



7-5-2013

## 'It Could be Worse ... Lot's Worse!' Why Health-Related Quality of Life is Better in Older Compared with Younger Individuals with Heart Failure

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### Recommended Citation

Moser, D. K., Heo, S., Lee, K., Hammash, M., Riegel, B., Lennie, T. A., Arslanian-Engoren, C., Mudd-Martin, G., Albert, N., & Watkins, J. (2013). 'It Could be Worse ... Lot's Worse!' Why Health-Related Quality of Life is Better in Older Compared with Younger Individuals with Heart Failure. *Age and Ageing*, 42 (5), 626-632. <http://dx.doi.org/10.1093/ageing/aft078>

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# 'It Could be Worse ... Lot's Worse!' Why Health-Related Quality of Life is Better in Older Compared with Younger Individuals with Heart Failure

## Abstract

**Background:** health-related quality of life (HRQOL) is markedly impaired in patients with heart failure (HF). Despite worse prognosis and physical status, older patients have better HRQOL than younger patients.

**Objective:** to determine reasons for differences in HRQOL in older compared with younger HF patients.

**Methods:** a mixed methods approach was used. HRQOL was assessed using the Minnesota Living with HF Questionnaire and compared among HF patients ( $n = 603$ ) in four age groups ( $\leq 53$ , 54–62, 63–70 and  $\geq 71$  years). Socio-demographic/clinical and psychological factors related to HRQOL were determined in four groups using multiple regressions. Patients ( $n = 20$ ) described their views of HRQOL during semi-structured interviews.

**Results:** HRQOL was worse in the youngest group, and best in the two oldest groups. The youngest group reported higher levels of depression and anxiety than the oldest group. Anxiety, depression and functional capacity predicted HRQOL in all age groups. Qualitatively, patients in all age groups acknowledged the negative impact of HF on HRQOL; nonetheless older patients reported that their HRQOL exceeded their expectations for their age. Younger patients bemoaned the loss of activities and roles, and reported their HRQOL as poor.

**Conclusions:** better HRQOL among older HF patients is the result, in part, of better psychosocial status. The major factor driving better HRQOL among older patients is a change with advancing age in expectations about what constitutes good HRQOL.

## Keywords

health-related quality of life, older adults, anxiety, depression, older people

## Disciplines

Cardiology | Cardiovascular Diseases | Circulatory and Respiratory Physiology | Geriatric Nursing | Geriatrics | Health and Medical Administration | Health Services Research | Medical Humanities | Medicine and Health Sciences | Nursing | Preventive Medicine | Psychiatry and Psychology

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## Abstract

**Background:** Health-related quality of life (HRQOL) is markedly impaired in patients with heart failure (HF). Despite worse prognosis and physical status, older patients have better HRQOL than younger patients.

**Objective:** To determine reasons for differences in HRQOL in older compared to younger heart failure (HF) patients.

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Heart failure (HF) is a chronic, serious and expensive worldwide health problem that is notable for its strikingly negative impact on patients' health-related quality of life (HRQOL) [1, 2] [3]. Indeed, poor HRQOL is a hallmark of HF [4, 5]. Of interest to clinicians and researchers is the recognized phenomenon of better HRQOL in older compared to younger HF patients [6].

The finding that older patients with HF report better HRQOL is intriguing given that elders have worse physical status and prognosis than younger patients [7, 8]. Reasons for the better HRQOL in elders are unknown. Identification of mechanisms underlying this phenomenon may provide important insights for developing interventions to improve HRQOL for all patients with HF.

A mixed methods approach was used to determine reasons for age-related differences in HRQOL. We used quantitative and qualitative approaches to address the following objectives: (1) to quantitatively compare HRQOL among HF patients in 4 age groups; (2) to identify significant sociodemographic (i.e., gender, ethnicity, education levels, and marital status), clinical (i.e., New York Heart Association [NYHA] class, ejection fraction, and functional capacity), and psychosocial (i.e., depression and anxiety) factors related to HRQOL within the 4 age groups; and (3) to gain insight into HF patients' perceptions regarding HRQOL using semi-structured qualitative interviews. We hypothesized that older patients with HF would have better HRQOL than younger patients with HF because of their previously documented better psychosocial status [9] and altered expectations with aging [10].

