

## Quality of Life across Mental Disorders in Psychiatric Outpatients

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### Abstract

**Introduction:** Literature has shown that individuals with various psychiatric disorders experience a lower quality of life (QoL). However, few have examined QoL across disorders. The current study explored differences in QoL and symptom severity across 4 psychiatric diagnostic groups: anxiety disorders (including obsessive compulsive disorder [OCD]), depressive disorders, schizophrenia, and pathological gambling. **Materials and Methods:** Data analysed was from a previous study that examined the prevalence of hoarding symptoms among outpatients (n = 500) in a tertiary psychiatric hospital in Singapore. Measures utilised included the Beck Anxiety Inventory (BAI), Beck Depression Inventory-II (BDI-II) and Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF). Sociodemographic information and details on type and number of comorbidities were also collected. **Results:** The depressive disorder group had the highest level of depressive and anxiety symptoms and the lowest QoL whereas; the schizophrenia group had the lowest level of depressive symptoms and the highest QoL. Age and employment status were the only sociodemographic correlates which were significantly associated with QoL. After controlling for sociodemographic factors, only the type of mental disorder was found to have a significant effect in explaining BAI, BDI-II and Q-LES-Q-SF. **Conclusion:** Findings offer insight in terms of the burden associated with the various disorders.

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**Key words:** Anxiety, Comorbid, Depression, Symptom severity

### Introduction

Quality of life (QoL) can be defined as an “individual’s perception of their position in life...in relation to their goals, expectations, standards and concerns”.<sup>1</sup> Assessing the QoL of an individual is invaluable as it looks beyond the “direct manifestations of an illness” to examine its effects on the individual’s daily life and life satisfaction.<sup>2-3</sup> Furthermore, it also acts as a useful measure in assessing the efficacy of mental health interventions.<sup>3-8</sup>

QoL has been shown to be considerably impaired among individuals with various mental illnesses<sup>9-11</sup> including schizophrenia spectrum disorders,<sup>2,6,12</sup> depressive

disorders,<sup>13-16</sup> anxiety disorders,<sup>17-18</sup> and pathological gambling.<sup>19-20</sup> with a large majority of these studies conducted in clinical populations. Mastoff et al<sup>11</sup> for instance, found Dutch outpatients diagnosed with an Axis I or Axis II disorder to score worse on all domains of the World Health Organization Quality of Life-Bref (WHOQOL-Bref) compared to the general population whereas, a recent meta-analysis found patients with anxiety disorders to have lower QoL than non-clinical controls.<sup>18</sup>

While the aforementioned studies have shown QoL to be compromised among individuals with specific mental illnesses (e.g., anxiety disorders only),<sup>18</sup> few have

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compared QoL across disorders. Of the few that did, Pirkola et al<sup>21</sup> found the least severe scores on several health-related measures to be associated with pure alcohol use disorder, followed by pure anxiety and depressive disorders, comorbid alcohol use disorder, and comorbid anxiety and depressive disorders. Comparing scores on the EuroQol 5 dimensions questionnaire (EQ-5D) across disorders in the Singapore population, Subramaniam et al<sup>22</sup> found major depressive disorder (MDD) to have the greatest impact on QoL, followed by obsessive compulsive disorder (OCD) and bipolar disorder (BP), after controlling for sociodemographic factors, physical and psychiatric comorbidity. Roberts et al<sup>23</sup> on the other hand, found mental health conditions such as depression, mixed anxiety and depressive disorders, and long-term depression to have the highest decrements in health state utility as measured by SF-6D and EQ-5D indices.

Several factors have been examined in relation to QoL including sociodemographic correlates, psychiatric symptoms, and comorbidity. With regard to sociodemographic factors, unemployment, low socioeconomic status, poor social support, and lower educational attainment have been consistently associated with a poorer QoL.<sup>4,24-25</sup>

Psychopathology—especially anxiety and depressive symptoms—has been associated with lower QoL. Huppert et al<sup>26</sup> found higher scores of anxiety and depression on the Brief Psychiatric Rating Scale (BPRS) to be associated with a lower QoL among schizophrenia patients. In particular, depressive symptoms had a significant negative impact on various indices of subjective QoL including global score, financial and social contacts domains. In contrast, anxiety symptoms had a significant negative impact on the daily activities, family, and health domains of QoL. Similarly, a meta-analysis examining the relationship between positive, negative, and general psychopathology symptoms (e.g., depression and anxiety) and QoL in schizophrenia, found general psychopathology symptoms to consistently emerge as the strongest determinant of poor QoL.<sup>27</sup> A majority of these studies, however, have been conducted among those with schizophrenia and thus, provide limited insight into how these symptoms impact QoL in other disorders.

