

Predictors of General Functioning and Correlates of Quality of Life: A Cross-Sectional Study among Psychiatric Outpatients

Louisa Picco,^{1MPH}, Ying Wen Lau,^{1BSc}, Shirlene Pang,^{1MSc}, Anitha Jeyagurunathan,^{1MPhil}, Janhavi A Vaingankar,^{1MScI}, Edimansyah Abidin,^{1PhD}, Siow Ann Chong,^{1MBBS, MMed, MD}, Mythily Subramaniam,^{1MBBS, MHSM}

Abstract

Introduction: Functioning and quality of life (QOL) are negatively impacted as a result of mental illness. This study aimed to determine the: i) socio-demographic and clinical correlates of functioning and; ii) associations between functioning and QOL in a multiethnic sample of psychiatric outpatients. **Materials and Methods:** This was a cross-sectional study of outpatients receiving treatment from a tertiary psychiatric hospital. Functioning was assessed using the Global Assessment of Functioning (GAF) scale, while QOL was measured using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) which comprises 4 domains: physical health, psychological health, social relationships and environment. **Results:** Various socio-demographic and clinical correlates were associated with functioning including employment and marital status, education and diagnosis. Depression was the only clinical characteristic which negatively correlated with functioning ($P=0.035$). Amongst the whole sample, multiple linear regressions revealed that functioning was positively associated with all 4 QOL domains (physical health [$P<0.001$], psychological health [$P<0.001$], social relationships [$P<0.001$] and environment [$P<0.001$]). Further analysis of each diagnostic group revealed that functioning was positively associated with all 4 QOL domains in the anxiety, depression and obsessive compulsive disorder subsamples, while in the schizophrenia subsample, functioning was only significantly associated with the environment domain. **Conclusion:** Functional impairments were associated with different socio-demographic and clinical characteristics, which should be addressed when planning tailored treatment and interventions. Given that functioning is significantly associated with QOL, it is crucial to regularly assess and monitor them (in addition to symptomatic outcomes and adopting a more holistic and biopsychosocial approach).

Ann Acad Med Singapore 2018;47:3-12

Key words: Anxiety, Depression, Obsessive compulsive disorder, Schizophrenia

Introduction

Having a mental illness or poor mental health can impede an individual's capacity to realise his/her potential, work productivity and ability to make meaningful contributions to society. The social and economic impact of poor mental health is both diverse and debilitating and can lead to homelessness, poor educational and health outcomes and high unemployment rates.¹ In order to improve outcomes for people with mental illness, it is important to understand what affects functioning and how functional impairments in areas such as social, occupational or role and psychological aspects may be associated with other outcomes such as quality of life (QOL). Until recently, there has been a focus

on targeting symptom severity in people with psychiatric disorders in an effort to minimise it. However, it is important to consider improvements in psychosocial outcomes such as functioning and QOL at the same time.² Moving away from a medical model to a more biopsychosocial model—which aims to understand the social and psychological underpinnings of health and illness³ and the interaction between biological, psychological and social factors—is now becoming common practice in psychiatry. As such, routine and systematic measurement of functional outcomes are needed.

When assessing patient outcomes, the terms 'functioning' and 'QOL' are sometimes used interchangeably. Whilst there

¹Research Division, Institute of Mental Health, Singapore

Address for Correspondence: A/Prof Mythily Subramaniam, Research Division, Institute of Mental Health, Buangkok Green Medical Park, 10 Buangkok View, Singapore 539747.

Email: mythily@imh.com.sg

is conceptual overlap, there are also distinct differences and it is important to distinguish these 2 constructs. Functioning is a complex concept, and whilst there is little consensus on how it should be best defined, it describes “the ability to perform the tasks of daily life and to engage in relationships with others in ways that are gratifying to the individual and others and that meet the needs of the community”.⁴ QOL on the other hand is broadly defined as an “individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”.⁵ Evans and Lam⁶ eloquently make the distinction between functioning and QOL by stating that functioning is related to a person’s actual behaviour which is assessed by how this behaviour is executed, performed or maintained, whilst QOL is a subjective measure based on self-perception in relation to satisfaction, contentment or enjoyment in facets of life.

Measures of functioning are key indicators that can be used to determine impairment across various domains as well as to evaluate the success of treatment. In addition, patients have reported that treatment outcomes such as functioning, QOL and well-being are more important than symptomatic relief,⁷ which further exemplifies the importance of routine assessment of such outcomes in people with psychiatric disorders. There is an array of global measures to assess functioning, including the Global Assessment of Functioning (GAF) scale, Social and Occupational Functioning Assessment Scale (SOFAS) and the Specific Levels of Functioning (SLOF) scale, as well as scales that measure specific aspects of functioning such as work/role or social functioning including the Sheehan Disability Scale (SDS), Work Limitation Questionnaire and the Social Functioning scale. The GAF is one of the most widely used measures of functioning among patients with psychiatric and/or substance use disorders⁸ and has been translated in several languages and used in both clinical assessment and research. It is a single-item scale which measures overall functioning in relation to impairments in psychological, social and occupational/school functioning as assessed by a clinician or trained rater.⁹ The GAF scale is quick and easy to use and allows for comparisons in scores to be made across multiple disorders. It is a useful measure for not only planning psychiatric treatment but also assessing treatment outcomes.¹⁰

Whilst substantial evidence supports the need to assess functioning outcomes in psychiatry, the majority of research pertains to specific disorders such as schizophrenia^{11,12} or depression^{13,14} and therefore less is known about disorders such as obsessive compulsive disorder (OCD) or anxiety disorders. Furthermore, there is also a lack of studies that explore and compare correlates of functioning across disorders;^{11,15} additionally, there is scarcity of data relating

to functioning in Asian populations and consequently less is known about whether socio-demographic factors such as ethnicity are correlated with functioning. Finally, whilst several studies have explored the relationship between functioning and QOL, results are inconsistent and inconclusive, with some studies showing a moderate to strong relationship,^{2,16,17} whilst others find there to be no or minimal correlation^{15,18,19} between self-reported and clinician or rater-assessed measures.

