

# Reliability and Validity of the Korean Version of the MacNew Heart Disease Health-related Quality of Life Questionnaire

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## Research Article

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# Abstract

**Background:** Myocardial infarction and unstable angina are prevalent in Korea. A widely used patient-reported outcome for patients with heart disease in other countries is the The MacNew Heart Disease health-related quality of life questionnaire. In this study we tested the validity and reliability of the Korean version of the MacNew (K-MacNew).

**Methods:** Participants included 200 patients who had experienced unstable angina or myocardial infarction, and they were recruited from a tertiary hospital in Korea. The K-MacNew was developed using forward-backward translation techniques. Its internal consistency reliability, construct validity, and concurrent validity were assessed.

**Results:** Factor analysis results of the revised K-MacNew demonstrated that it has a three-factor structure (emotional, physical, and social) that supports construct validity. The K-MacNew had a moderate relationship between the physical and mental components of the SF-36 ( $r = 0.517$  to  $0.745$ ) and depression and anxiety ( $r = -0.730$  to  $-0.520$ ). The K-MacNew showed reliable internal consistency, with a Cronbach's  $\alpha$  of  $.947$  for the total scale.

**Conclusion:** The K-MacNew demonstrated good reliability and validity for use as a patient-reported outcome measure and is ready for the assessment of the health-related quality of life of patients with coronary artery disease in Korea. In order to establish the clinical validity of K-MacNew, additional studies should be conducted to verify the validity and reliability of K-MacNew in a number of participants including various types of coronary artery disease.

## Background

Heart disease is the second leading cause of death among Koreans after cancer [1], and coronary artery disease (CAD) is a typical chronic disease with an increased prevalence over the past decade worldwide, including in Korea [1, 2]. With the development of treatment regimens such as coronary intervention or coronary artery bypass surgery, the survival rate and survival time of patients with CAD have improved [3, 4]. However, patients with CAD experience physical problems, such as chest pain, fatigue, and exhaustion; and emotional reactions, such as boredom, sadness, helplessness, and anger—even after diagnosis or treatment. Additionally, patients with CAD experience social problems, such as adapting to their roles in the workplace and their families. These negative experiences are associated with low health-related quality of life (HRQOL) in patients with CAD [5, 6].

Traditionally, prevalence and mortality rates have been used as outcome indicators for existing or new treatment regimens. However, the use of patient-reported outcomes, such as HRQOL, has been recently recommended [7]. HRQOL is an important concept for evaluating a patient's overall perceived health status. HRQOL provides information about the burden of disease and its impact on health [5]. In the clinical field, HRQOL is more frequently measured than biochemical indicators when evaluating the

effectiveness of rehabilitation for patients with CAD; additionally, HRQOL can be used when making decisions about treatment [6, 8, 9].

The HRQOL of patients, including those with CAD, can be measured using either a generic tool developed to measure the QOL of healthy people or a disease-specific tool developed to measure the HRQOL of patients with certain diseases [10, 11]. The advantages of disease-specific measures result in part from achieving specificity by measuring the frequency and severity of specific symptoms such as chest pain in patients with CAD. The MacNew Heart Disease HRQOL questionnaire (MacNew) has been used worldwide [6, 7, 9, 12].

The MacNew is a modified version of the QOL after Myocardial Infarction Questionnaire, developed by Lim and colleagues [13] and Valenti and colleagues [14], which examines the impact of heart disease and treatment on patients' activities of daily living and physical, emotional, and social functioning [15]. The MacNew is used to examine HRQOL in patients with CAD, such as myocardial infarction and angina, as well as to assess the effectiveness of various behavioral interventions to promote medication adherence, cardiac rehabilitation, and secondary prevention of CAD [6, 15]. The MacNew has been validated in several countries, including China [6], France [7], and Germany [9]. Further, the MacNew has been translated and validated in more than 20 languages, which are available on the MacNew website ([macnew.org](http://macnew.org)). The MacNew Questionnaire was linguistically adapted to the Korean population by Kang and colleagues [16]. However, Kang and colleagues [16] just tested its theoretical construct validity using partial confirmatory factor analysis for only 136 patients with myocardial infarction and identified five factors for the MacNew without a five-factor solution. Additional psychometric properties of the Korean version, however, have not yet been extensively studied. Considering that myocardial infarction and unstable angina are prevalent among the Korean population, and that the MacNew is often used as a patient-reported outcome for patients with heart disease, including those with CAD, in other countries, it is necessary to validate the MacNew in Korean patients with CAD. Thus, this study was conducted to test the reliability and validity of the 27 items of the Korean version of the MacNew (K-MacNew).

