



Health-related quality of life and its predictors among outpatients with coronary heart disease in Singapore

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ABSTRACT

Aims and Background: Coronary heart disease (CHD) is a major cause of death and disability and negatively impacts on patients' health-related quality of life (HRQoL). This study aimed to explore HRQoL and identify its predictors among outpatients with CHD in Singapore.

Methods: A correlational study was conducted with a convenience sample of 106 outpatients with CHD recruited from a public hospital. HRQoL outcomes were measured using the Short Form-12 Health Survey (SF-12), Medical Outcomes Study Social Support Survey (MOS-SSS) and Hospital Anxiety and Depression Scale (HADS).

Results: Patients reported a generally high level of HRQoL as assessed by SF-12. Those aged over 65 years reported significantly higher mental health and those who were married had higher levels of education or income reported significantly higher physical health. There were significant negative correlations between physical and mental health and anxiety and depression ($p < .05$). Perceived social support was negatively correlated with anxiety and depression and positively correlated with mental health. Education level and depression significantly predicted physical health, while age, anxiety and depression predicted mental health.

Conclusion: Anxiety, depression, age and education are significant predictors of HRQoL in this patient population and should be assessed routinely and, where appropriate, addressed through individually-tailored interventions.

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1. Introduction

Coronary heart disease (CHD) continues to be a leading cause of morbidity and mortality among adults worldwide (Gough, 2011). In Singapore, CHD is the second leading cause of death (Health Fact Singapore, 2013), though a steady decline in morbidity and mortality rates is attributed to improved treatment and preventive measures (Mak et al., 2003).

Over the past decade, health-related quality of life (HRQoL) has assumed increasing prominence as an important measure of health outcome (Cepeda-Valery, Cheong, Lee, & Yan, 2011). HRQoL is a multi-faceted concept that measures the impact of disease and treatment on the individual's physical, psychological and social well-being, such as changes in symptoms, physical functioning and social roles (Stafford, Berk, Reddy, & Jackson, 2007). Symptoms such as chest pain and

breathlessness and lifelong treatment regimes are contributing factors to poor HRQoL (Celano et al., 2012). Furthermore, outpatients with CHD report higher stress levels due to uncertainty in disease progression, and are at higher risk of experiencing anxiety and depression, which translates to poorer HRQoL (Celano et al., 2012). Patients with poor HRQoL, in turn report worsening disease progression and poorer health outcomes (Škodová et al., 2011).

Studies also identify several predictors of HRQoL in outpatients with CHD, such as demographic, clinical and psychosocial factors (Barry, Stanislav, Lichtman, Vaccarino, & Krumholz, 2006; Celano et al., 2012; Škodová et al., 2011; Rumsfeld et al., 2001). Individuals with higher socioeconomic status, higher education level, who are married and enjoy high levels of social support report better HRQoL (Barry et al., 2006; Barbareschi, Sanderman, Kempen, & Ranchor, 2009; Boersma, Maes, & Joeke, 2005). On the other hand, females, individuals with a high number of cardiac co-morbidities and those experiencing increased severity of disease, anxiety and depression report poorer HRQoL (Stafford, Soljak, Pledge, & Mindell, 2012; Wang, Thompson, Ski, & Liu, 2012). Age is an inverse predictor with elderly individuals reporting better mental health whilst younger individuals

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report better physical health (Ford et al., 2008; Kimble et al., 2011; Lee, Choi, Chair, Yu, & Lau, 2012). These predictors would assist healthcare professionals in identifying individuals at risk for poor HRQoL and introducing tailored interventions to mitigate the negative impact of diminished HRQoL (Xie et al., 2008).