Psychiatric comorbidity has also been linked to lower QoL.<sup>10,21,26</sup> The European Study of the Epidemiology of Mental Disorders (ESEMeD) study found disability and loss of QoL among non-institutionalised individuals to increase with number of mental disorders.<sup>24</sup> This finding was replicated by Mastoff et al<sup>11</sup> who found a gradual decrease in QoL scores among Dutch psychiatric outpatients as the number of disorders increased, with the highest QoL reported by the general population and the lowest by psychiatric outpatients with comorbidities. Watsons et al,<sup>10</sup> on the other hand, found the addition of 1 comorbid condition

to significantly decrease QoL in social anxiety disorder, panic disorder, and BP, and 2 or more comorbidities to decrease QoL in unipolar mood disorder, eating disorder, and generalised anxiety disorder. The presence of a comorbid depressive and anxiety condition had a significant negative impact on QoL across all diagnostic groups.

Overall, the majority of the extant literature has examined QoL in relation to a particular disorder rather than comparing it across disorders. While this provides some understanding of the burden associated with individual disorders and their impact on individuals' QoL, it precludes comparisons across disorders. The current study sought to address this limitation by comparing QoL across disorders and to explore its association with sociodemographic correlates, anxiety and depressive symptoms, and comorbidity in a multiethnic psychiatric outpatient population in Singapore.

## Materials and Methods

### *Sample*

Data for the current study was obtained from a larger survey examining the prevalence of hoarding symptoms among outpatients (n = 500) recruited between May 2014 and April 2015 from the Institute of Mental Health (IMH), a tertiary psychiatric hospital in Singapore, and its satellite clinics. Participants were eligible for the study if they were at least 21 years old, had a primary DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> Edition) diagnosis of any anxiety disorders (including OCD), depressive disorders, schizophrenia, or pathological gambling, were conversant in English, and capable of providing informed consent. Patients who were cognitively incapable were not included. Primary diagnosis was established clinically by psychiatrists based on DSM-IV criteria and was obtained from patient records. Ethics approval was obtained from the institutional ethics committee (National Healthcare Group, the Domain Specific Review Board). All participants provided informed consent prior to study participation.

### *Measures*

#### Anxiety Symptoms

The Beck Anxiety Inventory (BAI)<sup>28</sup> is a 21-item self-report measure that examines distress associated with anxiety symptoms. Items are rated on a scale of 0 (not bothered at all) to 3 (severely bothered). The BAI has shown high internal consistency, test-retest reliability as well as good concurrent and discriminant validity.<sup>28</sup>

#### Depressive Symptoms

The Beck Depression Inventory-II (BDI-II)<sup>29</sup> is a 21-item self-report measure assessing depressive symptoms. Items are rated from 0 to 3, with higher scores indicating

greater severity. The scale has demonstrated high internal reliability and convergent validity.<sup>30</sup>

### Quality of Life

The Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF)<sup>31</sup> is a 16-item scale that assesses enjoyment and satisfaction across various life domains such as physical health, social relationships, and economic status over the past week.<sup>32</sup> Each item is rated on a scale of 1 (not at all or never) to 5 (frequently or all the time), with higher scores indicating a higher subjective QoL. A total score is obtained by summing the first 14 items. The last 2 items (i.e., medication and overall life satisfaction) are not included in the total score.<sup>31</sup>

### Statistical Analysis

All statistical analyses were performed using SPSS version 21.0. BAI and BDI-II scores were obtained by adding up the 21 items in each scale. Q-LES-Q-SF raw total score was transformed into a percentage maximum possible score.<sup>32</sup>

One-way ANOVA was used to examine the differences of BAI, BDI-II and Q-LES-Q-SF across diagnostic groups (anxiety disorders, depressive disorders, schizophrenia, pathological gambling). Bonferroni correction was applied in the posthoc comparisons to reduce the risk of Type I error.

To examine the unique variance of each independent variable (IV), associations between sociodemographic variables, diagnostic groups, type and number of mental-health comorbidities with BAI, BDI-II, Q-LES-Q-SF were examined using multiple linear regressions. Sociodemographic variables including age, gender,

ethnicity, education level, marital status, employment status were used to predict BAI, BDI-II and Q-LES-Q-SF, using “enter” method (first block of regression analysis). Subsequently, diagnostic groups were entered as an independent variable in the second block of regression analysis. Type of mental-health comorbidity and number of mental-health comorbidities were entered 1 at a time into the third block of regression analysis. “Enter” method refers to the selection method where all predictors listed/mentioned in the text are included in the regression analyses<sup>33</sup> whereas, block regression analyses is a term used in SPSS to refer to hierarchical regression.<sup>34</sup> In hierarchical regression, IVs are entered in a prespecified manner by the researcher, which is driven by theoretical considerations and is referred to as hierarchical because different number of set of predictors are entered for comparison.<sup>34</sup>

## Results

### Sample Distribution

Majority of the participants were of Chinese ethnicity, employed, had received at least secondary level education, were never married, and were staying with their immediate family (Table 1). Anxiety disorders, depressive disorders and schizophrenia each constituted approximately 30% of the entire sample, whereas pathological gamblers composed 10% of the sample. The anxiety disorder group had the highest percentage of comorbidity; 15.3% had a secondary anxiety disorder, and 12.9% had a comorbid depressive disorder. The pathological gambling group had the highest percentage of comorbid depressive disorder (18.9%) (Table 2).