## **Method**

### ***Design***

Institutional review board approval was obtained and all participants gave signed, informed consent. Quantitative data were obtained using cross-sectional survey techniques, and qualitative data were obtained using a qualitative descriptive method [11].

### ***Participants and Setting***

Data were obtained from participants who were enrolled in the HF HRQOL Collaborative [12, 13]. Patients were included who met these inclusion criteria: (1) diagnosis of HF; (2) community-dwelling; (3) free of major cognitive impairment; and (4) free of major life-threatening comorbidities expected to result in death within 12 months.

Data for the qualitative portion of this study were obtained from 20 individuals in the HF HRQOL Collaborative. The individuals who participated in the qualitative study were purposively selected to provide a group younger than 65 and a group older than 65 years of age, and met the same inclusion criteria described above.

***Measurement.*** All instruments used have well-established reliability and validity in HF patients and across a variety of ages [14-19].

***Health-related Quality of Life.*** Health-related quality of life was measured using the 21-item Minnesota Living with HF Questionnaire (MLHFQ) [18]. The MLHFQ measures patient perceptions of the impact of HF on physical, psychological, and social aspects of their' lives. Higher scores indicate worse HRQOL.

***Anxiety.*** Anxiety was assessed with the anxiety subscale of the Brief Symptom Inventory[20]. Higher scores indicate higher anxiety.

***Depressive Symptoms.*** Depressive symptoms were assessed using the Patient Health Questionnaire (PHQ-9) [21]. Each item corresponds to one of nine symptoms for the major

depressive disorder criteria in the Diagnostic and Statistical Manual of Mental Disorders-IV. Higher scores indicate higher levels of depressive symptoms.

*Functional Capacity.* Functional capacity was measured with the Duke Activity Status Index (DASI)[19]. The items in the DASI represent daily activities such as performed during personal care, ambulation, and household tasks. Each item is weighted by the estimated metabolic equivalents of task (MET) level associated with the activity; higher scores denote greater functional capacity.

*Clinical and Demographic Variables.* Comorbidity scores were measured using the Charlson comorbidity index [22]. NYHA functional class was evaluated via structured patient interviews. Socio-demographic and clinical data were collected from a standard questionnaire and medical records.

#### *Qualitative Interview*

In order to obtain data that would illuminate why observed differences exist between younger and older HF patients, we asked participants to respond to the following open-ended questions during interviews: (1) what does HRQOL mean to you; (2) how would you define HRQOL?; (3) what things influence your HRQOL?; and 4) describe your current HRQOL. Each interview was conducted individually in patients' homes. All interviews were audio-taped and transcribed verbatim..

#### *Data Analysis*

Quantitative data were analyzed using SAS 9.2 (SAS Institute Inc, NC). Patients were categorized into 4 groups by the quartile of age within this sample (i.e., aged  $\leq 53$ , 54-62, 63-70, and  $\geq 71$  years). To compare characteristics among the 4 age groups we conducted a chi-square

test for categorical variables and analysis of variance (ANOVA) for continuous variables followed by Bonferroni post-hoc test if ANOVA was significant.

Multiple linear regression analyses in each age group were conducted to determine independent predictors of HRQOL. The variables included in the model were age, gender, marital status, ethnicity, education level, NYHA class, ejection fraction, body mass index, depressive symptoms, anxiety, and functional capacity [6, 23]. All variables were forced into the model for simultaneous control. The assumptions of multiple linear regression analyses were examined by studentized residuals plots of the model, normality probability plots, and the Kolmogorov-Smirnov Test. There were no violations of the assumptions, nor were there problems with multicollinearity

Qualitative data were analyzed using conventional content analysis [24]. This process included summarizing information provided through the interviews to identify themes elucidating participants' perspectives. A coding scheme was derived based on emerging themes. An iterative process of interviewing, reading, coding, rereading, recoding and discussing codes with co-investigators was used to supplement and refine the coding scheme. The agreed upon codes were grouped into larger descriptive categories by investigators.