Although much is known about HRQoL of CHD patients and its predictors, research findings were limited in terms of generalisability as studies predominantly investigated the western population. There is limited knowledge of how Asian CHD outpatients perceive what supports or undermines their HRQoL, the extent of anxiety and depression post CHD and the influence of social support on HRQoL. There may be varied impact on HRQoL amongst the different ethnic groups that warrants attention given the presence of ethnic differences in CHD in Asian countries such as Singapore; with Indian residents facing higher risk of acute myocardial infarction compared to Chinese and Malay residents (Wong et al., 2012). In addition, there are limited studies that clearly investigate the relationship of HRQoL, anxiety and depression, social support, sociodemographic and clinical factors to CHD. This study aims to understand the relationship between these factors, in an attempt to provide healthcare professionals with a holistic overview of the health status of outpatients with CHD. Such information would assist healthcare professionals to select appropriate interventions based on the patient's needs in this rapidly burgeoning population, to better manage CHD and reduce dependency on the healthcare system (Poh, 2009).

2. Research methods

2.1. Study design and sample

A correlational study was conducted among a convenience sample of 106 outpatients with CHD recruited from a heart clinic in a public hospital in Singapore during October 2012 to January 2013. Patients were clinically diagnosed with CHD including non-ST segment elevation myocardial infarction (NSTEMI), ST segment elevation MI (STEMI) and stable or unstable angina, aged 21 years and above and able to communicate in English and/or Mandarin. Individuals with a known history of major psychiatric illness, stroke or cerebrovascular disease, chronic kidney disease or an ejection fraction (EF) below 40% were excluded.

2.2. Research instruments

2.2.1. Twelve-Item Short Form Health Survey (SF-12)

The SF-12 consists of eight subscales: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotion (RE) and mental health (MH), which are grouped into two dimensions: physical component summary (PCS) and mental component summary (MCS) scores (Failde, Medina, Ramirez, & Arana, 2010). PCS measures presence of physical disability, while MCS identifies psychological distress and measures emotional well-being (Failde et al., 2010). Scores for each component are converted to a range of 0–100, with higher scores indicating better functioning and well-being. The standard SF-12 PCS and MCS are norm-based on the American general population with mean scores of 50 (Failde et al., 2010). The SF-12 is a valid tool in assessing HRQoL in cardiac patients demonstrating good reliability and validity with a Cronbach alpha greater than 0.70 for all subscales (Luo et al., 2003).

2.2.2. Hospital Anxiety and Depression Scale (HADS)

The HADS is a 14-item (7 items for anxiety and 7 items for depression) questionnaire designed for physically ill patients (Zigmond & Snaith, 1983), including cardiac patients (Strik, Honig, Lousberg, & Denollet, 2001). There are two subscales—HADS-Anxiety and HADS-

Depression—each with a score of 7 and below indicating normal psychological status, while a score of 8–10 and 11 and above would be indicative of borderline or severe case of psychological morbidity respectively (Zigmond & Snaith, 1983). The HADS has a high internal consistency with a Cronbach alpha ranging from 0.77 to 0.86 (Zigmond & Snaith, 1983; Strik et al., 2001). In the present study, the Cronbach alpha for the anxiety and depression subscales was 0.66 and 0.67 respectively.

2.2.3. Medical Outcomes Study Social Support Survey (MOS-SSS)

The MOS-SSS measures self-perceived adequacy of functional social support (Sherbourne & Stewart, 1991). It consists of 19 items, which are divided into four subscales: tangible support, informational and emotional support, positive social interaction and affectionate support (Sherbourne & Stewart, 1991). Each item is rated using a 5-point Likert scale, ranging from 1 (= none of the time) to 5 (= all of the time), for how often each kind of social support was available when required. Responses for each subscale are totaled and rescaled to a 0 to 100 range for each subscale, with higher score representing better perceived support (Sherbourne & Stewart, 1991). The reliability of the scale has been established with a Cronbach alpha greater than 0.91 for all subscales (Phillips, Burkner, & White, 2011). The present study also showed that the MOS-SSS has acceptable internal consistency, with Cronbach alpha ranged from 0.90 to 0.95 for the four subscales and total scale.

2.2.4. Demographic and Clinical Data

Data, such as age, gender, educational level, employment and clinical status, such as time of diagnosis, CHD family history, smoking status, alcohol consumption, documented cardiac co-morbidities and treatment modalities, were collected from a review of patient records and through patient interview using a structured proforma. Outpatients who did not receive revascularisation therapy (percutaneous coronary intervention/coronary artery bypass graft) were categorized as receiving medical therapy, in view of their conservative management.