## Methods

### Design

This study used a descriptive design to ensure that the translation of the MacNew into Korean was methodologically sound for use with Korean patients with CAD.

### Participants

A convenience sample was selected, comprising 205 participants who visited the outpatient center of a tertiary medical center in South Korea. The inclusion criteria were as follows: (a) diagnosed with unstable angina or myocardial infarction, (b) aged 19 – 75 years, (c) able to understand and speak Korean, (d) did not take drugs related to the central nervous system, (e) lived in Korea, and (f) able to understand the study and provide informed consent. Of the 205 participants who answered the questionnaire, five were

excluded owing to missing or inconsistent responses. Thus, data from 200 participants were included in the final analysis.

## **Instruments**

### **The MacNew Heart Disease HRQL questionnaire**

The MacNew includes 27 items in three dimensions: emotional, physical, and social. Each item is rated on a 7-point Likert scale ranging from “1 = poor HRQOL” to “7 = high HRQOL.” Some items are used more than once across the dimensions [14]. The global score is the mean score for all 27 items. Each participant’s score was summed and divided by the total number of items [15]. The score for each dimension is the mean score for the items in that dimension, and omitted items were excluded from the calculation. Item 27, about a respondent’s sex life, can be excluded during scoring. The global and individual dimensional scores range from 1 to 7. The minimal important difference (MID) for the total MacNew and each dimension of the MacNew is 0.50 points [17]. Higher scores indicate higher HRQOL [15]. For the global MacNew, Cronbach’s  $\alpha$ s were 0.96 in Hofer and colleagues [15] and 0.95 in the present study.

### **The 36-Item Short Form Health Survey Instrument (SF-36)**

The SF-36 version 2 was used to assess general HRQOL. It is a self-administered questionnaire comprising 36 items with two components (physical and mental) [18]. The physical component summary includes four domains: physical role functioning, physical role, bodily pain, and general health. The mental component summary includes four domains: vitality, social functioning, emotional role, and mental health. This instrument uses a norm-based scoring method, in which the score for each domain is converted to a score out of 100, or the observed score is standardized with reference to the American population with a mean of 50 and standard deviation of 10 [19]. This method was used in the present study, and higher scores indicated higher HRQOL. For use in the present study, the questionnaire was licensed by Optuminsight Life Sciences, Inc. (Lincoln, RI, USA; License No: QM044578).

### **The Hospital Anxiety and Depression Scale (HADS)**

The HADS was used to assess depression and anxiety. It consists of 14 items scored from 0 to 21. The seven odd-numbered items are about anxiety, while the seven even-numbered items are about depression. Each item is rated on a 4-point scale ranging from 0 (no symptoms) to 3 (severe). Total scores range from 0 to 21, with higher scores indicating higher anxiety and depression. The reliability of the HADS, as measured with Cronbach’s  $\alpha$ , was 0.86 for depression and 0.89 for anxiety at the time of adaptation into Korean by Oh and colleagues [20], and 0.77 for depression and 0.86 for anxiety in the present study.

### **The Korean Activity Scale Index (KASI)**

The KASI [21] is a self-report questionnaire measuring heart disease patients’ functional status. The KASI includes 15 questions, and the score is multiplied by the weight of the response to each question to calculate the total score. Total possible scores range from 0 to 79, and higher scores indicate better

functional performance. Depending on KASI scores, functional status classification ranges from Level 1 (more than 46 points) to Level 4 (less than 4 points). As a result of comparing the exercise load test to verify the validity of the KASI, the correlation with exercise time on the exercise load test was 0.62 ( $p < 0.001$ ), and the correlation between the functional grade calculated from the KASI and the functional performance grade was 0.49 ( $p < 0.001$ ) [21].

