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Confirmatory factor analysis of the Minnesota living with heart failure questionnaire among patients following open heart surgery for valve dysfunction

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Abstract

Introduction The Minnesota Living with Heart Failure Questionnaire (MLHFQ) was designed to assess the impact of the adverse effects of heart failure (HF). Numerous reports suggest an additional third factor with the proposed third factor representing a social dimension. The purpose of this study was to use confirmatory factor analysis (CFA) to validate the factor structure of the MLWHFQ, and examine a proposed third factor structure.

Methods Participants were 1290 individuals with open heart surgery for isolated valve repair or replacement between September 2005 and May 2016. Confirmatory factor analysis was used to assess both initial and proposed alternate factor structures.

Results CFA indicated a poor fit for the original proposed 2-factor solution [root mean square error of approximation (RMSEA) = 0.116], whereas separate proposed 3-factor solutions with varying item scoring fit marginally well (RMSEA = 0.080, 0.089). The CFA suggests the existence of a third dimension, social, beyond the established original two-factor solution. Results suggest in a direct comparison of proposed social dimensions, both Garin's four item solution and Munyombwe's six-item solution provide similar results.

Conclusions Results suggest support for an additional third factor among patients undergoing isolated valve replacement surgery. We suggest given the inclusion of items important to our population, relatively strong fit indices, and correlation with the SF-12, the social dimension proposed by Munyombwe best fits our population.

Keywords Heart failure · Health-related quality of life · Confirmatory factor analysis · Heart valve procedures · Minnesota Living with Heart Failure Questionnaire

Heart valve disease is a subset of cardiovascular disease which can lead to heart failure (HF), which affects roughly 5 million adults each year in the United States with estimated costs of $37.2 billion in 2009 [1]. Heart valve disease which includes aortic, mitral, tricuspid, and pulmonary valve diseases can lead to symptoms of heart failure, stroke, blood clots, sudden cardiac arrest, arrhythmias, and cardiomyopathy [2]. Aortic and mitral valves are the most common diseased heart valves but heart valve disease can occur alone or together with other valves. Aortic valve disease is the most common heart valve affected by disease with the annual incidence of aortic stenosis estimated at in 1.5 million [1].

Health-related quality of life (HRQoL) instruments are utilized as a key outcome measure following medical procedures to indicate perceived health status on quality of life. The Minnesota Living with Heart Failure Questionnaire (MLWHFQ) is a disease-specific health-related quality of life (HRQoL) instrument for patients with HF [2–5]. The MLWHFQ can be a key outcome measure in outpatients with symptomatic heart failure or reduced ejection fraction. Ample published literature validating the 2-factor structure of the MLWHFQ [6–9] exists. However, published literature examining the potential existence of a third latent factor [7, 10–13] has been minimal. The most recent published assessment of MLWHFQ confirmed the validity of the MLWHFQ and confirmed the existence of a third factor [14].

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The purpose of this study is to (1) use confirmatory factor analysis to validate the factor structure of the MLWHFQ; (2) examine the proposed third factor structure, and (3) assess convergent validity using the SF-12.

Methods

Study population

Participants were 1290 individuals having undergone open heart surgery for isolated valve repair or replacement between September 2005 and May 2016 enrolled in our Valve Registry Follow-up program (Fig. 1).

Measurements

The MLHFQ is a 21-item, 6-point Likert Scored [0 (none)–5 (very much)] self-administered disease-specific questionnaire for patients with HF [2, 5]. The MLHFQ ranges are as follows: total score range 0–105; physical domain (8 items, range 0–40); emotional domain (5 items, range 0–25). Only thirteen items comprise the physical and emotional domains, eight of the remaining items are included only for calculation of the total score. Lower scores for total score, and