2.3. Data Collection Procedure

Ethical approval was obtained from the relevant ethics board in Singapore. Recruitment took place during patients' visits to the heart clinic in a public hospital in Singapore. Patients who met the study criteria were identified and provided with a copy of the participant information sheet which explained the purpose of the study, procedure, information obtained, instruments used and the potential risks and benefits of the study. Those who agreed to participate were required to read and sign a consent form. The patients were informed that their participation in this study was completely voluntary and they could withdraw from the study at any time. Their personal information such as name and identification number was not recorded to maintain their privacy and anonymity. Patients who consented were given the questionnaires and were asked to complete them during their waiting time. The data collection process at the clinic took an estimated of 20 minutes.

2.4. Data Analysis

Data were analysed using SPSS version 20. Descriptive statistics were used to summarize and describe the demographic and clinical characteristics of the sample. Independent sample t-test, ANOVA and Pearson product-moment correlation were used to compare scale means and correlations of the SF-12, MOS-SSS and HADS scores. SF-12 mean scores were generated from QualityMetric Health Outcomes™ Scoring Software 4.5 provided by the distributors of the instrument. Stepwise multiple linear regression analysis was used to identify predictors of HRQoL. All the independent variables which

demonstrated significant differences or correlations with SF-12 PCS or MCS (i.e. $p < .05$) were included in the multiple linear regression analysis using the stepwise method to determine predictors of HRQoL.

3. Results

Of 132 patients invited to participate over a 4-month period of data collection, 106 (80.3%) completed the questionnaires.

The demographic and clinical characteristics of the sample are summarized in Table 1. Ages ranged from 37 to 90 ($M = 57.73$, $SD = 11.13$) years. Most of the patients were male (89.6%) and married (89.6%). Nearly half of them had attained secondary education (43.4%), and earned below S\$1,500 per month. Nearly half were Chinese, a third Malay and a fifth Indian. Most ($n = 98$, 92.5%) were diagnosed with myocardial infarction (MI), with the remainder diagnosed with angina. Time since diagnosis ranged from 1 month to 21 years, with more than half of the participants living with CHD for 6 months or more. Hyperlipidemia was the most prevalent cardiac co-morbidity. Nearly one-third of the sample was currently smoking while a quarter was consuming alcohol. About three-quarters underwent PCI, and 13% underwent CABG.

The means scores of the SF-12 subscales, HADS-anxiety and depression subscales and the MOS-SSS are presented in Table 2. The HADS scores were in the normal range of 0–7 for anxiety ($n = 102$, 96.2%) and depression ($n = 105$, 99.1%). Only three (2.8%) of the sample reported borderline clinical anxiety. And only one moderate to severe depression (Zigmond & Snaith, 1983).

Table 3 presents the statistical significant results of comparisons between the SF-12 PCS and MCS scores and demographic and clinical characteristics. One way ANOVA revealed the highest age (65 years and above) group reporting higher MCS scores, married patients reporting higher PCS scores than their unmarried counterparts, the

Table 2

SF-12, HADS, and MOS-SSS mean scores of outpatients with CHD ($n = 106$).

	Mean (SD)	Range (minimum–maximum)
SF-12 PCS	48.07 (7.00)	27.85–59.16
Physical functioning (PF)	72.17 (31.68)	0.00–100.00
Role physical (RP)	83.14 (25.18)	0.00–100.00
Bodily pain (BP)	93.87 (14.56)	25.00–100.00
General health (GH)	52.26 (17.28)	0.00–100.00
MCS	57.92 (6.60)	32.02–69.42
Vitality (VT)	73.58 (23.36)	25.00–100.00
Social functioning (SF)	88.44 (24.68)	0.00–100.00
Role emotion (RE)	94.81 (12.06)	37.50–100.00
Mental health (MH)	85.61 (18.16)	12.50–100.00
HADS		
Anxiety	2.32 (2.45)	0.00–13.00
Depression	1.42 (2.01)	0.00–12.00
MOS-SSS (total score)	82.53 (16.95)	16.67–100.00

PCS: Physical Component Summary, MCS: Mental Component Summary, HADS: Hospital Anxiety and Depression Scale, MOS-SSS: Medical Outcomes Study Social Support Survey.

highest income group (i.e. \$3500 or above) reporting higher HRQoL, the tertiary level education group reporting higher PCS scores and the unemployed group reporting higher MCS scores.