Therefore, the purpose of this study is to fill a gap in the existing literature by exploring functioning across mental disorders in a multiethnic Asian population. More specifically, among a sample of outpatients with schizophrenia, OCD, depression and anxiety spectrum disorders, this study aimed to determine the socio-demographic and clinical correlates of functioning, as assessed by the GAF scale. In addition, associations between functioning and QOL were investigated, amongst the whole sample and across the 4 diagnostic groups. We hypothesised that there would be differences in functioning across the different diagnostic groups, given that each psychiatric disorder has specific and different traits that would affect how people function on a daily basis, where there is some earlier evidence showing a significant inverse correlation between functioning and QOL specific to social relationship, among those with major depressive disorder.¹⁵ Furthermore, we hypothesised that the psychological health and social relationships QOL domains would be significantly associated with functioning, given that the GAF specifically asks questions relating to an individual’s psychological health and social relationships.

Materials and Methods

Participants and Recruitment

Prior to the commencement of the study, ethical approval was obtained from the Institutional Ethics Committee, the Domain Specific Review Board of the National Healthcare Group, Singapore. The current study adopted a cross-sectional design, using convenience sampling. Participants were seeking treatment and recruited from outpatient clinics at the Institute of Mental Health (IMH), the only tertiary psychiatric hospital in Singapore. Inclusion criteria comprised: i) Singapore citizens and permanent residents, ii) aged 21–65 years, iii) Chinese, Malay or Indian ethnicity, iv) capable of providing consent and; v) literate in English. In addition, participants were also required to have a clinical diagnosis of either schizophrenia, OCD, depression or anxiety spectrum disorders of at least 1 year duration, as determined by a psychiatrist, using International Classification of Disease version 9 (ICD-9) criteria. Patients with intellectual disabilities, patients who were not fluent in English and patients who had been seeking treatment at IMH

for less than 1 year were excluded. The study employed a convenience sampling strategy to recruit participants using multiple methods and referral sources. Firstly, patients could self-refer, whereby they were alerted to the study via posters in the clinics. Secondly, psychiatrists and other healthcare professionals were also informed of the study and assisted in referring eligible patients for the study. A quota-based method was adopted to ensure similar recruitment numbers across the 4 diagnostic groups.

This was a face-to-face, interviewer-administered interview, which took approximately 1 hour to complete. The interview commonly took place before or after a routine consultation at IMH, however, if this timing was not suitable, an alternative arrangement and location was made to best suit the participant. It was ensured that study team members who administered the interview were not involved in any form of care or treatment of the participants, in order to minimise any form of coercion. Upon completion of the interview, participants received an inconvenience fee of \$30 to compensate them for their time. Data was captured in real-time via online Computer Assisted Personal Interviewing via iPad, by trained researchers who were members of the study team. This method allowed interviewers to provide assistance or clarification to the participants where needed, whilst reducing the likelihood of pattern answers. Additional information on the study recruitment process and participants are published elsewhere.²⁰

Measures

Socio-demographic information including age, gender, ethnicity, education attainment, marital and employment status were provided by the participant. Clinical information pertaining to their diagnosis, age at diagnosis, duration of illness, comorbid psychiatric illnesses and hospitalisations were extracted from their medical records.

Global Assessment of Functioning (GAF)

The GAF scale⁹ is a scoring system for the severity of illness in psychiatry which assesses overall functioning, taking into account impairments in psychological, social and occupational/school functioning. The scale ranges from 0 (inadequate information) to 100 (superior functioning). The 100-point scale is divided into 10-point intervals, each of which has anchors describing symptoms and functioning pertaining to that interval. For example the interval from 51-60 corresponds to moderate symptoms which is described as flat affect and circumstantial speech, occasional panic attacks or moderate difficulty in social, occupational, or school functioning, which may include having only a few friends or conflicts with peers or co-workers. At the top end, a score from 91-100 indicates optimal mental health and coping capabilities, while a score in the 1-10 range may

indicate a danger to oneself or others and being incapable of maintaining minimal personal hygiene. The GAF was administered at the same time and incorporated as part of the survey interview.

Prior to the commencement of the study, all study team members involved in recruitment and administration of the survey underwent specific training relating to administration of the GAF, which was led by a senior psychiatrist and study team member (SAC). Raters were instructed to start at either the top or the bottom of the scale and to go up/down the list until the most accurate description of functioning for the individual is reached. Following the training, raters were required to independently rate dummy cases and online examples to ensure consistent scoring across rates. At the commencement of the survey data collection, all initial cases were rated by 2 raters, to ensure consistency in scoring. Where scores differed by greater than a 10-point interval, the trainer was consulted upon to assist in reaching a consensus for scoring individual cases. Once raters were consistently scoring within the same 10-point, all future cases were scored by just 1 rater.