Table 1. Sociodemographic Distribution of Sample across Diagnostic Groups

	All Sample (n = 500)		Anxiety Disorders (n = 144, 28.8%)		Depressive Disorders (n = 153, 30.6%)		Schizophrenia (n = 150, 30%)		Pathological Gambling (n = 53, 10.6%)	
	n	%	n	%	n	%	n	%	n	%
<b>Age</b>										
Mean	35.3		33.1		34.8		37.5		36.7	
SD	10.1		9.66		10.4		9.6		10.4	
<b>Age group</b>										
21 – 30	183	36.6	64	44.4	62	40.5	40	26.7	17	32.1
31– 40	177	35.4	51	35.4	45	29.4	63	42.0	18	34.0
41– 50	95	19.0	21	14.6	35	22.9	27	18.0	12	22.6
Older than 50	45	9.0	8	5.6	11	7.2	20	13.3	6	11.3
<b>Gender</b>										
Male	282	56.4	88	61.1	62	40.5	81	54.0	51	96.2
Female	218	43.6	56	38.9	91	59.5	69	46.0	2	3.8

\*Housing and Development Board (HDB) flats are a type of public housing managed by the HDB, a statutory board of the Singapore government. The majority of Singapore residents stay in HDB flats, which range in size from 1 to 5 rooms.

†Nursing homes are a type of housing where stay-in-care is provided to psychiatric patients with milder clinical symptoms.

Table 1. Sociodemographic Distribution of Sample across Diagnostic Groups (Cont'd)

	All Sample (n = 500)		Anxiety Disorders (n = 144, 28.8%)		Depressive Disorders (n = 153, 30.6%)		Schizophrenia (n = 150, 30%)		Pathological Gambling (n = 53, 10.6%)	
	n	%	n	%	n	%	n	%	n	%
Ethnicity group										
Chinese	351	70.2	106	73.6	102	66.7	98	65.3	45	84.9
Malay	50	10.0	15	10.4	17	11.1	18	12.0	0	0
Indian	67	13.4	15	10.4	17	11.1	29	19.3	6	11.3
Others	32	6.4	8	5.6	17	11.1	5	3.3	2	3.8
Education level										
No formal/primary	23	4.6	3	2.1	9	5.9	11	7.3	0	0
Secondary/O-level	147	29.4	23	16.0	39	25.5	65	43.3	20	37.7
A-level	40	8.0	11	7.6	11	7.2	17	11.3	1	1.9
Polytechnic/diploma	196	39.2	79	54.9	56	36.6	39	26.0	22	41.5
University	94	18.8	28	19.4	38	24.8	18	12.0	10	18.9
Marital status										
Never married	309	61.9	93	64.6	78	51.0	116	77.3	22	42.3
Currently married	132	26.5	42	29.2	41	26.8	24	16.0	25	48.1
Divorced/separated	51	10.2	9	6.3	29	19.0	8	5.3	5	9.6
Widowed	7	1.4	0	0	5	3.3	2	1.3	0	0
Employment status										
Employed	281	56.8	80	56.3	77	50.7	79	53.4	45	84.9
Economically inactive	83	16.8	34	23.9	32	21.1	13	8.8	4	7.5
Unemployed	131	26.5	28	19.7	43	28.3	56	37.8	4	7.5
Living arrangement										
Staying alone	43	8.7	5	3.5	17	11.1	15	10.1	6	11.3
Roommate(s)	37	7.4	8	5.6	7	4.6	21	14.2	1	1.9
Spouse/non-married partner	43	8.7	13	9.1	15	9.8	5	3.4	10	18.9
Extended family	26	5.2	8	5.6	8	5.2	8	5.4	2	3.8
Immediate family	344	69.2	107	74.8	105	68.6	99	66.9	33	62.3
Resident type										
Bungalow/terrace	15	3.0	3	2.1	7	4.6	3	2.0	2	3.8
Private condo/flat	35	7.1	12	8.5	15	9.9	4	2.7	4	7.7
HDB*	433	87.7	127	89.4	129	85.4	131	87.9	46	88.5
Nursing home†	11	2.2	0	0	0	0	11	7.4	0	0

\*Housing and Development Board (HDB) flats are a type of public housing managed by the HDB, a statutory board of the Singapore government. The majority of Singapore residents stay in HDB flats, which range in size from 1 to 5 rooms.

†Nursing homes are a type of housing where stay-in-care is provided to psychiatric patients with milder clinical symptoms.

### One-way ANOVA

BAI ( $F [3,379] = 10.94, P < 0.001$ ), BDI-II ( $F [3,441] = 20.1, P < 0.001$ ) mean scores and Q-LESQ-SF percentage maximum score ( $F [3, 430] = 9.45, P < 0.001$ ) significantly differed across diagnostic groups.

Table 3 shows posthoc comparisons with Bonferroni correction across diagnostic groups. Depressive disorder group had the highest BAI rating; this was significantly higher than the schizophrenia ( $P < 0.001$ ) and pathological gambling groups ( $P < 0.001$ ), but was not significantly

different from the anxiety disorder group ( $P = 1.00$ ). In addition, the depressive disorder group had the highest BDI-II ratings, and the lowest Q-LESQ-SF score compared to the other 3 groups.