In addition, a significant difference was observed for the PCS subscale ($p < .05$) for co-morbidity with hypertension. A statistically significant difference was also noted for the MCS scores ($p < .05$) for alcohol consumers, with non-consumers reporting higher MCS scores. Based on one way ANOVA of treatment measures, a statistically significant difference was reported for the PCS scores with patients who underwent CABG obtaining higher mean scores across the subscales ($p < .05$).

Pearson's correlations were used to examine the relationship between psychosocial factors: anxiety and depression, MOS-SSS and SF-12 PCS and MCS scores. Table 4 illustrates a statistically significant negative correlation between the PCS and HADS-anxiety ($r = -0.27$, $p < 0.05$) and depression ($r = -0.26$, $p < .05$) scores. Statistically significant correlations are also observed between total social support and MCS subscale ($r = 0.23$, $p < .01$), as well as anxiety ($r = -0.22$, $p < .01$) and depression ($r = -0.22$, $p < .01$) scores respectively.

Stepwise multiple linear regression was used to identify predictors for SF-12 PCS and MCS separately. Gender, income, marital status, hypertension, treatment, education, HADS-Anxiety and HADS-Depression scores were entered as the independent variables in the regression model as they showed significant association with PCS. Three (i.e. secondary education, tertiary education, HADS-Depression) out of eight variables were identified as predictors of PCS, which accounted for 21.8% of the variance (Table 5).

Age, income, employment status, alcohol consumption, HADS-Anxiety, HADS-Depression and social support, which were significantly associated with MCS, were entered as the independent variables in the model. Among these variables, three (i.e. age, HADS-Anxiety and HADS-Depression) were identified as predictors of MCS, which accounted for 33.4 % of the variance (Table 5).

4. Discussion

The HRQoL of the sample in this study appears to be relatively high compared to those conducted in China and the United States (US) using the SF-36 and SF-12 to evaluate HRQoL of CHD patients (Lee et al., 2012; Norris et al., 2008; Wang, Lau, Chow, Thompson, & He, 2013). The higher scores in this study may be attributable to the inclusion of only outpatients with CHD, whereas other studies included CHD patients with heart failure (Wang et al., 2013); and cardiac arrhythmias (Norris et al., 2008). In addition, outpatients in this study may experience lesser symptoms such as chest pain or fatigue, thus enhancing their HRQoL (Norris et al., 2008). Moreover,

Table 1

Demographic and clinical characteristics data ($n = 106$).

Demographic	<i>n</i> (%)	Clinical	<i>n</i> (%)
Age (years)		Diagnosis	
35–54	43 (40.6)	MI ^c	98 (92.5)
55–64	40 (37.7)	Angina ^d	8 (7.5)
65 & above	23 (21.7)	Time since diagnosis	
Gender		Less than 6 months	46 (43.4)
Female	11 (10.4)	6 months and above	60 (56.6)
Male	95 (89.6)	Treatment	
Marital status		PCI	78 (73.6)
Married	95 (89.6)	CABG	14 (13.2)
Unmarried ^a	11 (10.4)	Medical therapy	14 (13.2)
Education level		Family history of CHD	
Primary or no formal education	32 (30.2)	Yes	53 (50.0)
Secondary	46 (43.4)	No	53 (50.0)
Tertiary	28 (26.4)	Currently smoking	
Employment status		Yes	32 (30.2)
Employed ^b	72 (67.9)	No	74 (69.8)
Unemployed	34 (32.1)	History of smoking	
Income		Yes	33 (31.1)
<\$1500	49 (46.2)	No	73 (68.9)
\$1500–3499	38 (35.8)	Alcohol	
≥\$3500	19 (17.9)	Yes	27 (25.5)
Primary caregiver		No	79 (74.5)
Self	101 (95.3)	Diabetes	
Others	5 (4.7)	Yes	69 (65.1)
Ethnicity		No	37 (34.9)
Chinese	48 (45.3)	Hyperlipidemia	
Malay	35 (33.0)	Yes	95 (89.6)
Indian	21 (19.8)	No	11 (10.4)
Others	2 (1.9)	Hypertension	
		Yes	68 (64.2)
		No	38 (35.8)

^a Unmarried includes single, divorced, widowed and separate.