World Health Organization Quality of Life-BREF

The 26-item World Health Organization Quality of Life-BREF (WHOQOL-BREF) measures self-reported overall QOL and general health. It also comprises 4 distinct QOL domains: physical health, psychological health, social relationships and environmental aspects.²¹ The physical health domain consists of items relating to activities of daily living, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest and work capacity. Psychological health items relate to bodily image and appearance, positive and negative feelings, self-esteem, spirituality/religion/personal beliefs and thinking, learning, memory and concentration, while the social relationships items ask about personal relationships, social support and sexual activity. Finally, the items about environmental aspects comprise statements relating to financial resources, freedom, physical safety and security, health and social care, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation or leisure activities, physical environment and transport. Participants were instructed to indicate “how much”, “how completely”, “how often”, “how good” or “how satisfied” they felt during the 2-week period prior to the interview, using a 5-point Likert Scale from 1 to 5. Scores for the 4 domains were calculated by taking the mean of all items within each domain and multiplying by 4 and then linearly transforming it to a 0-100 scale. Items 3, 4 and 26 were reversed scored. For missing items, the mean of other items in the domain were substituted, however, if more than 2 items were missing from the domain, the

domain score was not calculated. Domain scores were scaled in a positive direction, with higher scores denoting higher QOL.²¹ The Cronbach's alpha in our sample for each of the 4 domains was: physical health, 0.81; psychological health, 0.84; social relationships, 0.63; environment, 0.78.

Sample Size

Power analysis to determine the relationship between the GAF scores and the WHOQOL-BREF domain scores was conducted using Pearson correlation formula implemented in the SAS software. The Type I error and power of this study was set at 5% and 80%, respectively. Earlier research has shown that a significant inverse correlation was observed between the GAF scores and the WHOQOL-BREF-social relationship domain scores in subject with major depressive disorder ($r = -0.41$).¹⁵ This estimation produced a total sample size of 44. Allowing for approximately 35% non-response rate, a required sample size of 59 is desirable for examining the relationship within this group. However, after taking into consideration subgroup analysis which requires an equivalent number of respondents under each subgroup (i.e. 4 diagnostic groups), a minimum sample size of 236 ($59 \times 4 = 236$) was required to achieve enough precision to detect differences in the current study.

Statistical Analysis

Analysis was performed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive analyses were conducted for study sample characteristics. The socio-demographic and clinical correlates of functioning were determined by performing multiple linear regression analysis (using the SPSS General Linear Model [Univariate] function) with functioning as the dependent variable and the socio-demographic and clinical variables as the independent variables. To examine the association between functioning and QOL, multiple linear regression analysis (controlled for socio-demographic and clinical characteristics) was performed where the GAF score was treated as the independent variable, with the 4 QOL domains as the dependent variable in 4 separate models. We repeated this regression analysis for each of the diagnostic groups to investigate whether the relationship between functioning and QOL differs across diagnostic groups. Multi-collinearity between the variables was checked before running the regression analyses. All statistically significant results were reported at $P < 0.05$.

Results

A total of 280 outpatients with schizophrenia ($n = 74$), OCD ($n = 61$), depression ($n = 74$) and anxiety spectrum disorders ($n = 71$) were recruited. The mean age of the sample was 38.9 years, and the majority were male (54.6%), Chinese (53.6%), never married (63.1%) and employed (55.7%). The

mean GAF score amongst the overall sample was 53.4, and ranged from 18 to 95, while for those with schizophrenia, OCD, depression and anxiety, the mean scores were 54.3, 53.3, 50.0 and 55.9, respectively. The mean scores for the physical health, psychological health, social relationships and environment domains of the WHOQOL-BREF were 54.0, 49.8, 54.2 and 61.1 respectively, among the entire sample (Table 1).

Table 2 shows the socio-demographic and clinical correlates of functioning. Results revealed that those who were unemployed ($P < 0.001$) and had secondary or 'O'/'N' level (10-11 years of schooling) education ($P = 0.027$) had poorer functioning as compared to those who were employed and had diploma level education, respectively. Those who were married ($P = 0.038$), however, had a significant positive correlation with functioning. A depression diagnosis ($P = 0.035$) was the only clinical characteristic which negatively correlated with functioning.

Multiple linear regressions (controlled for socio-demographic and clinical characteristics) were conducted to examine the association between functioning and QOL (Table 3). In the whole sample, functioning was positively associated with all 4 QOL domains (physical health [$P < 0.001$], psychological health [$P < 0.001$], social relationships [$P < 0.001$] and environment [$P < 0.001$]). The repeated analysis for each diagnostic group revealed that functioning was positively associated with all 4 QOL domains in the anxiety, depression and OCD subsamples. In the schizophrenia subsample, however, functioning was only significantly associated with the environment domain.

