotics (Table S1).

The mean values (SDs) of the total WHOQOL-BREF, physical health domain, psychological domain, social relationships domain, and environmental domain score are presented in Table 2.

Correlations between biopsychosocial factors and QOL

Bivariate analyses found that the PANSS total, positive symptoms, negative symptoms, and anxiety/depression showed significant correlation with the overall QOL (all *P*-values <0.001) and all of the four domain scores. Depression, seeing a relative less often than once per week, lack of reciprocity with neighbors, and having adverse drug events (ie, memory loss, insomnia) were significantly correlated with a poorer overall QOL. Thirty-eight percent of the participants had metabolic syndrome but only fasting blood sugar was found to be significantly related to overall QOL and the physical health domain of QOL.

Participants with drowsiness were more likely to have poorer QOL in the physical health and psychological domains while dry mouth was associated with a poorer QOL in the physical health and social relationships domains. Occurrence of stiff tongue was found to be significantly related to lower scores of the psychological and social relationships domains of QOL, while presence of stiff walk significantly affected the environmental domain (Table 3).

Multiple linear regression analyses

The forward-selection multiple linear regression model revealed that negative symptoms, depression, and seeing a relative less often than once per week were predictors for overall QOL (adjusted *R*²=47.2%). Negative symptoms were also found to be the main predicting factor for all domains of QOL, while depression was the main predictor for psychological and environmental domains (Table 4).

Table 1 Baseline characteristics

Characteristic/biopsychosocial factor	Subjects (N=80)
Sex (n, %)	
Male	34 (42.5)
Female	46 (57.5)
Marital status (n, %)	
Single	52 (63.4)
Married	19 (23.2)
Separated/divorced	9 (13.4)
Age (years) (mean ± SD)	42.7±14.1
Duration of illness (years) (mean ± SD)	13.6±9.3
Type of antipsychotic (n, %)	
Typical antipsychotics	35 (43.7)
Atypical antipsychotics	45 (56.3)
Adverse event (n, %)	
Drowsiness	27 (33.8)
Sexual adverse events	8 (11.1)
Memory loss	25 (31.3)
Dry mouth	18 (22.5)
Drooling	13 (16.3)
Insomnia	17 (21.3)
Stiff tongue	12 (15.0)
Stiff walk	7 (8.8)
Metabolic profile (mean ± SD)	
Waist circumference (cm)	86.4±10.5
Fasting blood sugar (mg/dL)	103.7±33.1
Triglycerides (mg/dL)	131.4±98.9
High-density lipoprotein (mg/dL)	54.5±12.8
Systolic blood pressure (mmHg)	122.3±15.3
Diastolic blood pressure (mmHg)	79.3±10.4
PANSS score (mean ± SD)	
PANSS total	45.6±12.6
PANSS Marder positive symptoms	12.7±4.6
PANSS Marder negative symptoms	11.0±4.2
PANSS Marder disorganized thought	9.8±3.3
PANSS Marder hostility/excitement	5.4±1.4
PANSS Marder anxiety/depression	6.8±2.8
CDSS-Thai score (mean ± SD)	3.9±4.3
Social support deficit (n, %)	
Living alone	11 (13.4)
Seeing a relative less often than once a week	8 (9.8)
Lack of reciprocity with neighbors	9 (11.0)
Lack of reciprocity between family members	11 (13.4)
Difficulty in relationship with relatives	7 (8.5)
Dissatisfaction with support from family	5 (6.1)

Abbreviations: CDSS-Thai, Thai version of the Calgary Depression Scale for Schizophrenia; PANSS, Positive and Negative Syndrome Scale; SD, standard deviation.

Discussion

Our findings indicate that psychosocial factors, especially negative symptoms, depression, and social support, are the main predictors for QOL in individuals with schizophrenia. Biological factors, although found to be significantly related to QOL, were not major predictors.

Baseline characteristics and QOL

No significant association between QOL and sex, age, education, or duration of illness was found. These findings are in

Table 2 The World Health Organization Quality of Life-BREF (WHOQOL-BREF) scores for quality of life

Domain	Score (mean ± SD)
Total	90.4±15.2
Physical health	24.3±4.4
Psychological	21.6±4.3
Social relationships	10.0±2.2
Environment	27.9±4.9

Abbreviation: SD, standard deviation.

line with the study of Holloway and Carson which reported that personal and sociodemographic characteristics were weakly associated or not associated with global subjective well-being.³¹