^b Employed includes working part-time or full-time status.

^c MI: myocardial infarction.

^d Angina includes stable angina and unstable angina.

Table 3Comparison between SF-12 subscale scores and demographic and clinical characteristics ($n = 106$).

	PCS Mean (SD)	MCS Mean (SD)
Age range (years)		
35–54 ($n = 43$)	48.66 $\pm$ 7.66	56.03 $\pm$ 7.65
55–64 ($n = 40$)	48.62 $\pm$ 5.67	58.30 $\pm$ 5.91
65 and above ($n = 23$)	45.99 $\pm$ 7.63	60.81 $\pm$ 4.28
F^a	1.30	4.29
p Value	.281	.020*
Marital status		
Married ($n = 95$)	48.54 $\pm$ 6.85	57.81 $\pm$ 6.86
Unmarried ($n = 11$)	44.01 $\pm$ 7.30	58.79 $\pm$ 3.70
t^b	2.06	–0.74
p Value	.042*	.469
Income (\$\$)		
Below 1500 ($n = 49$)	46.20 $\pm$ 7.12	59.92 $\pm$ 5.18
1500–3499 ($n = 38$)	49.24 $\pm$ 7.40	55.25 $\pm$ 7.81
3500 & above ($n = 19$)	50.52 $\pm$ 4.37	58.10 $\pm$ 5.59
F^a	3.61	5.86
p Value	.031*	.004**
Education		
No formal/Primary ($n = 32$)	43.82 $\pm$ 8.10	59.02 $\pm$ 7.11
Secondary ($n = 46$)	49.01 $\pm$ 6.08	57.16 $\pm$ 7.07
Tertiary ($n = 28$)	51.38 $\pm$ 4.37	57.91 $\pm$ 5.06
F^a	11.31	0.74
p Value	.000**	.479
Employment		
Unemployed ($n = 34$)	46.37 $\pm$ 8.06	59.85 $\pm$ 5.28
Employed ($n = 72$)	48.87 $\pm$ 6.34	57.01 $\pm$ 6.99
t^b	–1.73	2.10
p Value	.086	.038*
Hypertension		
Yes ($n = 68$)	47.06 $\pm$ 6.90	57.62 $\pm$ 6.53
No ($n = 38$)	49.87 $\pm$ 6.89	58.46 $\pm$ 6.78
t^b	–2.01	–0.63
p Value	.047*	.531
Alcohol		
Yes ($n = 27$)	47.79 $\pm$ 6.87	54.73 $\pm$ 8.48
No ($n = 79$)	48.47 $\pm$.71	59.01 $\pm$ 5.47
t^b	–1.03	–2.45
p Value	.307	.019*
Treatment		
PCI ($n = 78$)	48.82 $\pm$ 6.28	57.05 $\pm$ 6.67
CABG ($n = 14$)	49.65 $\pm$ 6.08	59.26 $\pm$ 6.37
Medical therapy ($n = 14$)	42.28 $\pm$ 9.07	61.43 $\pm$ 5.25
F^a	6.15	3.07
p Value	.000**	.050

PCS: physical component summary; MCS: mental component summary.

* $p < .05$.** $p < .01$.^a One way ANOVA.^b Independent t-test.

higher HRQoL can be reported after the onset of CHD through the re-evaluation of perspective, leading to a more positive outlook in life (Boersma et al., 2005). Despite the high scores, several differences between subgroups have been identified, indicating the influence of individual characteristics on HRQoL.

Table 4Correlations among SF-12 subscale scores, HADS and total social support scores ($n = 106$).

	PCS	MCS	Total social support	HADS Anxiety	HADS Depression
PCS	1				
MCS	–0.14	1			
Total social support	–0.10	0.23**	1		
HADS-Anxiety	–0.27*	–0.48*	–0.22**	1	
HADS-Depression	–0.26*	–0.51*	–0.22**	0.62*	1

PCS: physical component summary; MCS: mental component summary.

