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Factors associated with subjective quality of life in Korean patients with depressive disorders: the CRESCEND study

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Abstract
Purpose A number of studies suggest that depression is associated with the significant disability and the poorer subjective quality of life (QOL). We aimed to assess subjective QOL in Korean patients with depression and explore the factors (sociodemographic characteristics and clinical features) associated with subjective QOL.
Methods We obtained the data from 808 depressive patients who entered the Clinical Research Center for Depression (CRESCEND) study and evaluated the relationship between subjective QOL and personal sociodemographics, and various clinical features, including depressive severity, and subjective QOL. We assessed subjective QOL using the 26-item abbreviated version of the World Health Organization Quality of Life (WHO-QOL-BREF) instrument.
Results Decrements in patients' physical health, psychological health, social relationships, and environment domains of subjective QOL were all strongly associated with the greater depressive symptom severity. After controlling for age and depressive symptom severity, the lower subjective QOL was independently related to being divorced or separated, the less monthly household income, and having no religious practices.
Conclusion Our results suggest the importance of sociodemographic characteristics in addition to symptoms for the understanding of subjective QOL in depressed patients. The prospective studies to compare the different treatments' effects on various subjective QOL domains are needed.

Keywords Depression · Subjective quality of life · Korean · WHOQOL-BREF

Abbreviations

BDI-II	Beck Depression Inventory-Second Edition
CGI	Clinical Global Impression scale
CRESCEND	Clinical Research Center for Depression
CRF	Case report form
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
HAM-A	Hamilton Anxiety Rating Scale
HAM-D	17-item Hamilton Depression Rating Scale
QOL	Quality of life

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SSI-BECK	Beck Scale for Suicide Ideation
WHOQOL-BREF	26-item abbreviated version of the World Health Organization Quality of Life assessment instrument
WHOQOL-100	100-item of the World Health Organization Quality of Life assessment instrument

Introduction

Depression is a chronic illness associated with excessive mortality, disability, and secondary morbidity [1]. Perhaps, the most disabling aspects of depression are its adverse impacts on psychosocial functioning, role participation, and life satisfaction [2]. Individuals' subjective perceptions of physical health, psychological health, social functioning, and environment, "subjective quality of life (QOL)," are the independent determinants of wellness and disease burden in depressed patients [2–5]. Therefore, current research on the health impact of depression should include studies that seek to establish how depression influences the patients' subjective QOL.

Research has suggested that patients suffering from depression show similar or worse subjective QOL compared to the patients who have chronic medical conditions or other severe mental illnesses (e.g., schizophrenia or bipolar disorder) [2, 6–8]. Although depressive symptom severity is a major determinant of subjective QOL in patients with depression [5, 9–11], it is just moderately correlated with subjective QOL [12]. Furthermore, researchers have found that some effective treatments for depression did not improve subjective QOL [13]. There is a general agreement to regard subjective QOL as a multi-factor-determined construct. Researchers have suggested that various clinical, socio-demographic, or biological factors may moderate subjective QOL and that the value systems and cultural factors may particularly influence it. However, researchers have directed little attention toward the factors other than symptom severity that might contribute to the subjective QOL of depressed patients. The findings of a few subjective QOL studies have lacked consistent presentations and have varied among diverse groups [14–17].

We have conducted the present study using Korean patients with depression who had participated in a large national naturalistic study, the Clinical Research Center for Depression (CRESCEND) study. We aimed to carry out the following:

1. To explore the factors (sociodemographic characteristics and clinical features) related to subjective QOL, including the perceived physical, psychological, social, and environmental status.
2. To explore the sociodemographic characteristics independently associated with subjective QOL (after controlling for age and depressive symptom severity).