Discussion

This is one of the few studies to explore the correlates of functioning across multiple psychiatric disorders, and to our knowledge, the only study which has done so in Asia. Significant functional impairment was observed among the patients in our sample. The mean GAF score in the current sample was 53.4. This score was higher than that of a local sample of first-episode psychosis patients (mean GAF score = 39.8),²² and it is comparable to scores amongst other studies of psychiatric outpatients conducted in Western settings,^{16,22-24} where mean scores commonly range from 51-60. A score within this range corresponds to moderate symptoms which is described as flat affect and circumstantial speech, occasional panic attacks or moderate difficulty in social, occupational, or school functioning, which may include having only a few friends or conflicts with peers or co-workers.⁹

Existing literature shows that the correlation between socio-demographic factors and functioning is inconclusive. Several studies have reported that such variables are not correlates of functioning,²⁵⁻²⁷ whilst others observe

Table 1. Socio-Demographic and Clinical Characteristics

Variable	n (%)	Mean (SD)				
		Global Assessment of Functioning	Physical Health	Psychological Health	Social Relationships	Environment
Overall	280	53.4 (16.0)	54.0 (13.2)	49.8 (16.0)	54.2 (22.3)	61.1 (16.7)
Gender						
Male	153 (54.6)	52.1 (16.4)	53.8 (13.9)	49.8 (15.9)	52.2 (22.4)	61.3 (16.8)
Female	127 (45.4)	54.9 (15.5)	54.3 (12.3)	49.8 (16.2)	56.5 (21.9)	60.9 (16.6)
Marital status						
Never married	176 (63.1)	52.8 (15.9)	53.7 (13.3)	49.1 (15.7)	53.4 (21.2)	61.6 (16.5)
Married	58 (20.8)	58.9 (15.7)	54.9 (12.7)	52.2 (16.1)	54.1 (25.7)	61.7 (17.1)
Separated, divorced, widowed	45 (16.1)	48.6 (15.2)	53.5 (13.0)	49.7 (17.2)	57.4 (22.0)	59.0 (17.4)
Ethnicity						
Chinese	150 (53.6)	55.0 (15.4)	52.1 (13.1)	48.2 (15.2)	52.4 (20.1)	61.0 (17.1)
Malay	65 (23.2)	51.3 (14.2)	56.2 (12.1)	50.8 (16.9)	59.1 (22.0)	60.8 (17.2)
Indian	65 (23.2)	51.8 (18.8)	56.3 (13.8)	52.5 (16.7)	53.2 (25.8)	61.7 (15.4)
Highest education						
Primary or below	19 (6.8)	45.9 (12.8)	55.8 (15.5)	47.4 (19.5)	53.9 (26.1)	51.2 (20.3)
Secondary or 'O'/'N' level	93 (33.3)	49.2 (14.7)	54.1 (14.2)	49.9 (16.6)	53.0 (23.0)	58.3 (17.5)
'A' level/diploma	124 (44.4)	55.1 (15.3)	54.2 (11.7)	49.9 (15.1)	55.0 (21.7)	62.6 (14.7)
University	43 (15.4)	60.8 (18.6)	53.2 (13.7)	50.8 (16.0)	54.9 (20.8)	68.2 (14.9)
Employment status						
Employed	156 (55.7)	57.5 (15.4)	55.1 (12.4)	50.7 (15.5)	53.7 (21.9)	63.7 (15.6)
Student/homemaker/retired	34 (12.1)	56.2 (16.3)	54.2 (11.5)	49.1 (14.0)	62.1 (19.4)	62.6 (15.2)
Unemployed	90 (32.2)	45.2 (11.6)	52.1 (14.9)	48.4 (17.4)	52.0 (23.4)	56.1 (18.1)
Diagnosis						
Schizophrenia	74 (26.4)	54.3 (16.0)	60.4 (11.5)	54.2 (16.1)	59.8 (18.8)	63.1 (15.1)
Anxiety	71 (25.4)	55.9 (15.9)	53.4 (13.3)	49.1 (15.0)	54.5 (22.6)	63.5 (16.9)
Depression	74 (26.4)	50.0 (17.6)	50.4 (11.8)	47.1 (16.4)	48.8 (24.6)	56.5 (17.9)
Obsessive compulsive disorder	61 (21.8)	53.3 (13.5)	51.4 (14.0)	48.6 (15.7)	53.6 (21.6)	61.6 (16.1)
Previous hospitalisation						
Yes	123 (45.7)	52.1 (16.3)	55.3 (14.0)	49.3 (16.5)	52.4 (22.5)	60.2 (16.5)
No	146 (54.3)	55.0 (15.8)	53.2 (12.2)	50.2 (15.4)	55.9 (21.6)	62.0 (16.7)
Comorbid mental disorder						
Yes	110 (39.3)	52.2 (15.3)	53.6 (13.4)	49.4 (16.1)	52.5 (23.2)	61.4 (16.8)
No	170 (60.7)	54.2 (16.5)	54.2 (13.0)	49.9 (15.8)	55.2 (21.6)	60.9 (16.6)
		Mean (SD)				
Age		38.9 (11.6)				
Age at diagnosis		29.5 (10.4)				
Duration of illness		8.93 (8.80)				