* $p < .05$.** $p < .01$.**Table 5**Predictors of PCS and MCS of outpatients with coronary heart disease based on stepwise multiple linear regression ($n = 106$).

	B	Standard error - B	t-statistic	95% CI of B (lower–upper bound)
Physical component summary				
Tertiary ^a	7.38	1.60	4.60**	4.20 to 10.55
Secondary ^b	5.20	1.42	3.65**	2.37 to 8.02
HADS-Depression	–0.86	0.30	–2.86**	–1.45 to –0.26
$R^2 = 0.218$				
Mental component summary				
HADS-Depression	–1.09	0.33	–3.29**	–1.75 to –0.43
HADS-Anxiety	–0.63	0.27	–2.63**	–1.18 to –0.91
Age (Years)	0.13	0.05	2.73**	0.04 to .23
$R^2 = 0.334$				

^a Tertiary: '1' = tertiary, '0' = no formal/primary.^b Secondary: '1' = secondary, '0' = no formal/primary & tertiary.** $p < .01$.

Patients aged 65 years and above, reported significantly higher MCS scores. This finding is congruent with studies that reported better mental health among elderly participants aged 65 years and above (De Smedt et al., 2008; Ford et al., 2008; Lee et al., 2012; Wang et al., 2013). CHD has been reported to inhibit productivity and increase stress levels, especially among individuals aged 35 to 54, fueling fears of a recurrent attack, disruption to work and potential loss of income (Yu, Thompson, Yu, & Oldridge, 2009). Furthermore, the experience that comes with age may assist these elderly participants to better cope with such psychological stressors compared to their younger counterparts (Dickson, Howe, Deal, & McCarthy, 2012). Although there was no significant difference in PCS scores, it is worthy to note that participants aged 35 to 54 had the highest mean PCS scores, which is reflective of better physical condition and less pronounced CHD state among younger participants (Kimble et al., 2011).

Married individuals reported significantly better physical health compared to unmarried ones, possibly due to the presence of a spouse that assists in monitoring the diet and physical activity of the patient (Barry et al., 2006). Interestingly, there was no statistically significant difference between the marital statuses for MCS scores. One plausible explanation could be the absence of familial responsibility and challenges that unmarried individuals would enjoy, thus reducing mental stress and improving psychological outcome (Sherman et al., 2003; Rantanen et al., 2008).

Higher income individuals reported better physical health, a finding reported elsewhere (Barbareschi et al., 2009). The mechanisms underpinning the observed difference could involve increased access to better healthcare services or even affordability of fitness clubs that could substantially improve physical health outcome (Stafford et al., 2012). Interestingly, there was no discernible trend between the income groups for mental health scores. This contradicts earlier findings that higher income would translate to better MCS mean scores and HRQoL (Barbareschi et al., 2009; Stafford et al., 2012). Plausible explanations could include higher stress levels in middle income group due to treatment cost concerns and potential disruption to income coupled with not qualifying for financial assistance schemes based on their income (Barbareschi et al., 2009).¹³

Better educated patients reported higher PCS mean scores, a finding reported elsewhere possibly due to better understanding of illness, enhanced behavioral modification and better adherence to management plans, leading to better health outcomes (Yu et al., 2009). Another interesting finding is unemployed individuals reporting better mental health compared to employed individuals. This contrasts with the common notion that being employed increases self-efficacy and provided a sense of purpose, both contributing to better mental health (Sherman et al., 2003; Škodová et al., 2011). Given that most of the 34 unemployed participants were elderly, it

may lend some support in explaining the higher mean MCS score. However, the difference in MCS scores is less than three points and may be of little clinical significance (Yu et al., 2009).