## **Results**

### ***Quantitative Findings***

*Sample characteristics.* A total of 603 patients were included in this analysis (Table 1). Significant group differences among the age quartiles were observed in marital status, ethnicity, body mass index, ejection fraction, and scores of HRQOL, depressive symptoms, and anxiety. Patients in the youngest group (age  $\leq 53$  years) were more obese and had worse HRQOL and higher levels of anxiety than patients in the two oldest groups (age of 63-70 years and  $\geq 71$  years,

respectively). Patients in the youngest group had lower ejection fraction and higher levels of depressive symptoms compared to patients in the age group of 63-70 years.

*Predictors of Health-related Quality of Life in Four Age Groups.* Multiple linear regression models by age quartile are presented in Table 2. The regression model in patients in the youngest group explained 66% of the total variance in MLHFQ scores. Scores of depressive symptoms, anxiety, and functional capacity were independent predictors of MLHFQ scores. Higher levels of depressive symptoms and anxiety and more limited functional capacity were associated with worse HRQOL. In the two middle age groups (age 54-62 years and 63-70 years) identical predictors of HRQOL were observed, which were marital status and scores of depressive symptoms, anxiety, and functional capacity, explaining 62% and 68% of the variance in MLHFQ scores, respectively. In these two age groups, patients who were married or cohabitating were more likely to have worse HRQOL than patients who were single, divorced, or widowed. Worse HRQOL was independently predicted by higher levels of depressive symptoms and anxiety and more impaired functional capacity.

In the oldest age group (age  $\geq 71$  years) 56% of the total variance of the MLHFQ scores was explained by the regression model. Poorer HRQOL was significantly associated with higher scores of depressive symptoms and anxiety and reduced functional capacity.

### ***Qualitative Findings***

#### *Definition of Health-related Quality of Life and Factors Affecting Health-related Quality of Life: Comparison of the Perspectives of Younger and Older Patients*

Patients (Table 3) described HRQOL as consisting of happiness, ability to perform desired activities, and relationships with others. As one patient stated, "...yes, yes, quality of life



means ....how happy, content you are, doing what you want to do...everything you want to do...being able to...being with ...being with loved ones and friends if you want...”. The following factors were defined by patients as affecting HRQOL: spirituality, psychological factors, economic status, health status, social support, and health-related behaviors.

In comparing patients’ perspectives on the definitions of HRQOL, no differences were noted between younger and older patients. Both groups of patients identified happiness, relationships, and ability to do activities as defining quality of life. In both younger and older patients, ability to perform activities was fundamental to defining quality of life.

*Why Older Patients with Heart Failure Have Better Health-related Quality of Life Than Younger Patients; Changed Expectations.*

Data from the interview question exploring individuals’ perceptions of their own HRQOL were used to illuminate reasons for the better HRQOL in elders. Patients’ comments revealed an overarching theme that could be described as “Changed Expectations”.

Although younger and older patients both acknowledged the negative impact of their impaired functional abilities on HRQOL, older patients reported that their HRQOL exceeded personal expectations given their age or the alternative of death. “It could be worse....lot’s worse...” and similar sentiments were voiced by several older patients. As one 82 year old male patient stated, “I can’t do lots anymore, but I was slowin’ down anyway...I’m old! What do you expect when...when you’re old...everyone is slowin’ down...I’m still kickin’ though”. Thus, for older patients, “Accepting and Grateful” described their perceptions reflecting the change in expectations for the quality of their lives with HF. Referring to HRQOL, another older patient stated, “Even though I can’t do anything that I can do before, I think it’s good.” As stated by

other older patients, “ I should’ve been dead so many times...and I am not...Thank God that I’m alive” and “[T]here’s people in a lot worse shape than I’m in...”.

Older patients also accepted performance of alternative activities as contributing to a good HRQOL and compared their HRQOL to others they perceived were in worse condition: “.....because no matter what kind of condition that you get in, as long as you are able to get up and walk around, you can go to hospital, or some place and find people in worse condition....that’s a good quality of life”.