SD: Standard deviation

Table 2. Socio-Demographic and Clinical Correlates of Functioning

	95% Confidence Interval (CI)			P Value
	B	Lower CI	Upper CI	
Gender				
Female	2.348	-1.392	6.088	0.217
Male	Ref.			
Ethnicity				
Malay	-1.658	-6.612	3.296	0.510
Indian	0.130	-4.722	4.982	0.958
Chinese	Ref.			
Education				
Primary or below	-4.588	-12.739	3.563	0.269
Secondary or 'O'/'N' level	-5.052	-9.525	-0.579	0.027
University	5.157	-0.197	10.512	0.059
'A' level/ diploma	Ref.			
Employment status				
Student/homemaker/retired	-1.737	-7.745	4.271	0.570
Unemployed	-10.230	-14.464	-5.996	<0.001
Employed	Ref.			
Marital status				
Married	5.925	0.342	11.508	0.038
Separated/divorced/widowed	0.710	-5.321	6.740	0.817
Never married	Ref.			
Diagnosis				
Anxiety	-1.661	-8.716	5.393	0.643
Depression	-6.752	-13.033	-0.471	0.035
Obsessive compulsive disorder	-2.686	-9.385	4.013	0.430
Schizophrenia	Ref.			
Hospitalisation				
Yes	-1.469	-5.885	2.946	0.513
No	Ref.			
Age at diagnosis	0.071	-0.159	0.301	0.544
Duration of illness	0.238	-0.029	0.506	0.081
Comorbid mental disorder	-0.231	-3.777	4.238	0.910
Intercept	55.475	45.753	65.197	<0.001

an association between 1 or more socio-demographic characteristics and functioning. In the current study, significant differences in GAF scores were observed by education, marital and employment status. More specifically, when compared to those who were employed, unemployment was significantly correlated with poorer functioning, which corroborates with findings from a recent study which explored the interaction between depressive symptoms, functioning and QOL among outpatients with major depressive disorder seeking care in the United States² and outpatients with depressive disorders in the Netherlands.²⁴ Similarly, earlier studies found that higher

GAF scores were associated with not only employment, but also more hours worked and greater income earned.^{28,29}

With regard to education, those with secondary education had poorer functioning, compared to diploma holders. Mean GAF scores by education level (Table 1) increased with education and whilst university education ($P = 0.059$) was not significantly correlated with functioning, it showed a trend towards significance. These findings suggest that increased education may be linked or associated with better outcomes for people, where they have the necessary skills to overcome impairments in psychological, social and/or occupational functioning. It is also likely that education

Table 3. Associations between Functioning and Quality of Life

		Global Assessment of Functioning							
		95% CI							
	Dependent Variable	Mean (SD)	B*	Lower CI	Upper CI	P Value	Adjusted R ²	B†	P Value
Whole sample	Physical health	54.0 (13.2)	0.4356	0.260	0.452	<0.001	0.251	0.344	<0.001
	Psychological health	49.8 (16.0)	0.507	0.390	0.623	<0.001	0.262	0.461	<0.001
	Social relationship	54.2 (22.3)	0.702	0.546	0.859	<0.001	0.306	0.630	<0.001
	Environment	61.1 (16.7)	0.494	0.375	0.608	<0.001	0.309	0.518	<0.001
Anxiety	Physical health	53.4 (13.3)	0.465	0.265	0.665	<0.001	0.320	0.430	<0.001
	Psychological health	49.1 (15.0)	0.499	0.299	0.699	<0.001	0.457	0.508	<0.001
	Social relationship	54.5 (22.6)	0.615	0.267	0.962	0.001	0.279	0.677	<0.001
	Environment	63.5 (16.9)	0.464	0.205	0.724	0.001	0.254	0.494	<0.001
Depression	Physical health	50.4 (11.8)	0.314	0.152	0.477	<0.001	0.414	0.406	<0.001
	Psychological health	47.1 (16.4)	0.629	0.373	0.884	<0.001	0.320	0.572	<0.001
	Social relationship	48.8 (24.6)	1.036	0.678	1.394	<0.001	0.405	0.789	<0.001
	Environment	56.5 (17.9)	0.673	0.419	0.928	<0.001	0.418	0.603	<0.001
OCD	Physical health	51.4 (14.0)	0.749	0.466	1.033	<0.001	0.319	0.574	<0.001
	Psychological health	48.6 (15.7)	0.629	0.352	0.907	<0.001	0.467	0.689	<0.001
	Social relationship	53.6 (21.6)	0.860	0.453	1.266	<0.001	0.392	0.853	<0.001
	Environment	61.6 (16.1)	0.535	0.186	0.883	0.003	0.243	0.628	<0.001
Schizophrenia	Physical health	60.4 (11.5)	0.004	-0.274	0.281	0.979	-0.127	0.014	0.866
	Psychological health	54.2 (16.1)	0.252	-0.112	0.616	0.171	-0.013	0.139	0.239
	Social relationship	59.8 (18.8)	0.337	-0.054	0.728	0.090	0.020	0.214	0.122
	Environment	63.1 (15.1)	0.318	0.018	0.619	0.038	0.143	0.319	0.003

CI: Confidence interval; OCD: Obsessive compulsive disorder; SD: Standard deviation

*Beta coefficient was derived from multiple linear regression after adjusting for socio-demographic and clinical characteristics.

†Beta coefficient was derived from simple linear regression without any adjustments.

is related to employment, whereby better qualifications improve the chances of finding a job and may further explain these findings.

Those who were married had significantly higher functioning compared to those who were single—a finding which is not surprising given that research has repeatedly shown that those who are married have better physical and mental health compared to unmarried counterparts. More specifically, in relation to functioning, spouses can provide psychological and social support, which is assessed as part of the GAF, and is a likely explanation for this finding. It is also possible that those with better functioning were more likely to be married. However, due to the cross-sectional nature of the study, we were unable to determine this causal relationship. Interestingly, of the socio-demographic correlates that were significantly

associated with functioning (i.e. education, employment and marital status), these were largely characteristics that are actionable, unlike demographic characteristics such as age, gender or ethnicity which cannot be changed. Therefore, interventions such as occupational therapy and treatment which address modifiable characteristics including education and employment may further result in improved functioning.