Methods

Study sample

The present analysis was a part of the Clinical Research Center for Depression (CRESCEND) study. The CRESCEND study is an ongoing nine-year prospective clinical study of depression outcomes by Korean government, which was commenced in 2005 with a large nationwide sample. The design and the procedure of the study have been described elsewhere [18]. It is a naturalistic follow-up study in the clinical settings to investigate the characteristics, course, and outcomes in Korean patients with depressive disorders. The 18 hospitals collaborating in this study were the psychiatric departments of 16 university hospitals and 2 general hospitals located throughout Korea. The study scheduled examinations at baseline, at 1, 2, 4, 8, 12, 24, and 52 weeks in following order, and annually thereafter. At each visit, clinicians reviewed the subjects and decided on their treatment modalities. Clinical research coordinators obtained all other data on subjects' sociodemographic, clinical, and treatment-related parameters. These coordinators received training and certification in case report form (CRF) implementation and data collection methods from the central coordinating center (the Catholic University Medical of Korea, St. Mary's hospital). Regional center clinicians supervised the coordinators, who compiled subjects' data on a predetermined CRF at each visit and recorded it on the CRESCEND study's website homepage (www.smileagain.or.kr) within 2 days. Authorized access was controlled by identification numbers and passwords for security and confidentiality, and personnel of the data management center (the Preventative Medicine department of the Catholic University of Korea) monitored the site. All persons with a depressive disorder who visited the study hospitals seeking treatment were potential study subjects. Clinicians assigned the diagnoses based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria [19]. All study attendees had to present with a diagnosis of depressive disorder according to DSM-IV criteria. From January 2006 to August 2008, the CRESCEND study enrolled 1,183 patients [18].

We applied broad inclusion criteria and minimal exclusion criteria for the analysis described here. Inclusion criteria were (1) outpatient or inpatient aged from 18 to

75 years and (2) DSM-IV diagnosis of a depressive disorder, i.e., major depressive disorder, dysthymic disorder, or depressive disorder, not otherwise specified. Exclusion criteria were (1) a current or lifetime comorbid DSM-IV diagnosis of bipolar disorder, psychotic disorder or symptoms, organic psychosis, or dementia, (2) pregnant or breastfeeding, or (3) those with very severe medical or neurological illnesses that might interfere with the study's evaluations and interviews, although we could include patients with physical disorders. The consent forms and research protocols were approved by the respective university and/or hospital institutional review boards. All subjects reviewed the appropriate consent form and gave written informed consent in the presence of research staff before participating in the study.

Measurements

At baseline, subjects underwent a diagnostic evaluation, and clinicians took their retrospective personal history regarding their general medical conditions or psychiatric illness and treatment. Sociodemographic characteristics and clinical features were evaluated by the clinical research coordinator using the structured CRF. The data on age, gender, duration of education, marital status, living arrangement, religious practices, employment status, monthly household income, age at onset, duration of illnesses, number of previous depressive episodes, and family history of depression were obtained.

The clinician-administered measures were the Clinical Global Impression scale (CGI) [20], the 17-item Hamilton Depression Rating Scale (HAM-D) [21], and the Hamilton Anxiety Rating Scale (HAM-A) [22] for illness severity or improvement, depressive symptoms' objective severity, and anxiety symptoms' severity, respectively. The self-administered measures comprised the Beck Depression Inventory-Second Edition (BDI-II) [23] and the Beck Scale for Suicide Ideation (SSI-BECK) [24] for depressive symptoms' subjective severity and current suicidal ideation, respectively. The higher scores on HAMD, HAMA, CGI, BDI-II, or SSI-BECK indicated more severe symptomatology. All measurements have been demonstrated to be valid and reliable in the Korean population [25].

For assessing subjective QOL, we administered the 26-item abbreviated version of the World Health Organization Quality of Life assessment instrument (WHOQOL-BREF) developed from the 100-item WHOQOL assessment instrument (WHOQOL-100)'s field trial version data [3]. According to the WHOQOL Group, the WHOQOL-BREF provides a valid and reliable alternative to the WHOQOL-100 for the assessment of domain profiles. It consists of subjective QOL items concerning respondents' views regarding the meaning of different aspects of life, and how satisfactory or problematic their experience of these aspects are. The WHOQOL-BREF contains 2 items from the Overall QOL and General Health facet and 1 item from each of the remaining 24 facets, which fall into 4 domains: physical health (7 items), psychological health (6 items), social relationships (3 items), and environment (8 items). All items were rated on a 5-point scale (1–5), with a higher score indicating a higher subjective QOL. Domain scores were calculated by multiplying the mean of all items included within the domain by four. So the potential scores for each domain ranged from 4 to 20. The Korean version of the WHOQOL-BREF has proven to be valid and reliable [26].