For younger patients, “Loss and Disappointment” described their perceptions reflecting the change in expectations for the quality of their lives with HF. Younger patients expected to remain active and maintain their many social, domestic and work roles, but these expectations were changed negatively by the reality of HF. They bemoaned the loss of these roles and their ability to perform activities, and reported their HRQOL as very poor. As shared by a 52 year old woman, “My career is over. I can’t do stuff with my family...my husband and I had plans...my quality of life...is terrible”. A 48 year old man stated, “Poor [HRQOL]...I’ve gone from being a very active person to being a person that I can do only as much as my body allows me...now I’m just a couch potato”. A 46 year old man said, “I’m just a shell of my former self...I can’t do what I want, I can’t live like I want, I’m not, not, myself...and no good to anyone.”

### **Discussion**

We determined how HRQOL differed among age groups in patients with HF and what factors were associated with this difference. Older patients with HF had better HRQOL and fewer symptoms of anxiety and depression compared to younger patients. Qualitative analysis of data suggested that better quality of life in older compared to younger patients was a result of older patients’ abilities to reconceptualize or change their expectations for quality of life in the

context of HF. This finding is supported by other investigators who have found that older adults who “give up” activities due to chronic illness have better mental well-being if they “replace” those activities with other activities that are achievable given the limitations imposed by illness [10].

Psychological distress (e.g., depressive symptoms and anxiety), commonly reported by patients with HF [25, 26], contributes to impairment of HRQOL [27]. In this study higher levels of psychological distress were observed in younger patients with HF than older patients, which is consistent with previous studies [9]. This appears to translate into worse HRQOL in younger patients compared to their older counterparts.

Narrative descriptions from HF patients in this study provided additional insights about the major factor that explained the mechanism of better HRQOL in older patients with HF. Compared to their younger counterparts, older individuals had a change in their expectations about what constituted a good HRQOL as they aged. Older individuals expected their quality of life to decline as they aged and thus did not seem devastated, as did younger individuals, when it declined as a consequence of HF. Older patients were able to put their declining functional status into perspective by comparing themselves to others who they considered to be in worse shape. They were grateful that they were still alive and not as bad off as many others. Younger individuals, on the other hand, expected to have long, productive and active lives and had difficulty accepting the many losses attendant with HF.

According to Ubel and colleagues [28] evaluating ones’ physical health is a relative process that consists of comparing one’s physical health with that of others in the same age group. As people age, the decline in physical capabilities is expected to be a universal phenomenon [28]. This notion may make it easy for older patients to accept physical decrements

[29]. Reduced physical capacity due to HF is viewed far more negatively by younger patients as their peers tend to be healthy and very active. Additionally, societal expectations are different between younger and older adults. Younger adults are expected to build their careers and raise families. For younger patients with HF, inability to fulfill their responsibilities results in a discrepancy between what they want to accomplish and what they believe is expected, and what they are actually able to do. This discrepancy may be associated with the feeling of loss and disappointment that result in poor HRQOL.

Of interest, we found that older patients' self-evaluation of their HRQOL was at times contrary to their own definitions of HRQOL. For example, having the ability to perform physical and social activities was an important component of patients' definitions of HRQOL regardless of age, and almost all patients reported that they experienced limitations in physical and social activities since developing HF. Nonetheless, compared to younger patients, most older patients reported that their HRQOL was good. This contradiction reflected the important role of positive outlook and changing personal expectation on older patients' self-evaluations of their HRQOL. Patients often evaluated their HRQOL positively based on how bad things could be instead of how things actually were due to HF, and what they were able to do as opposed to what they were unable to do due to HF.

Although there are no studies examining reasons for the differences in HRQOL between older and younger patients with HF, a recent study of age-related differences in vigilance about symptoms among patients with HF [30], supports the findings from the current study. In that study, younger HF patients perceived that HF symptoms negatively affected their daily lives, which caused hypervigilance. Although this may contribute to the difficulty older patients seems

to have monitoring and noting escalating symptoms, it also seems to contribute to older patients' better assessment of their HRQOL.