In addition to investigating the socio-demographic correlates of functioning, clinical correlates were also explored. Functioning was significantly lower amongst those with depression (when compared to schizophrenia), a finding which is consistent with existing literature.^{25,28} These findings could be interpreted in several ways: firstly, this may be a result of the specific symptoms of each disorder. For depression, symptoms are commonly

grouped as affective (comprising symptoms such as sad or low mood, dysphoria, anhedonia, guilt); cognitive (e.g. lack of motivation, concentration difficulty, cognitive slowing) and somatic which includes symptoms such as changes in sleep or appetite.^{6,30} Symptoms of schizophrenia, however, commonly include hallucinations and delusions as well as withdrawal, lack of spontaneity and poor attention, judgement and insight.³¹ As a consequence of such symptoms, it is possible that those with schizophrenia do not always have the capacity or insight to understand the nature, significance and severity of their illness, where it is possible that these people had an unawareness of cognitive³² and functional deficits³³ and thus failed to report them. Furthermore, research has found that those with poorer neuropsychological performance tend to underestimate impairments³⁴ and this is another possible explanation for the current finding. Finally, it could also be in relation to the severity of these symptoms or comorbid conditions. Unfortunately, such information was not captured. Therefore this warrants further exploration into the impact of symptom severity and comorbidities on functioning across mental disorders, using structured measures such as the Positive and Negative Syndrome Scale (PANSS).

Besides depressive symptoms, maladaptive rumination has been shown to mediate the relationship between perceived identity, emotional representation of illness and negative emotions in Singaporeans suffering from depression.³⁵ Such ruminations cause distraction to patients and affect their functioning and productivity. Lam et al³⁶ highlight that additional factors aside from symptoms and side effects are also important in determining functional improvements. Given that clinical practice guidelines stipulate that the primary goal of depression treatment is to restore functioning,³⁷ it is important that this becomes routine practice, especially given that impairment was greatest amongst this diagnostic group. Furthermore, findings from a local study have highlighted the importance of psychological interventions which focus on improving symptom management ability and problem-focused coping skills in improving QOL and functioning in people with depression.³⁸

The association between functioning and QOL was also investigated, whereby a significant positive association between functioning and specific QOL domains was observed. Our findings are in line with existing research^{2,16,17} which also found a significant positive association between functioning and QOL, among those with depression. Contrary to this, others have not observed the same finding.^{15,18,19} Possible reasons for these inconsistencies may be explained by methodological differences including the use of different functioning and QOL measures which may be either self-rated or clinician-rated, different samples

with varying diagnoses and different study designs. In the present study, a strong association between functioning and QOL was observed which substantiates the importance of routinely measuring these outcomes in psychiatric assessment, treatment and programme evaluation.

To our knowledge, there has only been 1 other study that has explored functioning and QOL across multiple disorders. Caldirola et al¹⁵ in their study of Italian inpatients with major depressive disorder, bipolar disorder, OCD and anxiety disorders, also used the GAF and WHOQOL-BREF to explore the relationship between functioning and QOL. Surprisingly, no significant correlations were found between functioning and any of the 4 WHOQOL-BREF domains, amongst the whole sample or by diagnosis, with the exception of a significant inverse correlation between functioning and the social relationship domain, among those with major depressive disorder. Whilst the disorders of interest in the current study are quite similar to that studied by Caldirola et al,¹⁵ their sample was relatively small ($n = 117$) and comprised of inpatients enrolled in a psychiatric rehabilitation programme, and these contributing factors may explain the discrepancies observed in the findings between the studies.

When the sample was split into the 4 diagnostic groups, the same strong positive association between functioning and each of the QOL domains was observed, except in the schizophrenia group, where functioning was only significantly associated with the environment domain. We hypothesised that functioning would be associated with the social and psychological domains, given that the GAF specifically measures psychological and social impairments. It is difficult to postulate why amongst those with schizophrenia, functioning was only significantly associated with the environment domain of the WHOQOL-BREF. This domain comprises broad concepts such as physical environment, having enough money to meet one's needs, the opportunity for leisure activities and satisfaction with one's living place, access to health services and transport—many of which could affect psychological, social and or occupational/school functioning. This unique finding amongst those with schizophrenia therefore requires further exploration in order to better understand how these constructs are associated.

It is also important to highlight that for conditions such as schizophrenia, functioning does not appear to impact QOL that significantly after controlling for socio-demographic and clinical characteristics. It is possible that other factors such as symptom severity¹⁸ may have a greater influence on QOL than functioning. Studies have also revealed that self-reports of functioning amongst those with schizophrenia are often not replicated in objective evidence or the assessment of others,³⁹ which is often the result of lack of insight. It is

also plausible that impairments or deficits in functioning or QOL may differ according to individual characteristics such as their temperament, the quality of their social relationships or their personal value system¹⁵ and as such may explain the current finding.