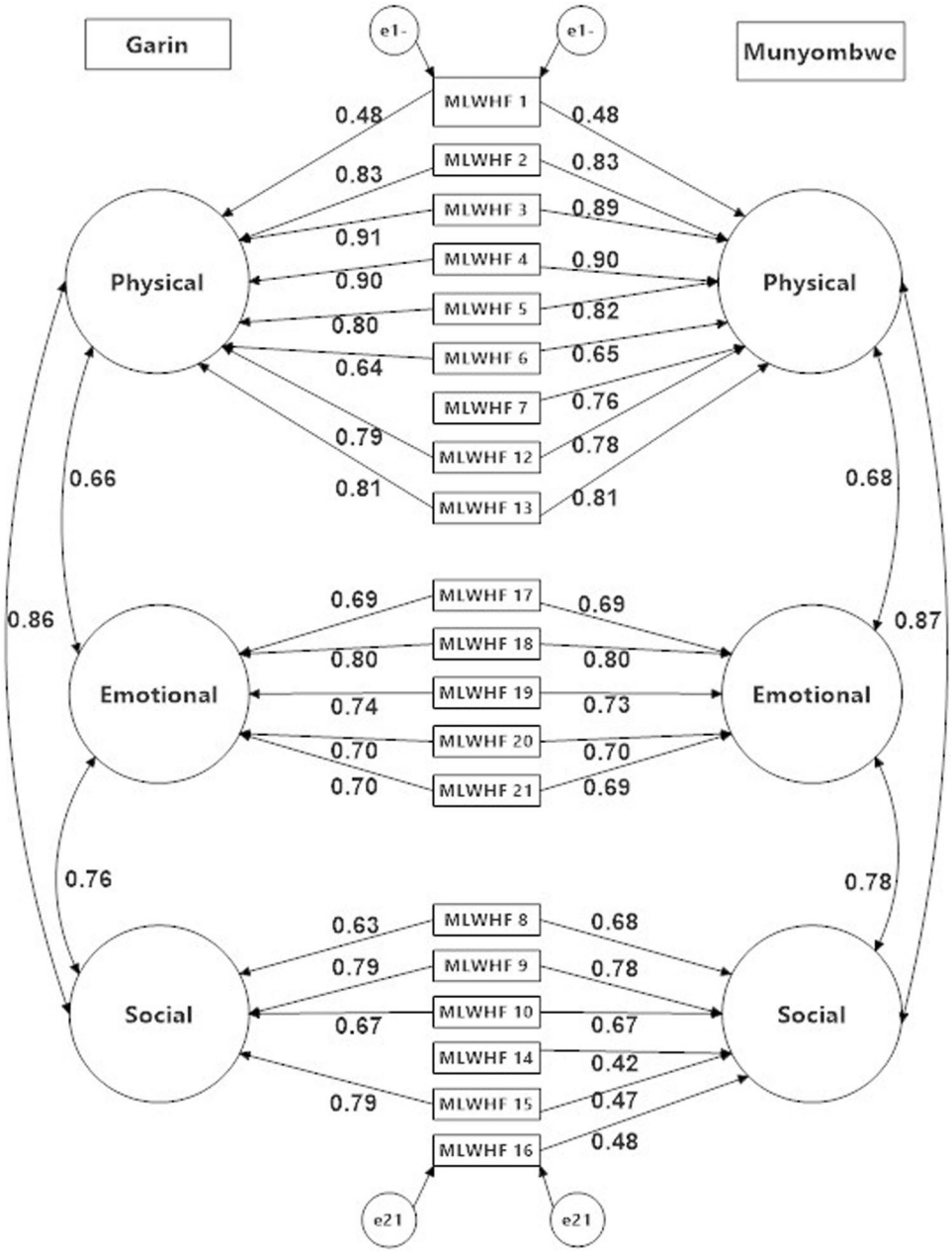

Fig. 1 Confirmatory factor analysis of the MLHFQ physical, emotional and social subscales

physical and emotional domains indicate better HRQoL. The MLWHFQ has been translated into over 25 languages and widely used among various populations.

The SF-12 is a 12-item, 3- and 5-point Likert scored [1 (none)–5 (very much)] self-administered generic HRQoL questionnaire [15] comprised of eight domains (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, mental health). However, generally only two overall summary scores are presented: the physical component score (PCS) and mental component score (MCS). Summary scores range from 0 to 100, with higher scores indicating better health status. The European System for Cardiac Operative Risk Evaluation (EuroSCORE II) is a risk score model (http://www.euroscore.org/calc.html) used to ascertain a patient's magnitude of risk for complications such as mortality after cardiac surgery.

Statistical analysis

Descriptive statistics from the MLWHFQ were calculated using mean ± standard deviation (SD) or frequency and percent, where appropriate. Item correlations were calculated using Pearson's product moment correlations (ρ). We assessed internal consistency using Cronbach's alpha

Coefficient with coefficients ⩾ 0.70 deemed acceptable.