Statistical analyses

We present all data as a percentage for categorical variables and as the mean (standard deviation) for continuous variables. For binary measures such as gender, living arrangement (living alone or not), occupation (current employed or not), and religion (religious practice or not), we used an independent t-test to compare mean WHOQOL-BREF scores. For ordinal measures with more than 2 levels, such as marital status, duration of education, and monthly household income, we used analyses of variance models to compare mean WHOQOL-BREF scores across the groups. To identify the relationship between WHOQOL-BREF scores and characteristics, we used a Pearson's correlation analysis when the clinical features and the sociodemographic characteristics (i.e., age) were continuous. The statistical significance for all tests was set at $P < 0.05$. Also, regression analysis was used to identify the additional factors independently associated with subjective QOL after controlling for the effects of age and depressive symptom severity (as measured by HAM-D total score). We controlled for age and severity of depressive symptoms severity because these variables are consistently associated with subjective QOL. As the analyses were exploratory in nature, no correction for multiple tests was made, so results must be interpreted accordingly.

Results

Table 1 shows the sample's baseline sociodemographic and clinical characteristics. Of the 1,183 patients enrolled in the CRESCEND study, 808 met inclusion and exclusion criteria for the present study and had complete data, including their WHOQOL-BREF results. A greater symptom severity (higher scores on HAM-D, HAM-A, CGI, BDI-II, and SSI-BECK) was associated ($P < 0.001$) with lower scores in all WHOQOL-BREF domains.

Table 1 Baseline sociodemographic and clinical characteristics (N = 808)

Characteristics	% of Subjects
Gender (Female)	73.4
Education, y	
≤6	8.8
7–12	64.7
≥13	26.5
Marital status	
Married	65.6
Never married	18.7
Widowed	6.2
Divorced/separated	9.5
Monthly household income, US $	
<1,000	26.5
1,000–2,999	40.6
3,000–4,999	20.8
≥5,000	12.1
Living alone	12.9
Unemployed state	25.9
No religious belief and practices	38.6
Family history of depression	15.2
Current medical co-morbidities	34.0
	Mean (SD)
Age, y	46.8 (14.8)
Age at onset of first episode, y	43.2 (16.0)
Number of episode	1.9 (1.9)
Length of illness, y	3.6 (6.6)
HAM-D	19.7 (6.0)
HAM-A	19.0 (8.8)
BDI-II	29.5 (11.7)
CGI	4.6 (1.0)
SSI-BECK	10.5 (8.8)
WHOQOL-BREF	
Overall QOL and general health	9.5 (2.8)
Domain 1 physical health	9.7 (1.9)
Domain 2 psychological health	9.3 (1.9)
Domain 3 social relationships	10.5 (2.6)
Domain 4 environment	10.1 (2.3)

HAM-D 17-item Hamilton Depression Rating Scale, *HAM-A* Hamilton Anxiety Rating Scale, *BDI-II* Beck Depression Inventory-Second Edition, *CGI* Clinical Global Impression scale, *SSI-BECK* Beck Scale for Suicide Ideation, *WHOQOL-BREF* 26-item abbreviated version of the World Health Organization Quality of Life

Table 2 presents the associations between sociodemographic characteristics and WHOQOL-BREF scores without adjustments for age or depressive severity. As seen on Table 2, higher age was correlated with higher scores in the psychological health, social relationships, and environment domains. The overall QOL and the general health scores were associated with marital status ($P = 0.004$), monthly household income ($P < 0.001$), employment status ($P = 0.001$), and current medical co-morbidities ($P < 0.001$). There were significant differences in physical health domain scores according to employment status ($P = 0.029$) and religious belief and practice ($P = 0.023$). The psychological health domain scores were significantly associated with education levels ($P = 0.026$), marital status ($P = 0.012$), living arrangements ($P = 0.016$), and religious practices ($P = 0.003$). Moreover, there were significant differences in social relationships domain scores by gender ($P < 0.001$), education levels ($P = 0.010$), marital status ($P < 0.001$), and employment status ($P = 0.041$). Finally, the environment domain scores were associated with education levels ($P = 0.017$), marital status ($P < 0.001$), monthly household income ($P < 0.001$), living arrangements ($P = 0.004$), employment status ($P = 0.017$), and religious practices ($P = 0.031$).