The following limitations should be considered when interpreting these results. Information pertaining to functioning and QOL was self-reported and therefore may be subjected to social desirability bias. Whilst the GAF raters were trained and undertook various strategies to ensure consistency across scoring, subjective bias is possible, given they relied on the participant's self-report. Whilst inconsistencies in scoring were discussed with a senior psychiatrist and team members, formal documentation of the inter-rater reliability was not captured. In addition, it is also important to highlight that whilst at the time of recruitment, the GAF was the recommended measure of functioning within the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV), with updates in the later version, this has now been replaced. Other limitations relating to the study design such as the cross-sectional nature (which do not allow for changes in functioning to be measured over time) should also be acknowledged, while convenience sampling as well as restrictions concerning the inclusion criteria will affect the generalisability of the study findings and do not allow for a response rate to be calculated. It is also possible that those who participated had better QOL and functioning compared to those who didn't participate or those patients who have defaulted or currently not undergoing treatment. Finally, while this study was among people with mental illness, information on comorbid chronic physical conditions was not captured and is likely to impact functioning and QOL outcomes, as functional status explained all or most of the depression-chronic disease link in a sample of older Singaporeans.⁴⁰

Conclusion

Despite this, the current study is to our knowledge, the first to explore functioning across multiple psychiatric disorders in a multiethnic Asian population. It also examined the relationship between functioning and QOL. As various correlates of functioning were identified including education, marital status and employment, this highlights the importance of considering various socio-demographic factors when designing interventions to improve functioning. Given that such factors are largely modifiable, this further reinforces the importance of building the skills and capacity to support people with mental illness to pursue educational and employment opportunities, which will ultimately reduce functional impairments. Differences in functioning were also observed across different diagnostic groups, where depression was associated with poorer functioning.

Clinicians need to be mindful of the differences in functional impairments across disorders and given the cognitive, emotional and physical symptoms associated with depression, they should be cognisant of this when planning tailored treatment and interventions to monitor and improve functioning and recovery outcomes. Given that functioning is significantly associated with QOL life, it is crucial to regularly assess and monitor functioning and QOL in psychiatric outpatients, with the ultimate goal being to improve outcomes and recovery, which will then have an impact to the wider community and society. Functional impairment should be assessed in addition to symptomatic and QOL outcomes and adopting a more holistic and biopsychosocial approach.

Acknowledgement

This research was supported by the Singapore Ministry of Health's National Medical Research Council under the Centre Grant Programme (Grant No.: NMRC/CG/004/2013).

REFERENCES

1. World Health Organisation. Mental Health and Development: Targeting People with Mental Health Conditions as a Vulnerable Group. Available at: http://www.who.int/mental_health/policy/development/mh_devel_targeting_summary_2010_en.pdf?ua=1. Accessed on 7 December 2016.
2. Ishak WW, Balayan K, Bresee C, Greenberg JM, Fakhry H, Christensen S, et al. A descriptive analysis of quality of life using patient-reported measures in major depressive disorder in a naturalistic outpatient setting. *Qual Life Res* 2013;22:585-96.
3. Alonso Y. The biopsychosocial model in medical research: the evolution of the health concept over the last two decades. *Patient Educ Couns* 2004;53:239-44.
4. Michalak EE, Murray G. A clinician's guide to psychosocial functioning and quality of life in bipolar disorder. In: Young AH, Ferrier nI, Michalak EE, editors. *Practical Management of Bipolar Disorder*. Cambridge, UK: Cambridge University Press; 2010.
5. World Health Organization Quality of Life assessment (WHOQOL). Position paper from the World Health Organization. *Soc Sci Med* 1995;41:1403-9.
6. Evans VC, Lam RW. Assessments of functional improvement: self- versus clinician-ratings. *Medicographia* 2014;36:512-20.
7. Zimmerman M, McGlinchey JB, Posternak MA, Friedman M, Attiullah N, Boerescu D. How should remission from depression be defined? The depressed patient's perspective. *Am J Psychiatry* 2006;163:148-50.
8. Piersma HL, Boes JL. The GAF and psychiatric outcome: A descriptive report. *Community Ment Health J* 1997;33:35-40.
9. Dufton BD, Siddique CM. Measures in the day hospital. I. The global assessment of functioning scale. *Int J Partial Hosp* 1992;8:41-9.