Pathological gambling group reported considerably higher level of depressive symptoms than the schizophrenia group (but comparable to the anxiety disorder group). This may partly be due to the high percentage of comorbid depressive disorders in the pathological gambling group. Despite the higher level of depressive symptoms endorsed, the pathological gambling group did not endorse low QoL.

Table 2. Types and Number of Comorbid Mental Disorders across Diagnostic Groups

	Type of Comorbidity								Number of Comorbidities			
	Anxiety Disorder		Depressive Disorder		Personality Disorder		Adjustment Disorder		1 Comorbidity		2 or More Comorbidities	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Anxiety disorders	22	15.3	39	16.1	2	1.4	1	0.7	52	36.1	8	5.6
Depressive disorders	13	12.9	0	0	10	6.5	1	0.7	26	32.1	1	3.7
Schizophrenia	5	12.6	7	4.7	1	0.7	0	0	10	6.7	2	1.3
Pathological gambling	2	4.5	10	18.9	0	0	5	9.4	17	11.1	1	1.3

Table 3. Posthoc Comparisons with Bonferroni Correction on Beck Anxiety Inventory, Beck Depression Inventory-II, Q-LES-Q-SF across Diagnostic Groups

		BAI			BDI-II			Q-LES-Q-SF		
		$\Delta$ Mean	SE	P Value	$\Delta$ Mean	SE	P Value	$\Delta$ Mean	SE	P Value
Anxiety disorders	Depressive disorders	-1.18	1.54	1	-8.19*	1.60	<0.001	7.98*	2.21	0.002
	Schizophrenia	5.74*	1.54	<0.001	3.74	1.62	0.13	-2.84	2.21	1
	Pathological gambling	7.25*	2.09	0.004	-2.47	2.17	1.00	-1.96	2.90	1
Depressive disorders	Schizophrenia	6.92*	1.52	<0.001	11.93*	1.58	<0.001	-10.81*	2.18	<0.001
	Pathological gambling	8.43*	2.08	<0.001	5.72*	2.14	0.046	-9.94*	2.88	0.004
Schizophrenia	Pathological gambling	1.51	2.08	1	-6.21*	2.15	0.02	0.87	2.88	1

BAI: Beck Anxiety Inventory; BDI-II: Beck Depression Inventory-II; SE: Standard error; Q-LES-Q-SF: Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form

\*P value <0.001.

Overall, the depressive disorder group showed the worst symptomology (highest ratings in BAI, BDI-II) and lowest QoL, whereas the schizophrenia group showed the least symptomology and highest QoL.

### Multiple Linear Regressions

Unique variances of sociodemographic variables, diagnostic groups, comorbidity types, and number of comorbid conditions are presented in Table 4. All 3 regression analyses—with sociodemographic variables predicting BAI, BDI-II, Q-LES-Q-SF—showed significant R-square value. However, only age and employment status were significantly associated with subjective QoL. Those who were aged 41-50 years ( $\beta = 6.72$ ,  $P = 0.012$ ) reported higher subjective QoL compared to those aged 21-30 years; whereas those who were unemployed ( $\beta = -13.70$ ,  $P < 0.01$ ) reported lower QoL compared to those who were employed.

Adjusting for sociodemographic variables, diagnostic groups were entered in the second block. All 3 regression analyses showed significant R-square value improvement, indicating that diagnostic groups had a significant role in explaining BAI, BDI-II, and Q-LES-Q-SF.

The effect of diagnostic groups on BAI, BDI-II, Q-LES-Q-SF were similar to those found in one-way ANOVA—the schizophrenia group had significantly lower BAI, BDI-II scores, and higher Q-LES-Q-SF scores, whereas the depressive disorder group had significantly higher BDI-II

scores and lower Q-LES-Q-SF scores, as compared to the anxiety disorder group.

In the third block, types of comorbidity were first entered. R-square improvements were not significant at  $P > 0.05$  in all 3 regression analyses. Subsequently, types of comorbidity were removed and the number of comorbid conditions was entered. Except for BAI, the number of comorbidities did not add significant R-square improvement to the other 2 regression analyses.

### Discussion

Age and employment status emerged as the only sociodemographic correlates which were significantly associated with QoL in the current sample. Those who were younger and unemployed reported a lower subjective QoL. This was in line with Adewuya and Makanjuola<sup>7</sup> and Priebe et al<sup>25</sup> who found unemployment to be associated with lower QoL among schizophrenia patients. One reason for this is that employment not only provides financial remuneration but also represents a “normalising experience” for individuals to integrate into society which in turn, contributes to their self-worth and QoL.