We performed and initial exploratory factor analysis (EFA) to determine the dimensionality of the MLHWF questionnaire among our population of isolated valve recipients. Cutoff values for factor loadings were set at 0.45. Items cross-loading on multiple factors were assigned to the factor with a higher loading. We used confirmatory factor analysis (CFA) to determine the factor structure of the MLWHFQ using maximum likelihood (ML) estimation. To assess model fit, different indexes of fit obtained by the ML method were examined: Bentler-Bonnett NFI, normed fit index (≥ .90 is considered a good fit); Bentler CFI, comparative fit index (≥ .90 is considered a good fit); SRMR, standardized root mean square residual (≤ .08 is considered good a good fit). As models were non-nested, comparisons of different factor structures were made using the Akaike Information Criterion (AIC). Lower AIC values indicate a better fit.

We examined Rector's [2] 2-factor model representing latent factors of physical (MLWHFQ items (Q2–Q7, Q12, Q13) and emotional (MLWHFQ items Q17–Q21). In addition, we examined two prior published works, each suggesting a 3-factor latent structure: Garin's [4] 3-factor model representing latent factors of physical (Q1–Q6, Q12, Q13); emotional (Q17–Q21); and social (Q8–Q10, Q15) and Munyombwe's [7] 3-factor model representing latent factors of physical (Q1–Q7, Q12, Q13); emotional (Q17–Q21); and social (Q8–Q10,Q14–Q16). Items used in both Garin's [4] and Munyombwe's [7] emotional factor (MLWHFQ items Q17–Q21) are identical to the original emotional factor published by Rector [2]. Model differences are such that Garin's model excludes item 7 from physical and Munyombwe's model includes item 15 to social [4, 7]. All models were conducted using identical structure with first-order dimensions. For selection of scoring, our a priori social dimension scoring involved (a) CFA model values for CFI and NFI ≥ .90; (b) item loadings for physical, emotional, and social agreement; and (c) correlation with SF-12.

Results

Descriptive statistics

Demographic and clinical characteristics are presented in Table 1. Participant were primarily male (62.48%), age 62.67 years with approximately 72% presenting with a BMI < 30 kg/m^2. Twenty-one percent of participants presented with HF, 12% with NYHA Class III–IV, and 18% with diabetes. Seventeen percent of participants presented with a prior cardiovascular intervention: either prior coronary artery bypass graft (CABG) 6.1%, 7.8% prior valve, or other cardiac intervention (3.2%).

Construct validity

Estimates for the Kaiser–Meyer–Olkin coefficient for sampling adequacy (0.95) and Barlett test of sphericity (14,969, $p < 0.0001$) suggest our data were appropriate for further factor analysis. Using traditional scoring provided by Rector [5], a two-factor solution explained 54% of variance (physical, emotional), and a three-factor solution explained 59.2% of variance (physical, emotional, social). In a 2-factor solution only one item (#7, Relating to or doing things …) cross loaded on both factors; in a three-factor solution, only one item (#10, Sexual activities difficult) cross loaded on factor 1 (physical) and factor 3 (social). Results of the EFA suggest the presence of a third factor among our population (Table 2).

Comparison of two- and three-factor models

The results of the CFA comparing Rector's [5] 2-factor model to the various 3-factor models are presented in Table 3. Rector's 2-factor model appears to be a marginally poor fitting model with a RMSEA (0.059) with the CFI (0.905) and NFI (0.898) approximately around 0.90. All 3-factor models demonstrate acceptable fit via RMSEA

Table 1 Demographics of survey participants

Parameter	Participants $n=1290$
Age, *M*, SD	62.67, 13.54
Male	806 (62.48)
BMI	
BMI < 25	432 (33.49)
25 ≤ BMI < 30	499 (38.58)
30 ≤ BMI < 35	193 (14.96)
BMI ≥ 35	166 (12.87)
Current smoking	99 (7.67)
Family history CAD	212 (16.43)
Diabetes	229 (17.75)
CVA	64 (4.96)
Hypertension	769 (59.61)
CHF	270 (20.93)
MI	15 (1.163)
Prior CV intervention	220 (17.05)
Prior CABG	78 (6.05)
Prior valve	101 (7.83)
Valve type	
Isolated aortic	623 (48.29)
Isolated mitral	495 (38.37)
Other	172 (13.33)
Heart failure last 2 weeks	103 (7.98)
Ejection fraction ≤ 35%	40 (3.10)
NYHA classification	149 (11.6)
I	107 (8.3)
II	595 (46.1)
III	517 (40.1)
IV	71 (5.5)
SF-12 PCS, *M*, SD	41.74, 12.26
SF-12 MCS, *M*, SD	52.14, 9.92