Biological factors and QOL

Metabolic profiles

Only high fasting blood sugar was found to be significantly associated with overall QOL and the physical health domain of QOL while other metabolic profiles were not significantly related to QOL. The results of this study support the notion that some abnormal metabolic profiles are related to a poor QOL. Foldemo et al reported that elevated blood pressure and raised low-density lipoprotein cholesterol were related to lower HRQOL.³² In addition, Vancampfort et al suggested that lower HRQOL seemed to be associated with a higher body mass index and lack of physical activity, rather than to metabolic syndrome per se.⁵ However, the findings from this study were in contrast with those from the CATIE study which showed no significant association between metabolic syndrome and QOL.³³

Antipsychotics and adverse events

Typical antipsychotics were reported in previous studies to have more adverse events than atypical ones.⁸ The results of this study show that adverse events, including drowsiness, memory loss, dry mouth, insomnia, stiff tongue, and stiff walk, were significantly related to several domains of QOL, but typical antipsychotics were significantly associated with poorer QOL only in the environmental domain. These findings are consistent with a recent study which found that side effects rather than type of pharmacotherapy were associated with QOL.^{13,34} The CATIE study, although focused on life satisfaction rather than QOL, reported similar significant relationships between adverse events (eg, dry mouth, insomnia, sleepiness) and life satisfaction.³⁵

In the study reported here, individuals with drowsiness and insomnia were more likely to have a poor QOL in the

Table 3 Correlations between demographic characteristics, biopsychosocial factors, and quality of life

Item	Quality of life					Statistic
	Total	Physical health	Psychological	Social relationships	Environment	
Sex	-0.253	0.403	-0.305	-0.230	-0.815	Independent <i>t</i>
Age (years)	-0.139	-0.182	-0.076	-0.029	-0.078	Pearson's <i>r</i>
Education (years)	0.075	0.024	0.056	0.092	0.077	Spearman's <i>r</i>
Duration of illness (years)	0.093	0.004	0.128	0.035	0.113	Pearson's <i>r</i>
Biological factor						
Type of antipsychotic	-1.073	0.041	-1.024	-0.372	-2.051*	Independent <i>t</i>
Adverse events						
Drowsiness	1.927	2.022*	2.189*	1.498	1.569	Independent <i>t</i>
Sexual adverse events	1.250	0.294	1.272	1.535	1.962	Independent <i>t</i>
Memory loss	2.958**	2.759**	2.916**	3.754***	1.976	Independent <i>t</i>
Dry mouth	1.727	2.021*	1.761	2.262*	0.860	Independent <i>t</i>
Drooling	1.377	1.338	1.286	1.302	1.062	Independent <i>t</i>
Insomnia	2.883**	2.181*	2.870**	1.532	2.861**	Independent <i>t</i>
Stiff tongue	1.671	1.807	2.123*	2.244*	0.777	Independent <i>t</i>
Stiff walk	1.443	0.789	1.560	1.569	2.878*	Independent <i>t</i>
Metabolic profile (mean ± SD)						
Waist circumference (cm)	-0.069	-0.113	-0.081	-0.137	0.032	Pearson's <i>r</i>
Fasting blood sugar (mg/dL)	-0.239*	-0.338**	-0.192	-0.216	-0.150	Spearman's <i>r</i>
Triglycerides (mg/dL)	-0.084	0.102	0.052	0.054	0.079	Spearman's <i>r</i>
High-density lipoprotein (mg/dL)	0.051	0.067	0.104	0.113	-0.032	Pearson's <i>r</i>
Systolic blood pressure (mmHg)	-0.067	-0.050	0.007	-0.108	-0.084	Pearson's <i>r</i>
Diastolic blood pressure (mmHg)	0.033	0.002	0.096	-0.086	0.061	Pearson's <i>r</i>
Psychosocial factor						
PANSS score						
PANSS total	-0.599***	-0.522***	-0.658***	-0.510***	-0.462***	Pearson's <i>r</i>
PANSS Marder positive symptoms	-0.444***	-0.412***	-0.491***	-0.318**	-0.348**	Spearman's <i>r</i>
PANSS Marder negative symptoms	-0.620***	-0.555***	-0.644***	-0.533***	-0.497***	Spearman's <i>r</i>
PANSS Marder disorganized thought	-0.400***	-0.333**	-0.429***	-0.446***	-0.281*	Spearman's <i>r</i>
PANSS Marder hostility/excitement	-0.195	-0.177	-0.262*	-0.213	-0.108	Spearman's <i>r</i>
PANSS Marder anxiety/depression	-0.489***	-0.385***	-0.576***	-0.362***	-0.390***	Spearman's <i>r</i>
CDSS-Thai score	-0.580***	-0.459***	-0.644***	-0.390***	-0.511***	Spearman's <i>r</i>
Social support deficit						
Living alone	0.656	-0.008	0.686	0.521	1.149	Independent <i>t</i>
Seeing a relative less often than once a week	2.603*	2.257*	1.970	3.224**	2.570*	Independent <i>t</i>
Lack of reciprocity with neighbors	2.292*	1.564	2.629**	1.223	2.505*	Independent <i>t</i>
Lack of reciprocity between family members	1.974	0.724	2.658**	0.376	2.494*	Independent <i>t</i>
Difficulty in relationship with relatives	0.572	0.342	1.091	-1.116	0.769	Independent <i>t</i>
Dissatisfaction with support from family	1.953	0.867	2.045*	2.080*	1.996*	Independent <i>t</i>