Moving on to clinical characteristics, there were differences in HRQoL scores that merit mention. Comparison between different treatment modalities revealed statistically significant difference in PCS scores. Patients receiving medical therapy only reported the lowest physical health while those that had CABG reported the highest mean scores among the three treatment modalities. This affirms findings that revascularization therapies alleviate the pain and discomfort experienced during AMI and angina as well as improve physical functioning and health outcome, in turn improving HRQoL status (Christian, Cheema, Smith, & Mosca, 2007; Cepeda-Valery et al., 2011). Interestingly, patients receiving medical therapy only, demonstrated better mental health than those receiving revascularization therapies. Possible explanations include stress associated with undergoing surgical procedures such as PCI and CABG, where patients have to contend with high surgical cost, post-surgical care and the uncertainty of restenosis (Eastwood, Doering, Roper, & Hays, 2008; Škodová et al., 2011). Another plausible explanation could be related to patients receiving medical therapy only being older than the other two treatment groups, thus explaining the higher mental health scores due to age (Škodová et al., 2011).

The low anxiety and depression mean scores found may be attributed to the high level of total social support (Page et al., 2010). In addition, the statistically significant negative correlations between psychological status and HRQoL highlights the potential impact of issues such as lifelong treatment regimes and their ensuing costs, disruption to work and income, and fear of a recurrent attack, on the physical and mental health components of HRQoL (Stafford et al., 2012). Moreover, the mild but significant positive correlation between mental health and social support may be due to most of the patients being married, thereby benefitting from readily accessible, concrete support from spouses to cope with treatment demands and other forms of psychological stress associated with CHD (Sherman et al., 2003).

In our study, depression and education level were identified as the predictors for physical health as assessed by SF-12, though only 22% of the variance was explained by these factors. Nevertheless, the results suggest that high HADS depression scores predicted lower physical health, while higher educational levels predicted better physical health. Outpatients with CHD suffering from depression are often found to be distracted from engaging in secondary prevention behaviors such as exercising and medication adherence, and this accelerates disease progression and worsens physical outcome (Dickens, Cherrington, & McGowan, 2012). Highly educated patients tend to have better levels of health literacy which results in better self-care ability and improved health outcomes (Baune et al., 2012).

Predictors of mental HRQoL included anxiety and depression levels as well as age, yet only 33% of the variance explained by the three variables. Anxiety and depression have been found to either act independently or collectively in negatively influencing the individual's mental health through reduced engagement in social activities and increased levels of distress (Baune et al., 2012; Myers, Gerbera, Benyamini, Goldbourt, & Drory, 2012; Yohannes, Doherty, Bundy, & Yalfani, 2010). Our finding of age as a significant predictor of mental health is in line with other studies indicating age as a positive predictor of mental health (Ford et al., 2008; Lee et al., 2012; Wang et al., 2012).

5. Implications and Conclusion

The use of convenience sampling strategy from a single tertiary hospital limits the generalisability and interpretation of the findings, and caution must be exercised when extrapolating these results to CHD outpatients in other settings. A more proportionate recruitment may be

beneficial in future studies to enhance generalisability of findings and to better discern any differences in HRQoL status between major ethnic groups in Singapore. Moreover, the use of self-report questionnaire may have been susceptible to some common problems such as social desirability response set bias where participants had a tendency to misrepresent attitudes or traits by providing responses that place them in good light. Nevertheless, with the use of instruments that were established to be valid and reproducible in different populations, one could only hope to have reduced these biases.

To our knowledge, this study is the first of its kind in investigating the HRQoL of outpatients with CHD in Singapore. It presents healthcare professionals with insights on the key factors affecting HRQoL. Differences in HRQoL mean scores between gender, age and socioeconomic subgroups found in this study highlight the importance of patient tailored interventions to ensure optimal health outcomes. From this set of characteristics, we have identified age, educational status and psychological status as predictors of HRQoL. This suggests that special attention must be paid to younger patients and those with lower educational attainment, as they have been found to experience poorer mental and physical health respectively. Such efforts are imperative to minimize the increasing healthcare burden that would be borne by the community in the near future.

In conclusion, it is the prerogative of healthcare professionals to incorporate findings of this study into their respective clinical practice in order to improve the HRQoL of outpatients with CHD. With management objectives shifting towards treating the individual as a whole, as opposed to the disease alone, evaluating and managing the individual's HRQoL would be the recommended way forward in holistic care.

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