Unless otherwise noted expressed values are frequency and percent. Some percentages may not add to 100% due to missing data

BMI body mass index, *NYHA* New York Heart Association, *CAD* coronary artery disease, *CVA* cerebrovascular incident, *CHF* congestive heart failure, *MI* myocardial infarction, *CV* cardiovascular, *CABG* coronary artery bypass graft, *PCS* physical component subscale, *MCS* mental component subscale

(range: 0.078 [12]–0.092 [16]). Fit indices ranged from CFI: 0.880 [11] to 0.923 [10].

Internal consistency

Table 4 summarizes item descriptive and correlational statistics for MLWHFQ subscales for both Rector's 2-factor model and various proposed third factor structures. For Rector's 2-factor model, both physical (alpha = 0.935) and emotional factors (alpha = 0.851) demonstrated strong internal consistency (alpha ≥ 0.8) and moderate between factor correlation ($\rho = 0.616$). For the proposed third factor, social, internal consistency ranged from $\alpha = 0.689$ [11] to $\alpha = 0.879$ [16]. When physical factor correlations were examined with social, correlation coefficients ranged from $\rho = 0.682$ [10] to $\rho = 0.828$ [16]. Similarly, when emotional factor correlations were examined with social, correlation coefficients ranged from $\rho = 0.596$ [10] to $\rho = 0.622$ [11].

Criterion validity

Lastly, we assessed convergent validity of various proposed third factors (social) with various known indicators of poor cardiovascular health (Table 5). Participants with heart failure within the last 2 weeks prior to surgery were statistically significantly more likely to score higher on the proposed third dimension. This finding was replicated among patients with LVEF ≤ 35% and increased NYHA classification score. A strong correlation with the SF-12 physical component scale was evident with all proposed social scales, with a low of $r = -0.514$ [11] to a high of $r = -713$ [16]. A similar pattern was observed for the SF-12 mental component scale: a low of $r = -0.331$ [10] to a high of $r = -0.632$ [16].

Social dimension scoring selection

Both CFI and NFI values for only social scoring proposed by Garin (CFI: 0.923; NFI: 0.912) exceeded our 0.90 threshold. However, Lambrinou's [12] and Garin's [10] social dimension is comprised of three and four items, respectively, whereas our factor loadings suggest five items. Both the Lambrinou and Garin social dimension excludes items hospitalization (#14), medical costs (#15), and side effects from medications (#16); items critical to the assessment of our surgical population and included in the social dimension items ($n = 6$) proposed by Munyombwe [7]. Lastly, correlation coefficients for both the SF-12 PCS and MCS domains and the social dimension proposed by Munyombwe lie between those proposed by Lambrinou and Garin.

Discussion

Among a large cohort of patients with open heart isolated valve replacement surgery, our results support the validity of the MLHFQ and suggest the existence of a third factor. Further, our CFA suggests that in a direct comparison of the original two-factor structure with two separate proposed third factor structures, proposed social dimension scoring may be accomplished using those proposed by various authors.

Our study expands on previous work suggesting there appears to be growing consensus regarding the existence