Marital status was unrelated to HRQOL in the youngest and oldest age groups, but was associated with it in the age groups 54-62 and 63-70 years. We found that being married was associated with worse HRQOL in these two groups. Being married is associated with better outcomes in patients with HF in some studies,[31] while it is unrelated in others.[32] Conflicting findings are likely the result of using marital status as a surrogate for social support. In future studies, social support should be measured to more accurately assess these relationships.

Limitations of this study include the observational, cross-sectional study nature of the study. Given this design, no causal inferences can be made.

### ***Conclusions***

In summary, findings from this study indicated that changed expectations may explain why elders had better HRQOL than younger patients. Interventions to improve HRQOL could employ methods that alter patients' cognitive appraisal of their HRQOL. By assisting patients to adopt new goals and see possibilities despite their limitations, their HRQOL could improve.

**Declaration of Sources of Funding**

This work was supported by the National Institutes of Health, National Institute of Nursing Research [R01 NR008567 to D.K.M., P20NR010679 to D.K.M]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Nursing Research or the National Institutes of Health. Financial sponsors played no role in the design, execution, analysis, and interpretation of data or writing of the study.

## References

1. Lewis EF, Lamas GA, O'Meara E, Granger CB, Dunlap ME, McKelvie RS, et al. Characterization of health-related quality of life in heart failure patients with preserved versus low ejection fraction in CHARM. *Eur J Heart Fail.* 2007 Jan;9(1):83-91.
2. Roger VL, Go AS, Lloyd-Jones DM, Adams RJ, Berry JD, Brown TM, et al. Heart disease and stroke statistics--2011 update: a report from the American Heart Association. *Circulation.* 2011 Feb 1;123(4):e18-e209.
3. Hobbs FD, Kenkre JE, Roalfe AK, Davis RC, Hare R, Davies MK. Impact of heart failure and left ventricular systolic dysfunction on quality of life: a cross-sectional study comparing common chronic cardiac and medical disorders and a representative adult population. *Eur Heart J.* 2002 Dec;23(23):1867-76.
4. Juenger J, Schellberg D, Kraemer S, Haunstetter A, Zugck C, Herzog W, et al. Health related quality of life in patients with congestive heart failure: comparison with other chronic diseases and relation to functional variables. *Heart.* 2002 Mar;87(3):235-41.
5. Calvert MJ, Freemantle N, Cleland JG. The impact of chronic heart failure on health-related quality of life data acquired in the baseline phase of the CARE-HF study. *Eur J Heart Fail.* 2005 Mar 2;7(2):243-51.
6. Heo S, Moser DK, Riegel B, Hall LA, Christman N. Testing a published model of health-related quality of life in heart failure. *Journal of Cardiac Failure.* 2005 Jun;11(5):372-9.
7. Baruch L, Glazer RD, Aknay N, Vanhaecke J, Heywood JT, Anand I, et al. Morbidity, mortality, physiologic and functional parameters in elderly and non-elderly patients in the Valsartan Heart Failure Trial (Val-HeFT). *Am Heart J.* 2004 Dec;148(6):951-7.