Table 3 presents sociodemographic factors that were independently associated with subjective QOL after controlling for the effects age and symptom severity. On the overall QOL and general health domain, a low score was associated with a monthly household income under 1,000 US$ (compared to an income over 5,000 US$). Having religious practices appeared to be associated with better psychological health. Women reported better social relationships than men did. Finally, marital status and monthly household income were each significantly and independently associated with environment domain scores.

Discussion

In the present study, we found that the decrements in the physical health, psychological health, social relationships, and environment domains of subjective QOL were all associated with greater depressive symptom severity. This is consistent with a number of other studies that have identified the associations between current illness severity and many aspects of subjective QOL in depressed patients. Recent studies have revealed that the depressive symptom improvement during treatment leads to an improvement in subjective QOL [27–29]. In ranking the influence of different psychopathology aspects on subjective QOL, it is quite evident that depressive symptom severity is most consistently and most strongly correlated with subjective QOL [30]. Additionally, in the present results, greater anxiety symptoms (as measured by the HAM-A total score) were associated with poor subjective QOL. Recent and well-performed studies have demonstrated that anxiety symptoms may play a role as important as that of depressive symptoms in lowering subjective QOL in people with severe mental illness [31].

Table 2 Sociodemographic characteristics associated with subjective quality of life

Characteristics	WHOQOL-BREF											
	Overall QOL and General Health				Domains							
					Physical health		Psychological health		Social relationships		Environment	
	r		*P*		*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*
Age, y	0.070		**0.046**		0.057	0.105	0.072	**0.040**	0.113	**0.001**	0.079	**0.024**
	Mean (SD)		*P*	Mean (SD)	*P*		Mean (SD)	*P*	Mean (SD)	*P*	Mean (SD)	*P*
Gender												
Male	9.4 (2.9)		0.565	9.8 (2.1)	0.267		9.3 (2.0)	0.917	9.8 (2.7)	**<0.001**	10.0 (2.4)	0.398
Female	9.5 (2.8)			9.6 (1.9)			9.3 (1.9)		10.8 (2.5)		10.2 (2.3)	
Education, y												
≤6	9.3 (3.0)		0.171	9.5 (1.9)	0.087		9.1 (1.9)	**0.026**	10.3 (2.7)	**0.010**	9.9 (2.3)	**0.017**
7–12	9.5 (2.7)			9.8 (2.0)			9.4 (2.0)		10.6 (2.7)		10.2 (2.3)	
≥13	9.8 (2.8)			9.9 (1.9)			9.5 (1.7)		11.0 (2.6)		10.5 (2.2)	
Marital status												
Married	9.7 (2.6)		**0.004**	9.8 (2.0)	0.245		9.4 (1.9)	**0.012**	10.7 (2.6)	**<0.001**	10.4 (2.3)	**<0.001**
Never married	9.0 (3.1)			9.6 (1.9)			9.1 (1.9)		9.9 (2.8)		9.9 (2.4)	
Widowed	9.5 (3.1)			9.7 (1.9)			9.4 (2.0)		11.2 (2.1)		10.5 (2.0)	
Divorced/separated	8.7(3.1)			9.3 (1.8)			8.8 (1.9)		9.9 (2.6)		8.9 (2.1)	
Monthly household income, US $												
<1,000	8.8 (3.0)		**<0.001**	9.5 (1.9)	0.280		9.1 (1.9)	0.093	10.3 (2.8)	0.228	9.4 (2.2)	**<0.001**
1,000–2,999	9.5 (2.7)			9.7 (2.0)			9.3 (1.9)		10.6 (2.5)		10.1 (2.3)	
3,000–4,999	9.9 (2.7)			9.9 (1.8)			9.5 (2.0)		10.8 (2.6)		10.6 (2.1)	
≥5,000	10.2 (3.0)			9.9 (2.0)			9.3 (1.9)		10.3 (2.8)		11.2 (2.3)	
Living arrangements												
Alone	9.3 (3.2)		0.352	9.5 (1.9)	0.403		8.9 (1.9)	**0.016**	10.1 (2.6)	0.092	9.6 (2.3)	**0.004**
With partner	9.5 (2.8)			9.7 (1.9)			9.4 (1.9)		10.6 (2.6)		10.2 (2.3)	
Employment status												
Employed	9.7 (2.7)		**0.001**	9.4 (2.1)	**0.029**		9.4 (1.9)	0.099	10.6 (2.6)	**0.041**	10.3 (2.3)	**0.017**
Unemployed	9.0 (3.0)			9.8 (1.9)			9.1 (1.9)		10.2 (2.7)		9.8 (2.3)	
Religious practices												
Yes	9.5 (2.8)		0.491	9.8 (1.9)	**0.023**		9.5 (1.9)	**0.003**	10.7 (2.6)	0.117	10.3 (2.3)	**0.031**
No	9.4 (2.8)			9.5 (2.0)			9.1(1.9)		10.4 (2.7)		9.9 (2.3)	
Family history of depression												
Yes	9.2 (2.8)		0.173	9.5 (1.9)	0.295		9.4 (2.0)	0.716	10.3 (2.9)	0.329	10.2 (2.4)	0.870
No	9.6 (2.8)			9.7 (1.9)			9.3 (1.9)		10.6 (2.6)		10.1 (2.3)	
Current medical co-morbidities												
Yes	9.1 (2.7)		**<0.001**	9.6(2.0)	0.153		9.2 (1.9)	0.131	10.4 (2.6)	0.252	10.0 (2.3)	0.078
No	9.7 (2.9)			9.8(1.9)			9.4 (1.9)		10.6 (2.6)		10.3 (2.2)	
	r	*P*	*r*	*P*	*r*	*P*	*r*	*P*	*r*	*P*		
Age, y	0.070	**0.046**	0.057	0.105	0.072	**0.040**	0.113	**0.001**	0.079	**0.024**		