Table 2 Exploratory factor analysis of the MLWHFQ

Item	Factor 1 (physical)	Factor 2 (emotional)	Factor 3 (social)	Communality
1. Swelling in your ankles, legs	**52**	10	14	0.30
2. Resting during day	**80**	24	15	0.71
3. Walking or climbing stairs difficult	**87**	21	14	0.80
4. Working around house difficult	**83**	23	22	0.79
5. Away from home difficult	**73**	26	32	0.70
6. Sleeping difficult	**56**	30	27	0.47
7. Relating to or doing things with friends	**63**	34	37	0.65
8. Working to earn a living difficult	32	21	**58**	0.38
9. Recreational activities difficult	**62**	27	32	0.56
10. Sexual activities difficult	**47**	12	**49**	0.40
11. Eating less foods I like	**47**	26	34	0.40
12. Shortness of breath	**80**	14	15	0.67
13. Fatigue	**81**	23	14	0.71
14. Hospitalization	28	4	**57**	0.23
15. Medical costs	7	22	**71**	0.32
16. Side effects from medications	14	25	**60**	0.31
17. Feeling burden to family or friends	21	**60**	42	0.58
18. Feeling loss of self-control	26	**73**	28	0.65
19. Being worried	25	**75**	15	0.56
20. Difficulty concentrating or remembering	32	**68**	17	0.53
21. Being depressed	16	**82**	10	0.58
Eigenvalue	9.57	1.73	1.09	–
Cumulative % of Variance	45.58%	53.83%	59.03%	–
Cronbach's $\alpha = 0.938$	0.933	0.855	0.714	–

Principal components factoring with Varimax rotation. Factor loadings are multiplied by 100 with an absolute value ≥ 45 and flagged in bold

Kaiser–Meyer–Olkin coefficient for sampling adequacy (0.95); Barlett test of sphericity (14,969, $p < 0.0001$)

MLHFQ Minnesota Living With Heart Failure Questionnaire

Table 3 Confirmatory factor models of the latent structure of the MLWHFQ items

Model	χ^2	df	AIC	SRMR	RMSEA (90% CI)	CFI	NFI
Rector (1987) [2], 2 factor	913.21	64	967.20	0.059	0.116 (0.110–0.123)	0.905	0.898
Ho (2007) [16], 3 factor	1298.34	149	1619.55	0.057	0.092 (0.088–0.097)	0.893	0.880
Moon (2012) [11], 3 factor	1529.55	186	1380.34	0.055	0.090 (0.086–0.940)	0.880	0.893
Garin (2013) [10], 3 factor	841.96	116	915.95	0.047	0.080 (0.078–0.088)	0.923	0.912
Lambrinou (2013) [12], 3 factor	657.11	101	727.11	0.055	0.078 (0.072–0.084)	0.924	0.924
Munyombwe (2014) [7], 3 factor	1360.96	167	1446.96	0.052	0.089 (0.085–0.094)	0.889	0.876

χ^2 Chi square, *df* degrees of freedom, *AIC* Akaike information criterion, *SRMR* standardized root mean square residual, *RMSEA* root mean square error of approximation, *CFI* Comparative Fit Index, *NFI* Normed Fit Index

of a third dimension encompassing a social construct [7, 11–15]. Disagreement remains regarding which items comprise that third factor. For example, although we compared five proposed three-factor solutions, Munyombwe's third factor included an additional 2 items (item 14, hospitalization and item 16, side effects from medications) compared to Garin [4]. Lambrinou [12] proposed a social dimension comprised of only 3 items (items 8–10) similar to Ho [16] which included items 4, 5, and 7 which sufficiently loaded on all other physical models but 3 of Ho's 6 items load for all other models in the physical dimension. Of the 5 various proposed social dimensions, only those proposed by Garin [4] and Munyombwe [7] suggested similar item loadings. Lastly, it appears that use of factor loading criterion

Table 4 Internal consistency and factor correlations of the MLWHFQ subscales—two- and proposed three-factor model