In contrast to Subramaniam et al<sup>22</sup> who found increasing age to be associated with lower QoL in the general population, the current study among psychiatric outpatients found otherwise. Relative to the general population whereby younger age is associated with better well-being



Table 4. Multiple Linear Regressions on BAI, BDI-II and Q-LES-Q-SF

	BAI		BDI-II		Q-LES-Q-SF	
	$\beta$ (SE)	<i>P</i> Value	$\beta$ (SE)	<i>P</i> Value	$\beta$ (SE)	<i>P</i> Value
<b>1<sup>st</sup> block</b>						
Age group						
21 – 30	ref		ref		ref	
31 – 40	-4.03 (1.61)	0.01	-4.08 (1.69)	0.02	1.66 (2.22)	0.46
41 – 50	-6.74 (1.90)	<0.001	-6.69 (2.03)	<0.001	6.72 (2.67)	0.012
Older than 50	-7.95 (2.45)	<0.001	-7.47 (2.81)	0.008	6.91 (3.74)	0.07
Gender						
Male	ref		ref		ref	
Female	1.38 (1.20)	0.25	-0.62 (1.29)	0.63	3.07 (1.70)	0.07
Ethnicity group						
Chinese	ref		ref		ref	
Malay	-3.38 (2.08)	0.10	-4.42 (2.20)	0.045	2.84 (2.86)	0.32
Indian	0.13 (1.80)	0.94	0.55 (1.98)	0.78	-1.58 (2.63)	0.55
Others	1.87 (2.50)	0.46	1.10 (2.61)	0.67	1.38 (3.49)	0.69
Education level						
No formal/primary	ref		ref		ref	
Secondary/O-level	-5.78 (3.19)	0.07	-4.80 (3.13)	0.13	2.18 (4.38)	0.62
A-level	-6.58 (3.73)	0.09	-9.52 (3.72)	0.01	3.50 (5.07)	0.49
Polytechnic/diploma	-6.13 (3.23)	0.06	-7.58 (3.18)	0.02	5.86 (4.41)	0.18
University	-9.18 (3.35)	0.006	-8.34 (3.33)	0.01	3.71 (4.63)	0.42
Marital status						
Never married	ref		ref		ref	
Currently married	1.75 (1.55)	0.26	2.60 (1.66)	0.12	-1.78 (2.21)	0.42
Divorced/separated	5.04 (2.14)	0.02	7.36 (2.33)	0.002	-5.19 (3.01)	0.09
Widowed	7.19 (5.48)	0.19	0.17 (6.2)	0.98	-1.96 (10.12)	0.85
Employment status						
Employed	ref		ref		ref	
Economically inactive	-1.13 (1.78)	0.53	2.62 (1.93)	0.18	-1.33 (2.56)	0.61
Unemployed	6.08 (1.44)	<0.001	6.62 (1.54)	<0.001	-13.70 (2.10)	<0.001
R-square	0.102		0.111		0.136	
<i>P</i> value (for R-square)	<0.001		<0.001		<0.001	
<b>2<sup>nd</sup> block</b>						
Diagnostic groups						
Anxiety disorders	ref		ref		ref	
Depressive disorders	-0.15 (1.57)	0.93	7.47 (1.59)	<0.001	-7.86 (2.14)	<0.001
Schizophrenia	-7.70 (1.63)	<0.001	-5.60 (1.69)	<0.001	6.49 (2.25)	0.004
Pathological gambling	-7.15 (2.15)	<0.001	2.39 (2.21)	0.28	2.08 (2.91)	0.48
R-square	0.164		0.226		0.216	
$\Delta$ R-square	0.062		0.115		0.079	
<i>P</i> value (for $\Delta$ R)	<0.001		<0.001		<0.001	
<b>3<sup>rd</sup> block</b>						
Comorbidity types						
Comorbid anxiety disorders	-1.32 (2.10)	0.53	-2.83 (2.19)	0.20	4.72 (2.94)	0.11
Comorbid depressive disorders	1.53 (1.97)	0.44	3.58 (2.02)	0.08	-2.55 (2.68)	0.34

BAI: Beck Anxiety Inventory; BDI-II: Beck Depression Inventory-II; SE: Standard error; Q-LES-Q-SF: Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form

Table 4. Multiple Linear Regressions on BAI, BDI-II and Q-LES-Q-SF (Cont'd)

	BAI		BDI-II		Q-LES-Q-SF	
	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value
<b>3<sup>rd</sup> block</b>						
Comorbidity types						
Comorbid personality disorder	4.83 (3.65)	0.19	6.46 (3.62)	0.08	-1.71 (5.17)	0.74
Comorbid adjustment disorder	-4.36 (4.97)	0.38	-3.06 (4.93)	0.54	5.98 (6.54)	0.36
R-square	0.171		0.241		0.224	
$\Delta$ R-square	0.007		0.015		0.008	
P value (for $\Delta$ R)	0.46		0.077		0.362	
Number of comorbidities						
No comorbidity	ref					
1 other comorbidity	-0.99 (1.47)	0.50	0.62 (1.51)	0.68	-0.196 (2.02)	0.92
2 and more comorbidities	9.64 (3.75)	0.01	4.75 (3.91)	0.23	0.96 (6.03)	0.87
R-square	0.178		0.229		0.216	
$\Delta$ R-square	0.014		0.003		0.000	
P value (for $\Delta$ R)	0.023		0.463		0.981	

BAI: Beck Anxiety Inventory; BDI-II: Beck Depression Inventory-II; SE: Standard error; Q-LES-Q-SF: Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form

and functioning, the early onset of illness might confer substantial burden on younger adults as they may not have sufficient resources or adaptive mechanisms to cope with their illness compared to older individuals, resulting in a lower subjective QoL.<sup>7,35</sup>