Statistical significance is designated by bold type

r correlation coefficient, *WHOQOL-BREF* 26-item abbreviated version of the World Health Organization Quality of Life

The current results show that regardless of depressive symptom severity, some sociodemographic factors, such as gender, marital status, monthly household income, and religious practices, are independently associated with subjective QOL. Prior research found some demographic factors, such as age, gender, occupation, income, marital

Table 3 Sociodemographic characteristics independently associated with subjective quality of life

Characteristics	WHOQOL-BREF									
	Overall QOL and general health ($R^2 = 0.147$)		Domains							
			Physical health ($R^2 = 0.159$)		Psychological ($R^2 = 0.075$)		Social relationship ($R^2 = 0.107$)		Environmental ($R^2 = 0.135$)	
	β	P	β	P	β	P	β	P	β	P
Age, y [a]	0.026	**0.004**	0.010	**0.024**	0.011	0.084	0.016	0.072	0.025	**0.001**
HAM-D[a]	−0.137	**<0.001**	−0.123	**<0.001**	−0.067	**<0.001**	−0.106	**<0.001**	−0.071	**<0.001**
Gender (ref.: female)										
Male							−0.839	**<0.001**		
Education, y (ref.: ≥13)										
≤6					−0.358	0.197	−0.126	0.736	−0.195	0.552
7–12					−0.211	0.185	−0.201	0.345	−0.203	0.279
Marital status (ref.: married)										
Never married	−0.244	0.463			−0.091	0.693	−0.361	0.260	0.074	0.789
Widowed	−0.162	0.689			0.047	0.873	0.097	0.803	0.091	0.789
Divorced/separated	−0.292	0.387			−0.455	0.059	−0.553	0.075	−0.826	**0.004**
Monthly household income, US $ (ref.: ≥5,000)										
<1,000	−1.155	**0.001**							−1.646	**<0.001**
1,000–2,999	−0.514	0.092							−1.072	**<0.001**
3,000–4,999	−0.260	0.436							−0.579	**0.036**
Living arrangements (ref.: with partner)										
Alone					−0.266	0.214			−0.017	0.945
Employment status (ref.: employed)										
Unemployed	−0.349	0.117	−0.209	0.146			−0.032	0.882	−0.131	0.474
Religious practices (ref.: yes)										
No			−0.194	0.153	−0.298	**0.030**			−0.140	0.377
Current medical co-morbidities (ref.: no)										
Yes	−0.624	**0.003**								

Statistical significance is designated by bold type

β beta coefficient, *HAM-D* 17-item Hamilton Depression Rating Scale, *WHOQOL-BREF* 26-item abbreviated version of the World Health Organization Quality of Life

[a] Inclusion forced into each model

status, education, ethnicity, race, social support, and response style, predicting the differences in various subjective QOL domains [32–36]. However, the variables that are associated with subjective QOL in depression are not consistent across studies. For example, gender and age may be associated in one study but not in another [37, 38].