8. Wahle C, Adamopoulos C, Ekundayo OJ, Mujib M, Aronow WS, Ahmed A. A propensity-matched study of outcomes of chronic heart failure (HF) in younger and older adults. *Arch Gerontol Geriatr.* 2009 Jul-Aug;49(1):165-71.
9. Freedland KE, Rich MW, Skala JA, Carney RM, Davila-Roman VG, Jaffe AS. Prevalence of depression in hospitalized patients with congestive heart failure. *Psychosom Med.* 2003 Jan-Feb;65(1):119-28.
10. Duke J, Leventhal H, Brownlee S, Leventhal EA. Giving up and replacing activities in response to illness. *J Gerontol B Psychol Sci Soc Sci.* 2002 Jul;57(4):P367-76.
11. Sandelowski M. What's in a name? Qualitative description revisited. *Research in Nursing & Health.* 2010 Feb;33(1):77-84.
12. Riegel B, Moser DK, Carlson B, Deaton C, Armola R, Sethares K, et al. Gender differences in quality of life are minimal in patients with heart failure. *Journal of Cardiac Failure.* 2003 Feb;9(1):42-8.
13. Riegel B, Moser DK, Rayens MK, Carlson B, Pressler SJ, Shively M, et al. Ethnic differences in quality of life in persons with heart failure. *Journal of Cardiac Failure.* 2008 Feb;14(1):41-7.
14. Abu Ruz ME, Lennie TA, Riegel B, McKinley S, Doering LV, Moser DK. Evidence that the brief symptom inventory can be used to measure anxiety quickly and reliably in patients hospitalized for acute myocardial infarction. *J Cardiovasc Nurs.* 2010 Mar-Apr;25(2):117-23.
15. Moser DK, Frazier SK, Worrall-Carter L, Biddle MJ, Chung ML, Lee KS, et al. Symptom variability, not severity, predicts rehospitalization and mortality in patients with heart failure. *Eur J Cardiovasc Nurs.* 2011 Jun;10(2):124-9.



16. Song EK, Moser DK, Frazier SK, Heo S, Chung ML, Lennie TA. Depressive symptoms affect the relationship of N-terminal pro B-type natriuretic peptide to cardiac event-free survival in patients with heart failure. *Journal of Cardiac Failure*. 2010 Jul;16(7):572-8.
17. Lindenfeld J, Albert NM, Boehmer JP, Collins SP, Ezekowitz JA, Givertz MM, et al. HFSA 2010 Comprehensive Heart Failure Practice Guideline. *Journal of Cardiac Failure*. 2010 Jun;16(6):e1-194.
18. Rector TS, Cohn JN. Assessment of patient outcome with the Minnesota Living with Heart Failure questionnaire: Reliability and validity during a randomized, double-blind, placebo-controlled trial of pimobendan. Pimobendan Multicenter Research Group. *Am Heart J*. 1992 Oct;124(4):1017-25.
19. Hlatky MA, Boineau RE, Higginbotham MB, Lee KL, Mark DB, Califf RM, et al. A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). *Am J Cardiol*. 1989 Sep 15;64(10):651-4.
20. Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. *Psychol Med*. 1983 Aug;13(3):595-605.
21. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire*. *JAMA*. 1999 Nov 10;282(18):1737-44.
22. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis*. 1987;40(5):373-83.
23. Gottlieb SS, Kop WJ, Ellis SJ, Binkley P, Howlett J, O'Connor C, et al. Relation of depression to severity of illness in heart failure (from Heart Failure And a Controlled Trial

- Investigating Outcomes of Exercise Training [HF-ACTION]). *Am J Cardiol.* 2009 May 1;103(9):1285-9.
24. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qualitative Health Research.* 2005 Nov;15(9):1277-88.
25. Rutledge T, Reis VA, Linke SE, Greenberg BH, Mills PJ. Depression in heart failure a meta-analytic review of prevalence, intervention effects, and associations with clinical outcomes. *J Am Coll Cardiol.* 2006 Oct 17;48(8):1527-37.
26. Moser DK, Dracup K, Evangelista LS, Zambroski CH, Lennie TA, Chung ML, et al. Comparison of prevalence of symptoms of depression, anxiety, and hostility in elderly patients with heart failure, myocardial infarction, and a coronary artery bypass graft. *Heart Lung.* 2010 Sep-Oct;39(5):378-85.
27. Bekelman DB, Havranek EP, Becker DM, Kutner JS, Peterson PN, Wittstein IS, et al. Symptoms, depression, and quality of life in patients with heart failure. *Journal of Cardiac Failure.* 2007;13(8):643-8.
28. Ubel PA, Jankovic A, Smith D, Langa KM, Fagerlin A. What is perfect health to an 85-year-old?: Evidence for scale recalibration in subjective health ratings. *Medical Care.* 2005 Oct;43(10):1054-7.
29. Piazza JR, Charles ST, Almeida DM. Living with chronic health conditions: age differences in affective well-being. *Journal of Gerontology Series B Psychological Sciences and Social Sciences.* 2007 Nov;62(6):313-21.
30. Riegel B, Dickson VV, Cameron J, Johnson JC, Bunker S, Page K, et al. Symptom recognition in elders with heart failure. *Journal of Nursing Scholarship.* 2010 Mar;42(1):92-100.