Individuals in the depressive disorder group reported the highest anxiety symptoms followed by the anxiety disorder, schizophrenia, and the pathological gambling groups. Depressive symptoms were the highest in the depressive disorder group, followed by pathological gambling, anxiety disorder, and the schizophrenia group. With respect to QoL, the schizophrenia group reported the highest QoL, followed by the pathological gambling, anxiety disorders, and depressive disorders group. The latter finding paralleled those of Goppoldova et al,<sup>36</sup> who in examining subjective QoL across individuals with psychosis, mood, and anxiety disorders noted QoL to be the best among those with psychosis and worst among those with mood disorders. Likewise, Mack et al<sup>37</sup> found those with mood (and somatoform) disorders to have the highest disability levels and strongest loss of QoL compared to externalising disorders (e.g. alcohol use disorder) in a German population.

The tendency for schizophrenia patients to report a higher QoL has been linked to illness-specific mechanisms such as poor insight, minimisation, and denial of own situations, which may result in a distorted appraisal of their illness.<sup>36,38</sup> In line with this, Goppoldova et al<sup>36</sup> found a discrepancy in illness severity ratings, whereby patients with psychosis rated their illness as significantly less severe compared to their psychiatrists' ratings. However, Adewuya and

Makanjuola<sup>7</sup> found schizophrenia patients in a Nigerian population to rate their QoL as lower than that reported in previous studies; this anomalous result was attributed to the lack of mental health services in their population. Conversely, the low subjective QoL among those with depressive disorders has been associated with symptoms such as pessimism, decreased motivation and energy levels, which may have caused individuals to perceive their QoL to be worse than it is.<sup>36</sup>

Interestingly, results of the current study indicating lowest QoL among those with mood disorders—particularly depressive disorders and anxiety disorders—has been replicated in samples across other countries. For instance, Roberts et al<sup>23</sup> found depression, mixed anxiety and depressive disorders and long-term depression to be associated with the highest decrements in QoL among the general population in England whereas, Alonso et al<sup>24</sup> found dysthymia, MDD, post-traumatic stress disorder (PTSD), panic disorder, and social phobia to have the strongest impact on QoL after adjusting for gender, age, and mental and/or physical comorbidity. Thus, it is possible that despite cross-cultural differences, there might be some consistency in the QoL decrements in particular disorders.

Though the link between QoL and symptom severity was not directly examined in the current study, the depressive group with the highest anxiety and depressive symptoms also reported the lowest QoL, whereas the schizophrenia group with relatively lower anxiety and depressive symptoms reported the highest QoL. These results were consistent with past studies,<sup>26-27</sup> which found more symptoms of

depression and anxiety to be associated with lower subjective QoL. Tomida et al,<sup>12</sup> for instance, found higher depression and anxiety symptoms on the Positive and Negative Syndrome Scale (PANSS) to have a negative impact on the psychosocial and motivation/energy domains of QoL among Japanese schizophrenia patients. Similarly, Adewuya and Makanjuola<sup>7</sup> found anxiety/depressive symptoms (on the BPRS) to be the most important correlate of poor subjective QoL in Nigerian patients with schizophrenia. Interpretation of results should, however, be made with caution as relative to our study which used distinct measures (BAI, BDI-II) to assess depressive and anxiety symptoms across disorders; the aforementioned studies were conducted predominantly among patients with schizophrenia and used scales specific to the population.

Despite the high prevalence of depressive symptoms among pathological gamblers, these individuals reported higher QoL compared to the anxiety and depressive group. It is possible that pathological gamblers in our study were relatively well functioning given that the majority were employed; thus, accounting for their better QoL. Also, it is likely that other factors besides psychopathology may have a more pivotal role in influencing QoL in this group.<sup>35</sup> The current result, however, was consistent with previous findings, which found the EQ-5D index of pathological gamblers to be significantly lower than that of non-gamblers and non-problem gamblers in Singapore but higher than those with MDD, BP, generalised anxiety disorder (GAD), OCD and alcohol dependence.<sup>20,22</sup>

After controlling for sociodemographic factors, only diagnostic group had a significant effect in explaining BAI, BDI-II, and Q-LES-Q-SF. Type of and number of comorbid conditions did not add significantly in accounting for BDI-II and Q-LES-Q-SF. This was in contrast with past studies, which have shown increasing comorbidity to be associated with substantial reductions in the mental health component of QoL.<sup>37</sup> One reason for this might be the low number of outpatients in our study who had a comorbid condition, which could have reduced the likelihood of detecting a significant effect. It is also worth noting that our results indicate no unique contribution of comorbid conditions to the regression models, after accounting for primary diagnoses. In other words, the putative effect of secondary diagnoses on psychopathology and QoL may be better explained by patients' primary symptoms. Few studies have associated certain disorders—especially depressive disorders—with substantial burden in and of itself, such that comorbid conditions have a negligible effect on QoL.<sup>10</sup> Similarly, Trompenaars et al<sup>16</sup> found comorbidity with mood-related disorders to have an impact on QoL only if the comorbid condition was a personality disorder; comorbidity with Axis I disorders did not have an additional impact on QoL.