Some studies have examined depressed patients to explore the psychosocial and demographic factors, apart from symptom severity, that might contribute to subjective QOL. Chan et al.'s study on elderly Chinese with depression showed that comorbid medical conditions, level of functioning, and social support were subjective QOL predictors after controlling for depressive symptom severity [39]. The Keuhner and Buerger's study suggested that more enduring self-related traits, such as self-esteem, locus of control, and skills for coping with negative mood, contributed substantially to depressed patients' psychological and social domains of subjective QOL [40]. Recently, Trivedi et al. [5] reported on factors associated with HRQOL in a large cohort of depressive patients participating in the multi-centered Sequenced Treatment Alternative to Relieve Depression (STAR*D). Overall, our findings were similar to the STAR*D reports [5], where depressed patients with sociodemographic disadvantage, such as unemployment, divorcement, and low monthly household income, were at great risk for poorer subjective QOL. However, there were some differences between the two. The STAR*D reports showed that lower subjective QOL was independently correlated with being African-American or Hispanic, less educated, unemployed, divorced or separated, having public medical insurance, and having medical co-morbidities. In these subjective

QOL studies, the differences in service settings studied, baseline subjective QOL profiles, sample compositions, and the QOL measures limit comparability between the studies and their appropriateness with regard to drawing conclusions from them.

Our study underlined the different impacts of specific sociodemographic and clinical features on different specific subjective QOL domains. In the present study, we used the WHOQOL-BREF for our subjective QOL assessment. The WHOQOL-BREF has 4 domains (physical health, psychological health, social relationships, and environment) related to QOL, and each domain's scores show good discriminant validity and content validity [3, 26]. As a result, regardless of depressive symptom severity, male patients with depression reported poorer social relationships compared to female patients. In addition, having religious practices appeared to be associated with better psychological health. The environment domain score was associated with more sociodemographic variables (e.g., age, marital status, or monthly household income) than the other domains.

This study's limitations are as follows. (1) The representation of all depressed patients is insufficient because the study targeted only depressed patients who had visited general hospital psychiatric departments and were willing to participate in this study voluntarily. Given that impairment in subjective QOL is strongly predictive of whether treatment is received, the use of a treatment-seeking sample raises the potential for selection bias. (2) The absence of normative data precludes understanding how these associations differ between depressed patients and normal controls. (3) We obtained the data from a cross-sectional sample, thus precluding any inference of causes or consequences. (4) Even though medical insurance (private vs. public), type of employment, substance use can be significant factors associated with subjective QOL [5], these variables were not examined in this set of analyses. Despite all the limitations above, the current study contributed valuable data on subjective QOL in a large sample from a different culture. Ethnic and cultural differences in symptom presentation and subjective QOL could have clinical and social consequences [41]. Moreover, the strength of this study is in its use of data from the CRESCEND study, which is a large-scale depression cohort study conducted in Korea and shows the sociodemographic and clinical characteristics of depressed Korean patients.

Our findings show that depressive symptom severity is most strongly related to the subjective QOL in depressed patients. Also, the sociodemographic factors, such as age, marital status, monthly household income, and religious practices, were found to be independently associated with subjective QOL, emphasizing the importance of measuring functional status as well as depressive symptoms. This study also highlights the necessity of assessing subjective QOL in multiple domains. Clinicians treating depressed patients should monitor these individual domains (i.e., physical, psychological, and social) throughout treatment as well as considering additional specific intervention. Further studies should address the evaluation of the prospective relationships of the sociodemographic and clinical characteristics with subjective QOL to compare the different treatments' effects on various subjective QOL domains.

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