10. Moos RH, Nichol AC, Moos BS. Global Assessment of Functioning ratings and the allocation and outcomes of mental health services. *Psychiatr Serv* 2002;53:730-7.
11. Gade K, Malzahn D, Anderson-Schmidt H, Strohmaier J, Meier S, Frank J, et al. Functional outcome in major psychiatric disorders and associated clinical and psychosocial variables: a potential cross-diagnostic phenotype for further genetic investigations? *World J Biol Psychiatry* 2015;16:237-48.
12. Harvey PD, Heaton RK, Carpenter WT Jr, Green MF, Gold JM, Schoenbaum M. Functional impairment in people with schizophrenia: focus on employability and eligibility for disability compensation. *Schizophr Res* 2012;140:1-8.
13. McKnight PE, Kashdan TB. The importance of functional impairment to mental health outcomes: a case for reassessing our goals in depression treatment research. *Clin Psychol Rev* 2009;29:243-59.
14. Fried EI, Nesse RM. The impact of individual depressive symptoms on impairment of psychosocial functioning. *PLoS One* 2014;9:e90311.
15. Caldirola D, Grassi M, Riva A, Daccò S, De Berardis D, Dal Santo B, et al. Self-reported quality of life and clinician-rated functioning in mood and anxiety disorders: relationships and neuropsychological correlates. *Compr Psychiatry* 2014;55:979-88.
16. Kramer TL, Owen RR, Wilson C, Thrush CR. Relationship between self-report and clinician-rated impairment in depressed outpatients. *Community Ment Health J* 2003;39:299-307.
17. Trompenaars FJ, Masthoff ED, Van Heck GI, De Vries J, Hodiament PP. Relationships between social functioning and quality of life in a population of Dutch adult psychiatric outpatients. *Int J Soc Psychiatry* 2007;53:36-47.
18. Brissos S, Balanza-Martinez V, Dias V, Carita AI, Figueira ML. Is personal and social functioning associated with subjective quality of life in schizophrenia patients living in the community? *Eur Arch Psychiatry Clin Neurosci* 2011;261:509-17.
19. Olsson M, Carlström E, Marklund B, Helldin L, Hjärthag F. Assessment of Distress and Quality of Life: A Comparison of Self-Assessments by Outpatients with a Schizopsychotic Illness and the Clinical Judgment of Nurses. *Arch Psychiatr Nurs* 2015;29:284-9.
20. Picco L, Pang S, Lau YW, Jeyagurunathan A, Satghare P, Abdin E, et al. Internalized stigma among psychiatric outpatients: associations with quality of life, functioning, hope and self-esteem. *Psychiatry Res* 2016;246:500-6.
21. WHOQOL Group. Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment. *Psychol Med* 1998;28:551-8.
22. Verma S, Subramaniam M, Abdin E, Poon LY, Chong SA. Symptomatic and functional remission in patients with first-episode psychosis. *Acta Psychiatr Scand* 2012;126:282-9.
23. Chang TE, Weiss AP, Marques L, Baer L, Vogeli C, Trinh NT, et al. Race/ethnicity and other social determinants of psychological well-being and functioning in mental health clinics. *J Health Care Poor Underserved* 2014;25:1418-31.
24. Grootenboer EMV, Giltay EJ, van der Lem R, van Veen T, van der Wee NJA, Zitman FG. Reliability and validity of the Global Assessment of Functioning Scale in clinical outpatients with depressive disorders. *J Eval Clin Pract* 2012;18:502-7.
25. Gaité L, Vazquez-Barquero JL, Herran A, Ghornicroft G, Becker T, Sierra-Biddle D, et al. Main determinants of Global Assessment of Functioning score in schizophrenia: a European multicenter study. *Compr Psychiatry* 2005; 46:440-6.
26. Moos RF, McCoy L, Moos BS. Global Assessment of Functioning (GAF) ratings: determinants and role as predictors of one-year treatment outcomes. *J Clin Psychol* 2000; 56:449-61.
27. Roy-Byrne P, Dagadakis C, Unutzer J, Ries R. Evidence for limited validity of the revised Global Assessment of Functioning Scale. *Psychiatr Serv* 1996;47:864-6.
28. Mueser KT, Becker DR, Torrey WC, Xie H, Bond GR, Drake RE, et al. Work and nonvocational domains of functioning in persons with severe mental illness: a longitudinal analysis. *J Nerv Ment Dis* 1997;185:419-26.
29. Vetter P, Koller O. Clinical and psychosocial variables in different diagnostic groups: Their interrelationships and value as predictors of course and outcome during a 14-year follow up. *Psychopathology* 1996;29:159-68.
30. Kanter JW, Busch AM, Weeks CE, Landes SJ. The nature of clinical depression: symptoms, syndromes, and behavior analysis. *Behav Anal* 2008;31:1-21.
31. American Psychiatric Association. DSM-V diagnostic and statistical manual of mental disorder. 5th ed. Arlington, VA: American Psychiatric Publishing; 2013. p. 87-122.
32. Medalia A, Thysen J. A comparison of insight into clinical symptoms versus insight into neuro-cognitive symptoms in schizophrenia. *Schizophr Res* 2010;118:134-9.
33. Bowie CR, Twamley EW, Anderson H, Halpern B, Patterson T, Harvey PD. Self-assessment of functional status in schizophrenia. *J Psychiatr Res* 2007;41:1012-8.
34. Sabbag S, Twamley EW, Vella L, Heaton RK, Patterson TL, Harvey PD. Predictors of the accuracy of self assessment of everyday functioning in people with schizophrenia. *Schizophr Res* 2012;137:190-5.
35. Lu Y, Tang C, Liow CS, Ng WW, Ho CS, Ho RC. A regression analysis of maladaptive rumination, illness perception and negative emotional outcomes in Asian patients suffering from depressive disorder. *Asian J Psychiatr* 2014;12:69-76.
36. Lam RW, Filteau MJ, Milev R. Clinical effectiveness: the importance of psychosocial functioning outcomes. *J Affect Disord* 2011;132:S9-13.
37. Lam RW, Kennedy SH, Grigoriadis S, McIntyre RS, Milev R, Ramasubbu R, et al. Canadian Network for Mood and Anxiety Treatments (CANMAT) clinical guidelines for the management of major depressive disorder in adults. III. Pharmacotherapy. *J Affect Disord* 2009;117:S26-43.
38. Tan SH, Tang C, Ng WW, Ho CS, Ho RC. Determining the quality of life of depressed patients in Singapore through a multiple mediation framework. *Asian J Psychiatr* 2015;18:22-30.
39. Patterson TL, Semple SJ, Shaw WS, Halpain M, Moscona S, Grant I, et al. Self-reported social functioning among older patients with schizophrenia. *Schizophr Res* 1997;27:199-210.
40. Niti M, Ng TP, Kua EH, Ho RCM, Tan CH. Depression and chronic medical illnesses in Asian older adults: the role of subjective health and functional status. *Int J Geriatr Psychiatry* 2007;22:1087-94.