### Limitations

Results from this study, however, should be considered in view of certain limitations. Individuals in the current study were not diagnosed using a structured diagnostic interview. However, given that primary diagnosis was established clinically by psychiatrists based on DSM-IV criteria and was obtained from patient records, the diagnosis obtained is believed to be accurate. QoL in the current study was assessed as an overall composite score. While the overall score is useful in comparing QoL across disorders, it might not be an accurate representation of the impact disorders have on various domains of QoL. For instance, Beard et al<sup>17</sup> found different anxiety disorders to be associated with different domains of health-related quality of life (HR-QoL). PTSD and comorbid OCD were found to predict worse self-reported physical functioning, whereas social phobia, GAD, and comorbid MDD were found to predict worse self-reported mental functioning. Moreover, given that the Q-LESQ-SF assessed QoL over the past 1 week, this might not have been accurate in capturing the impact of a disorder on the QoL of individuals.

While the study examined the effects of anxiety and depressive symptoms, number and type of comorbidity as well as sociodemographic factors in relation to QoL across disorders, it is plausible that other factors not examined in the current study (e.g., social support, chronic physical conditions) might have had a more significant role in influencing QoL. Chong et al,<sup>39</sup> for instance, found HRQoL to be worse in those with both a mental and medical disorder compared to those with either a mental or medical disorder in the Singapore adult population. Lastly, causal interpretations regarding disorders and their effect on QoL cannot be made given the cross-sectional nature of the study.

### Conclusion

The study provides insight into the impact mental illnesses have on QoL. Although the specific domains with regard to QoL were not examined, it provides a comparison of overall QoL across the disorders, such that those with schizophrenia reporting the highest QoL and those with depressive disorders the lowest. In particular, the consistent finding of lower QoL among those with depressive and anxiety disorders across various countries is interesting. However, the lack of significance with regard to the impact of comorbidity on overall QoL was surprising given results from past studies suggesting otherwise. Hence, while current study results offer useful information in terms of the burden and impairment associated with the various disorders, examining the impact across different QoL domains would further allow healthcare professionals to make informed decisions in terms of targeting specific domains to improve QoL among care recipients.