Notes: *Significant at *P*-value <0.05 (two-tailed); **significant at *P*-value <0.01 (two-tailed); ***significant at *P*-value <0.001 (two-tailed).

Abbreviations: CDSS-Thai, Thai version of the Calgary Depression Scale for Schizophrenia; PANSS, Positive and Negative Syndrome Scale; SD, standard deviation.

physical health and psychological domains. Memory loss was also found to have a deleterious impact on the physical health and psychological domains of QOL as well as the social relationships domain. This might be explained by the fact that memory loss reflects poor cognitive function

in individuals with more severe schizophrenia. Furthermore, this finding is consistent with a study from Asia which demonstrated that working memory and verbal memory showed a strong correlation with the physical domain of QOL.³⁶

Table 4 Forward-selection multiple linear regression models with the total and the four domain scores of quality of life as dependent variables

Step	Independent variable	B	SE	β	t	P-value	R ² change	Model adjusted R ²
Model 1: QOL total as dependent variable								47.2%
1	PANSS Marder negative symptoms	-1.490	0.363	-0.410	-4.101	<0.001	0.384	
2	CDSS-Thai	-1.143	0.353	-0.322	-3.234	0.002	0.076	
3	Seeing a relative less often than once a week	-9.031	4.172	-0.179	-2.164	0.034	0.031	
Model 2: QOL physical health as dependent variable								29.9%
1	PANSS Marder negative symptoms	-0.587	0.100	-0.555	-5.892	<0.001	0.308	
Model 3: QOL psychological as dependent variable								53.8%
1	PANSS Marder negative symptoms	-0.419	0.096	-0.404	-4.340	<0.001	0.415	
2	CDSS-Thai	-0.401	0.094	-0.397	-4.250	<0.001	0.114	
3	Drowsiness	-1.505	0.701	-0.165	-2.148	0.044	0.027	
Model 4: QOL social relationships as dependent variable								35.5%
1	PANSS Marder negative symptoms	-0.196	0.057	-0.366	-3.456	0.001	0.288	
2	Memory loss	-1.085	0.460	-0.227	-2.356	0.021	0.058	
3	PANSS Marder disorganized thought	-0.145	0.071	-0.212	-2.027	0.046	0.034	
Model 5: QOL environment as dependent variable								36.7%
1	CDSS-Thai	-0.400	0.125	-0.289	-3.210	0.002	0.261	
2	PANSS Marder negative symptoms	-0.283	0.129	-0.265	-2.195	0.031	0.063	
3	Atypical antipsychotics	1.935	0.885	-0.224	2.185	0.032	0.041	
4	Seeing a relative less often than once a week	-3.034	1.461	-0.189	-2.076	0.041	0.035	

Note: Forward selection, probability-of-F-to-enter ≤ 0.05 .

Abbreviations: CDSS-Thai, Thai version of the Calgary Depression Scale for Schizophrenia; PANSS, Positive and Negative Syndrome Scale; QOL, quality of life; SE, standard error.

Psychosocial factors and QOL

Psychopathology

The results from this study are in line with those of previous studies which reported that negative symptoms affected QOL more than positive symptoms.^{2,10,36} Although our bivariate analyses found a significant association between positive symptoms and QOL, the correlation was not significant, after adjustment for several variables in the regression models. This is in line with a meta-analysis which suggested that positive symptoms had a poor correlation with QOL.³⁷

Narvaez et al suggested that more severe negative symptoms predicted a lower objective QOL while more severe depressive symptoms were predictors of worse subjective QOL.³⁸ In this study, however, negative symptoms and depression were the main predictors affecting the subjective QOL.