Factor subscales (No. Items)	Cronbach's alpha	Mean (SD)	Median (range, IQR)	Factor correlations		
Two-factor model						
Rector				Physical	Emotional	
Physical [8]	0.935	14.88 (11.81)	13.0 (0–40, 20.0)	1.0		
Emotional (5)	0.851	6.13 (6.04)	4.0 (0–25, 8.0)	0.616	1.0	
Three-factor model						
Garin, 2013 [10]				Physical	Emotional	Social
Physical [8]	0.922	14.55 (11.36)	13.0 (0–40, 20.0)	1.0		
Emotional (5)	0.851	6.13 (6.04)	4.0 (0–25, 8.0)	0.596	1.0	
Social [4]	0.741	5.24 (5.20)	4.0 (0–20, 7.0)	0.682	0.596	1.0
Munyombwe (2014) [7]						
Physical (9)	0.927	15.68 (12.56)	14.0 (0–45, 21.0)	1.0		
Emotional (5)	0.851	6.13 (6.04)	4.0 (0–25, 8.0)	0.616	1.0	
Social (6)	0.763	6.57 (6.56)	5.0 (0–30, 9.0)	0.706	0.616	1.0
Ho (2007) [16]						
Physical (8)	0.877	13.1 (9.8)	12 (0–40, 17)	1.0		
Emotional (5)	0.851	6.13 (6.04)	4.0 (0–25, 8.0)	0.600	1.0	
Social (6)	0.879	8.5 (8.3)	6 (0–15, 6)	0.828	0.630	1.0
Moon (2012) [11]						
Physical (12)	0.922	19.6 (15.1)	17 (0–60, 25)	1.0		
Emotional (5)	0.851	6.13 (6.04)	4.0 (0–25, 8.0)	0.622	1.0	
Social (4)	0.689	4.1 (4.6)	3 (0–20, 7.0)	0.714	0.604	1.0
Lambrinou (2013) [12]						
Physical (10)	0.877	16.8 (13.4)	15 (0–50, 22)	1.0		
Emotional (6)	0.851	6.79 (6.24)	5.0 (0–30, 8.0)	0.614	1.0	
Social (3)	0.728	4.0 (4.2)	6 (0–15, 6)	0.717	0.554	1.0

IQR interquartile range

cutpoints may affect scoring as well. For example, we chose a cutoff of 0.45 for factor inclusion. In a sensitivity analysis, increasing this cutoff to 0.50 suggests removal of items #10 (sexual activities...) from all dimensions and item #11 (Eating less …) from the physical dimension. Removal of item #10 is not reflected in any other published work but may represent a subgroup of our population. However, given valve replacement patients are similar in age and overall health as to other HF populations, this seems unlikely. Removing #11 from the physical dimension reflects factor structure proposed by Garin and Munyombwe.

It should be noted that participants in Bilbao et al., the most recent paper to suggest a third factor, were significantly older, and gender neutral, whereas our population was primarily male but relatively similar in NYHA Class III–IV. Our work expands the work of Bilbaou's et al, confirming the use of the MLWHF in a large medical/surgical population with a history of heart failure. Further, our study strongly suggests the presence of a third dimension, social, in a cardiac surgical group of patients. The social function may load stronger for our study as social support post cardiac surgery has been found to be associated with better survival [17, 18].

Other authors have proposed a social third factor but differ on items contained therein. For example, a social factor proposed by Lambrinou et al. is comprised of 3 items (items 8, 9 10) [12]. Both Garin [10] and Moon [11] propose a social dimension comprised of 4 items but Moon exchanges items 9, 10 for items 7 and 14. Lastly, Ho [16] and Munyombwe's social dimension is comprised of 6 items with Ho [16] exchanging several items (item 4, working around house difficult; item 5, being away from home difficult; item 7, relating to or doing things with friends…) from the physical dimension. Interestingly, all published authors agree on the 5-item emotional dimension. Prior to conducting a CFA, we conducted an EFA of our own open heart isolated valve population data is strongly suggestive of a third social dimension comprised of 4 items (items 8, 14–16) similar to those 6 items (items 8–10, 14–16) proposed by Munyombwe [7]. Lastly, in our data, item 10 (sexual activities difficult) loads equally on both the physical and social dimensions but does not load on Rector's original two-factor solution.

Table 5 Discriminant ability of MLWHFQ social subscale

	Ho (2007) [16] Median (IQR)	Moon (2012) [11] Median (IQR)	Lambrinou (2013) [12] Median (IQR)	Garin (2013) [10] Median (IQR)	Munyombwe (2014) [7] Median (IQR)	*p* value
Heart failure in last 2 weeks						
No	6 (13)	2 (5)	3 (6)	5 (6)	5 (8)	–
Yes	13 (13)	6 (8)	5 (6)	7 (6)	8 (10)	0.0001
LVEF < 35%						
No	6 (13)	2 (6)	3 (6)	4 (7)	5 (9)	–
Yes	13 (17)	5 (8)	5 (8.5)	7 (9)	8 (12)	0.0001
NYHA class						
I	6.5 (10)	2 (5)	3 (4)	5 (5)	6 (6)	–
II	10 (13.5)	4 (7)	4 (8)	5 (8)	8 (10)	–
III	17 (14)	7 (8)	6 (7)	8 (8)	11 (13)	–
IV	20 (22)	9 (6)	5 (8)	5 (9)	12 (10)	0.0001
	r	*r*	*r*	*r*	*r*	
SF-12 PCS	−0.713†	−0.514†	−0.582†	−0.557†	−0.562†	–
SF-12 MCS	−0.632†	−0.409†	−0.322†	−0.331†	−0.359†	–
EuroSCORE II	0.275	0.223**	0.149*	0.123*	0.179*	–