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## REFERENCES

- WHOQOL Group. The World Health Organization Quality of Life Assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med* 1995; 10:1403-9.
- Xiang YT, Weng YZ, Leung CM, Tang WK, Ungvari GS. Quality of life of Chinese schizophrenia outpatients in Hong Kong: relationship to sociodemographic factors and symptomatology. *Aust N Z J Psychiatry* 2007;41:442-9.
- Schmitz N, Kruse J, Kugler J. The association between physical exercises and health-related quality of life in subjects with mental disorders: results from a cross-sectional survey. *Prev Med* 2004;39:1200-7.
- Cichocki Ł, Cechnicki A, Franczyk-Glita J, Bładziński P, Kalisz A, Wroński K. Quality of life in a 20-year follow-up study of people suffering from schizophrenia. *Compr Psychiatry* 2015;56:133-40.
- Adelufosi AO, Ogunwale A, Abayomi O, Mosanya JT. Socio-demographic and clinical correlates of subjective quality of life among Nigerian outpatients with schizophrenia. *Psychiatry Res* 2013;209:320-5.
- Dan A, Kumar S, Avasthi A, Grover S. A comparative study on quality of life of patients of schizophrenia with and without depression. *Psychiatry Res* 2011;189:185-9.
- Adewuya AO, Makanjuola ROA. Subjective quality of life of Nigerian schizophrenia patients: sociodemographic and clinical correlates. *Acta Psychiatr Scand* 2009;120:160-4.
- Vatne S, Bjørkly S. Empirical evidence for using subjective quality of life as an outcome variable in clinical studies: a meta-analysis of correlates and predictors in persons with a major mental disorder living in the community. *Clin Psychol Rev* 2008;28:869-89.
- Barnes AL, Murphy ME, Fowler CA, Rempfer MV. Health-related quality of life and overall life satisfaction in people with serious mental illness. *Schizophr Res Treatment* 2012;2012:245103.
- Watson HJ, Swan A, Nathan PR. Psychiatric diagnosis and quality of life: the additional burden of psychiatric comorbidity. *Compr Psychiatry* 2011;52: 265-72.
- Masthoff ED, Trompenaars FJ, Van Heck GL, Hodiament PP, De Vries J. Quality of life and psychopathology: investigations into their relationship. *Aust N Z J Psychiatry* 2006;40:333-40.
- Tomida K, Takahashi N, Saito S, Maeno N, Iwamoto K, Yoshida K, et al. Relationship of psychopathological symptoms and cognitive function to subjective quality of life in patients with chronic schizophrenia. *Psychiatry Clin Neurosci* 2010;64:62-9.
- Fried EI, Nesse RM. The impact of individual depressive symptoms on impairment of psychosocial functioning. *PLoS One* 2014;9:e90311.
- Årdal G, Lund A, Hammar Å. Health-related quality of life in recurrent major depressive disorder-A 10-year follow-up study. *Nord J Psychiatry* 2013;67:339-43.
- Hope ML, Page AC, Hooke GR. The value of adding the Quality of Life Enjoyment and Satisfaction Questionnaire to outcome assessments of psychiatric inpatients with mood and affective disorders. *Qual Life Res* 2009;18:647-55.
- Trompenaars FJ, Masthoff ED, Van Heck GL, Hodiament PP, De Vries J. Relationship between mood related disorders and quality of life in a population of Dutch adult psychiatric outpatients. *Depress Anxiety* 2006;23: 353-63.
- Beard C, Weisberg RB, Keller MB. Health-related quality of life across the anxiety disorders: findings from a sample of primary care patients. *J Anxiety Disord* 2010;24: 559-64.
- Olatunji BO, Cisler JM, Tolin DF. Quality of life in the anxiety disorders: a meta-analytic review. *Clin Psychol Rev* 2007;27:572-81.
- Subramaniam M, Abidin E, Shijia Q, Winslow M. Quality of life in pathological gamblers in a multiethnic Asian setting. *Ann Acad Med Singapore* 2011;40:264-8.
- Subramaniam M, Abidin E, Vaingankar JA, Wong KE, Chong SA. Comorbid physical and mental illnesses among pathological gamblers: results from a population based study in Singapore. *Psychiatry Res* 2015;227:198-205.
- Pirkola S, Saarni S, Suvisaari J, Elovainio M, Partonen T, Aalto AM, et al. General health and quality-of-life measures in active, recent, and comorbid mental disorders: a population-based health 2000 study. *Compr Psychiatry* 2009;50:108-14.
- Subramaniam M, Abidin E, Vaingankar JA, Nan L, Heng D, McCrone P, et al. Impact of psychiatric disorders and chronic physical conditions on health-related quality of life: Singapore Mental Health Study. *J Affect Disord* 2013;147:325-30.
- Roberts J, Lenton P, Keetharuth AD, Brazier J. Quality of life impact of mental health conditions in England: results from the adult psychiatric morbidity surveys. *Health Qual Life Outcomes* 2014;12:6.
- Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H, et al. Disability and quality of life impact of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand* 2004;109:38-46.
- Priebe S, Reininghaus U, McCabe R, Burns T, Eklund M, Hansson L, et al. Factors influencing subjective quality of life in patients with schizophrenia and other mental disorders: a pooled analysis. *Schizophr Res* 2010;121:251-8.
- Huppert JD, Weiss KA, Lim R, Pratt S, Smith TE. Quality of life in schizophrenia: contributions of anxiety and depression. *Schizophr Res* 2001;51:171-80.
- Eack SM, Newhill CE. Psychiatric symptoms and quality of life in schizophrenia: a meta-analysis. *Schizophr Bull* 2007;33:1225-37.
- Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: Psychometric properties. *J Consult Clin Psychol* 1988;56:893-97.
- Beck AT, Steer RA, Brown GK. Manual for the Beck Depression Inventory-II. 2nd ed. San Antonio, TX: Psychological Corporation; 1996.
- Dozois DJA, Dobson KS, Ahnberg JL. A psychometric evaluation of the Beck Depression Inventory-II. *Psychol Assess* 1998;10:83-9.
- Lee YT, Liu SI, Huang HC, Sun FJ, Huang CR, Yeung A. Validity and reliability of the Chinese version of the short form of Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q-SF). *Qual Life Res* 2014;23:907-16.
- Endicott J, Nee J, Harrison W, Blumenthal R. Quality of life enjoyment and satisfaction questionnaire. *Psychopharmacol Bull* 1993;29:321-6.
- Landau S, Brian SE. A Handbook of Statistical Analyses Using SPSS. CRC Press LLC; 2004.
- Gaur AS, Gaur SS. (2006). Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS. Sage; 2006.

35. Ruggeri M, Gater R, Bisoffi G, Barbui C, Tansella M. Determinants of subjective quality of life in patients attending community-based mental health services. The South-Verona Outcome Project 5. *Acta Psychiatr Scand* 2002;105:131-40.
  36. Goppoldova E, Dragomirecka E, Motlova L, Hajek T. Subjective quality of life in psychiatric patients: diagnosis and illness-specific profiles. *Can J Psychiatry* 2008;53:587-93.
  37. Mack S, Jacobi F, Beesdo-Baum K, Gerschler A, Strehle J, Höfler M, et al. Functional disability and quality of life decrements in mental disorders: results from the Mental Health Module of the German Health Interview and Examination Survey for Adults (DEGS1-MH). *Eur Psychiatry* 2015;30:793-800.
  38. Hasson-Ohayon I, Kravetz S, Roe D, David AS, Weiser M. Insight into psychosis and quality of life. *Compr Psychiatry* 2006;47:265-9.
  39. Chong SA, Abdin E, Nan L, Vaingankar JA, Subramaniam M. Prevalence and impact of mental and physical comorbidity in the adult Singapore population. *Ann Acad Med Singapore* 2012;41:105-14.
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