Depression

In this study, depression showed a strong significant association with QOL in every domain and was a predictor for poor environmental and psychological QOL in individuals with schizophrenia. Our findings support the idea that depression is one of the most significant factors for predicting poor QOL in individuals with schizophrenia.¹⁴ Depression may be associated with a worse QOL due to poor living conditions.³⁸ Furthermore, individuals with

depression who have poor self-esteem and a negative view of themselves may rate their QOL worse than those without depression. Morgado et al reported that individuals with depression rated their functioning and living conditions at a lower level than an external observer and even themselves after recovery.³⁹

Our findings contradict those reported in a recent study which did not find a significant difference in QOL between those with and without depression.¹⁷ The discrepancy might be due to a difference in the severity of the depression in the sample, since most of the population in the previous study had mild depression and only participants with at least one caregiver were included; therefore, those participants might have had less severe depression and better social support compared to those in this study.¹⁷

Social support

In Thai culture, the focus of this paper, individuals with schizophrenia generally live with their family members, thus they receive financial as well as emotional support from their family. We found that lack of contact with relatives and lack of reciprocity with neighbors both had a significant association with poor overall QOL. Lack of contact with relatives was also found to be a predictor for poor environmental QOL. Our findings are in line with a previous study which reported that attachment and reassurance of worth were predictors for

improving QOL in schizophrenia.⁴⁰ The CATIE study also suggested that interpersonal relationships had great influence on the level of life satisfaction.³⁵ Moreover, the availability and adequacy of social support was found to be related to satisfaction with life in individuals with severe mental illness.⁴¹ Social support may improve QOL by stress-buffering, reducing depression, and enhancing the adaptation process.^{20,40} Our study suggests that lack of contact with relatives is one of the main predictors for overall QOL, even after adjusting for psychopathology and depression.

Limitations

Although this study leads to better understanding of the predictors for QOL in individuals with schizophrenia, some limitations should be taken into consideration when interpreting the findings from this study. First, the direction of causality among variables cannot be determined due to the cross-sectional study design. It is possible that there might be a vicious cycle whereby factors such as depression may cause a poor QOL which, in turn, may worsen depression.

Second, the WHOQOL-BREF mainly focuses on the subjective domain of QOL which may lead to lack of the objective measure and an over-reporting of QOL in individuals with schizophrenia. However, it is generally agreed that individuals whose symptoms are stable can assess their QOL by themselves.¹⁴ Moreover, a subjective domain of QOL has been considered a core component of assessing QOL, since an individual's perception of his/her condition represents a complete picture of the person's life.⁴²

Third, there may be some overlap in the evaluation of depression and negative symptoms of schizophrenia ($r=0.228$).⁴³ However, the CDSS-Thai has been validated to exclude depression from the negative symptoms which clarifies the results of the study.³⁰ In addition, the results from this study show that both depression and negative symptoms are independent predictors, even after being adjusted in the regression analyses.

Fourth, the small sample size might limit the positive findings.

Lastly, since this study was conducted at an outpatient clinic in Thailand, the findings from this study might have a lack of generalizability to other individuals with more severe symptoms in other settings.

Conclusion

Negative symptoms, depression, and poor contact with relatives were the main predictors for QOL in this sample.

Positive symptoms, disorganized thought, SSDs, increased fasting blood sugar, and some adverse events may also have correlation with QOL. This study suggests that depression and the adverse events of antipsychotics should be carefully monitored in individuals with schizophrenia, as they might affect QOL. Antipsychotic medications with the efficacy of reducing negative symptoms, depression, and fewer adverse events, especially in cognitive impairment, should be considered in the treatment of schizophrenia. Increased social support from family members and psychosocial treatment which involves the family, such as family therapy and interventions that increase reciprocity with family members and neighbors, are imperative in the enhancement of QOL. Further prospective studies should be conducted in other settings with different cultures and in larger populations to extend the knowledge and inform the possibility of the treatment of individuals suffering from schizophrenia.

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Disclosure

The authors declare no conflicts of interest in this work.

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Supplementary material

Table S1 Types of antipsychotic medications (N=80)

Type of antipsychotic medication	n (%)
Typical antipsychotic	
Perphenazine	16 (20.0)
Haloperidol	15 (18.8)
Chlorpromazine	3 (3.8)
Thioridazine	1 (1.2)
Atypical antipsychotic	
Risperidone	23 (28.8)
Clozapine	11 (13.8)
Aripiprazole	5 (6.2)
Quetiapine	4 (5.0)
Paliperidone	1 (1.2)
Olanzapine	1 (1.2)

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