Values are median (Interquartile range) or *r*, Pearson correlation coefficients. Statistical comparisons are Kruskal–Wallis tests

IQR interquartile range, *LVEF* left ventricular ejection fraction, *NYHA* New York Heart Classification, *SF-12* Short Form 12, *PCS* physical component scale, *MCS* mental component scale

*Fisher *r* to *Z*-Transformations for 2-dependent correlations $r = 0.3$, $p < 0.05$;**$p < 0.01$; †$p < 0.001$

Limitations of our study include those of any study using self-reported data, potential lack of generalizability given a unique population and geographical area. Further, the isolated cardiovascular surgery population, i.e., valve may present a subset population with slightly different psychometric properties. Strengths of our study include our large sample size, unique isolated valve population, use of standardized and validated questionnaires (i.e., MLHFQ, SF-12), and reported results similar to those of other populations.

Conclusion

Using a large sample size of patients with isolated valve replacement procedures and proposed factor structures of other authors, we conclude the existence of a third factor, a social dimension, in addition to the existing physical and emotional dimensions from the original two-factor solution. Although the differences in fit indices are slight, we conclude (a) our data support the existence of a social dimension among our population of isolated valve patients and (b) the MLWF tool is an appropriate tool to use in surgical patients who may experience heart failure.

In conclusion, the MLHFQ is a useful instrument to measure HrQOL among patients undergoing open heart surgery for valve dysfunction. We suggest given the inclusion of items important to our population, relatively strong fit indices, and correlation coefficients with the SF-12, the social dimension proposed by Munyombwe best fits our population.

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Compliance with ethical standards

Conflict of interest We have no financial or non-financial conflicts of interest to report.

Ethics approval and consent to participate This survey was approved by the Inova Health System local Institutional Review Board.

Appendix

See Table 6.

Table 6 Comparison of MLHFQ different factor structures proposed

	Rector (1992) [3]	Heo (2007)	Ho (2007) [16]	Moon (2012) [11]	Lambrinou (2013) [12]	Garin (2013) [10]	Muny-ombwe (2014) [7]	Barnett (2018)
1. Swelling in your ankles, legs		P	P	P	E	P	P	P
2. Resting during day	P	P	P	P	P	P	P	P
3. Walking or climbing stairs difficult	P	P	P	P	P	P	P	P
4. Working around house difficult	P	P	**S**	P	P	P	P	P
5. Away from home difficult	P	P	**S**	P	P	P	P	P
6. Sleeping difficult	P	P	P	P	P	P	P	P
7. Relating to or doing things with friends	P	P	**S**	**S**	P		P	P
8. Working to earn a living difficult			**S**	**S**	**S**	**S**	**S**	**S**
9. Recreational activities difficult		P	**S**	P	**S**	**S**	**S**	P
10. Sexual activities difficult			**S**	P	**S**	**S**	**S**	**S**
11. Eating less foods I like			P	P	P			P
12. Shortness of breath	P	P	P	P	P	P	P	P
13. Fatigue	P	P	P	P	P	P	P	P
14. Hospitalization				**S**			**S**	**S**
15. Medical costs				**S**		**S**	**S**	**S**
16. Side effects from medications			P	P			**S**	**S**
17. Feeling burden to family or friends	E	E	E	E	E	E	E	E
18. Feeling loss of self-control	E	E	E	E	E	E	E	E
19. Being worried	E	E	E	E	E	E	E	E
20. Difficulty concentrating or remembering	E	E	E	E	E	E	E	E
21. Being depressed	E	E	E	E	E	E	E	E
No. items—physical	8	10	8	12	9	8	9	11
No. items—emotional	5	5	5	5	6	5	5	5
No. of Items—social	–	–	6	4	3	4	6	5

E emotional, *P* physical, *S* social

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