31. Luttik ML, Jaarsma T, Veeger N, van Veldhuisen DJ. Marital status, quality of life, and clinical outcome in patients with heart failure. *Heart Lung*. [Research Support, Non-U.S. Gov't]. 2006 Jan-Feb;35(1):3-8.
32. Heo S, Moser DK, Chung ML, Lennie TA. Social status, health-related quality of life, and event-free survival in patients with heart failure. *Eur J Cardiovasc Nurs*. [Research Support, N.I.H., Extramural Research Support, Non-U.S. Gov't]. 2012 Jun;11(2):141-9.

Table 1. Sample Characteristics (N=603)

	<b>Total</b> <b>(N =603 )</b>	<b>Quartile 1</b> <b>(N = 154)</b>	<b>Quartile 2</b> <b>(N = 163)</b>	<b>Quartile 3</b> <b>(N = 147)</b>	<b>Quartile 4</b> <b>(N = 139)</b>	<b><i>p</i>-value</b>
	Mean (SD) or N (%)					
Age, years	61.0 (12.5)	44.8 (7.5)	58.2 (2.5)	66.2 (2.2)	76.9 (4.5)	<.0001
Gender						0.4219
Male	417 (69.2%)	106 (68.8%)	120 (73.6%)	101 (68.7%)	90 (64.7%)	
Female	186 (30.8%)	48 (31.2%)	43 (26.4%)	46 (31.3%)	49 (35.3%)	
Marital status						0.0006
Single/divorced/ widowed	269 (44.6%)	90 (58.4%)	66 (40.5%)	53 (36.1%)	60 (43.2%)	
Married/co-habiting	334 (55.4%)	64 (41.6%)	97 (59.5%)	94 (63.9%)	79 (56.8%)	
Ethnicity						<.0001
Caucasian	484 (80.3%)	101 (65.6%)	133 (81.6%)	126 (85.7%)	124 (89.2%)	
Others	119 (19.7%)	53 (34.4%)	30 (18.4%)	21 (14.3%)	15 (10.8%)	
Education, years	13.3 (3.2)	13.4 (2.8)	13.2 (3.2)	13.1 (3.4)	13.3 (3.5)	0.9344

NYHA class						0.5639
I/II	242 (40.1%)	64 (41.6%)	71 (43.6%)	57 (38.8%)	50 (36.0%)	
III/IV	361 (59.9%)	90 (58.4%)	92 (56.4%)	90 (61.2%)	89 (64.0%)	
Ischemic etiology (n=594)	423 (71.2%)	97 (63.8%)	115 (71.0%)	107 (74.3%)	104 (76.5%)	0.0871
Ejection fraction, %	30.2 (14.5)	27.9 (14.6)	29.4 (12.8)	30.6 (14.8)	33.2 (15.4)	0.0136
Months with diagnosis of heart failure	81.1 (83.3)	73.6 (77.8)	78.6 (87.0)	83.9 (70.5)	89.4 (90.8)	0.18
Comorbidity scores	3.3 (2.1)	3.2 (2.3)	3.2 (2.0)	3.4 (2.1)	3.5 (2.1)	0.3378
Body mass index, kg/m <sup>2</sup>	30.0 (7.2)	32.2 (8.6)	31.1 (6.7)	28.8 (6.3)	27.8 (5.9)	<.0001
MLHFQ scores	47.2 (26.7)	54.5 (28.0)	49.5 (27.4)	43.3 (26.1)	40.4 (22.8)	<.0001
PHQ-9 scores	7.8 (6.1)	9.1 (6.5)	7.7 (6.2)	7.5 (6.1)	6.6 (5.1)	0.0068
BSI-anxiety scores	0.9 (0.9)	1.1 (1.0)	0.9 (1.0)	0.7 (0.9)	0.6 (0.7)	<.0001
Duke Activity Status Index scores	12.8 (12.6)	13.5 (13.7)	12.6 (12.8)	13.4 (12.7)	11.5 (10.9)	0.5319

*Note.* Quartile 1= Age of  $\leq 53$ ; Quartile 2= age of 54-62; Quartile 3= age of 63-70; Quartile 4: age of  $\geq 71$

NYHA=New York Heart Association; MLHFQ= Minnesota Living with Heart Failure Questionnaire; PHQ-9=the Patient Health Questionnaire-9; BSI-anxiety=Brief Symptom Inventory-anxiety

**Post-hoc test results:**

Age= Quartile 1 differs from quartiles 2, 3, and 4

BMI: Quartile 1 differs from quartiles 3 and 4; quartile 2 differs from quartiles 3 and 4

MLHFQ scores: Quartile 1 differs from quartiles 3 and 4; and quartile 2 differs from quartiles 3

Ejection fraction and PHQ-9 scores: Quartile 1 differs from quartile 4

BSI-anxiety scores: Quartile 1 differs from quartiles 3 and 4; and quartile 2 differs from quartile 4

Table 2. Multiple Regression Results for the Minnesota Living with Heart Failure Scores by Age Groups (N=603)

	<b>Quartile 1 (N = 154)</b>		<b>Quartile 2 (N = 163)</b>		<b>Quartile 3 (N = 147)</b>		<b>Quartile 4 (N = 139)</b>	
Variables	Standardized $\beta$	<i>p</i> -value	Standardized $\beta$	<i>p</i> -value	Standardized $\beta$	<i>p</i> -value	Standardized $\beta$	<i>p</i> -value
Age	-0.13	0.47	-0.17	0.75	0.46	0.43	0.10	0.75
Female <sup>a</sup>	-2.76	0.38	-4.76	0.14	2.81	0.34	-5.96	0.05
Married/cohabitating <sup>b</sup>	-1.39	0.62	9.56	0.001	5.66	0.04	-2.22	0.44
Caucasian	-4.78	0.10	-1.89	0.60	-3.54	0.33	4.81	0.28
Education	0.20	0.68	0.15	0.73	0.48	0.20	-0.22	0.58
NYHA class III/IV <sup>d</sup>	6.60	0.05	0.93	0.76	0.37	0.90	3.18	0.33
Ejection fraction	-0.13	0.26	-0.14	0.22	-0.02	0.85	0.02	0.81
Body mass index	0.13	0.42	0.39	0.06	0.08	0.69	0.21	0.35
PHQ-9 scores	1.52	<0.001	1.99	<0.001	2.41	<0.001	1.64	<0.001
BSI-anxiety scores	5.72	0.001	4.76	0.01	4.05	0.02	4.84	0.048
Duke Activity level scores	-0.77	<0.001	-0.81	<.001	-0.58	<0.001	-0.87	<0.001
<b>Adjusted R2 (model <i>p</i>-value)</b>	0.66 (<0.001)		0.62 (<0.001)		0.68 (<0.001)		0.56 (<0.001)	

*Note.* Quartile 1= Age of  $\leq 53$ ; Quartile 2= age of 54-62; Quartile 3= age of 63-70; Quartile 4: age of  $\geq 71$

Reference groups: a= male; b=single/divorced/ widowed; c= Caucasian; d=NYHA class I/II

NYHA=New York Heart Association; MLHFQ= Minnesota Living with Heart Failure Questionnaire; PHQ-9=the Patient Health

Questionnaire-9; BSI-anxiety=Brief Symptom Inventory-anxiety



Table 3. Participant Characteristics (N = 20)

Characteristic	Mean $\pm$ SD or n (%)
Age, years	62 $\pm$ 11 (range 30 – 88)
Education, years	15 $\pm$ 3
Female	6 (30%)
Married	12 (60%)
New York Heart Association functional classification III/IV	14 (70%)
Caucasian	18 (90%)