## **Translation procedure**

Permission was obtained for psychometric testing of the MacNew from MacNew.org and the tool's developer. The MacNew was translated in accordance with the method suggested by the World Health Organization [22]. First, two bilingual interpreters fluent in Korean and English who understood the cultural differences between these countries translated the English version into Korean. Two nursing professors reviewed and evaluated the translation to identify and correct items that required revision owing to issues with translation accuracy and cultural differences. Then, another Korean bilingual translator who was unfamiliar with the original version translated the Korean version back to English. The exact meaning of terms and phrases may vary owing to cultural factors. Therefore, translators were advised to consider the specific cultural conditions between the two countries. Next, a professional translator compared the back-translation to the original version for accuracy without altering the context, word selection, or language. Finally, based on the English version reported by the original developer, the author reviewed and re-verified the Korean version to confirm the clarity and cultural relevance of the content.

The final version of the K-MacNew was pilot tested using 10 patients with CAD who had never been exposed to the questionnaire. As all participants in this pilot test stated that the content was appropriate and easy to understand, the K-MacNew was finalized.

## **Data collection**

After obtaining ethical approval, data were collected in cooperation with the cardiology clinic from August 2018 to February 2019. To minimize participant dropout during the data collection process, research assistants distributed and collected the questionnaires by meeting one-on-one with those who voluntarily agreed to participate in this study in the cardiology outpatient clinic. Participants answered the survey in a quiet room, and it took approximately 15 minutes to complete.

## **Statistical analysis**

General characteristics of participants were analyzed using descriptive statistics. The construct validity of the K-MacNew was established via factor analysis and the known-groups technique. First, principal component analysis (PCA) with varimax rotation was performed. Next, known-group analysis was performed using a t-test, and the MID was used to calculate the minimum score of change [17].

Regarding criterion validity, concurrent validity was tested by examining the correlations between the physical and emotional dimensions of the K-MacNew and the physical health and mental health domains of the SF-36, respectively [23]. Convergent validity was tested by analyzing correlations between the K-

MacNew and the HADS [24]. Scores were interpreted to indicate a mild correlation with a coefficient of below 0.40, moderate correlation with a coefficient ranging from 0.40–0.70, and strong correlation with a coefficient of 0.70 or higher. Reliability was tested using Cronbach's  $\alpha$ , with a coefficient of 0.70 interpreted as acceptable and 0.80 as high [25]. The collected data were analyzed using SPSS version 25 software (IBM, Armonk, NY, USA).

## Ethical statement

The present study was approved by the institutional review board of the authors' affiliated university hospital (no. AJIRB-SBR-SUR-17-503). Prior to data collection, we informed the participants about the study purpose, the risks and benefits of participation, the principles of voluntary participation, the right to withdraw or refuse participation without consequences, and that collected data would be used for research purposes only. Only those who provided written consent were administered the questionnaire. Completed questionnaires were immediately placed in a sealed envelope and collected by a trained research assistant. The collected questionnaires were coded and entered into a computer upon completion of data collection and stored in a locked cabinet.

## Results

### Participants' general characteristics

Among the 200 patients, 85.0% were men and the average age was 59.79 years. According to the KASI classification, 71.5% of the participants were in Category 1, which indicates good functional status. Other relevant characteristics are shown in Table 1.

### Korean version of MacNew Scores

As a result of analyzing the K-MacNew scores, the mean global, emotional, physical, and social scores were 5.93, 5.76, 5.93, and 6.19 points, respectively.

### Construct validity

Prior to the analysis, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test were used to confirm the suitability of the exploratory factor analysis (EFA). The KMO value was 0.93, which is close to 1. The analysis also found that Bartlett's test of sphericity was  $\chi^2(351) = 3419.434$  ( $p < 0.001$ ). Factors were extracted using PCA with varimax rotation, which has been frequently used in previous studies for factor analysis of the MacNew [6, 7, 26, 27]. The number of factors was determined based on the parallel test and eigenvalues  $> 1$ . Three factors were identified in the parallel test, and four factors were identified with an eigenvalue  $> 1$ . As the original MacNew comprises three factors, the K-MacNew also included three factors. The communality of all 27 items was 0.3 or higher; therefore, no items were removed. The cutoff point used in the current study was a loading criterion of 0.40 [13, 14]. Twenty-seven items were

cross-loaded on three factors: 15 items (1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15, 18, and 23) on Factor 1 (emotional dimension), 9 items (6, 9, 14, 15, 16, 17, 19, 20, 21) on Factor 2 (physical dimension), and 11 items (12, 13, 17, 20, 21, 22, 23, 24, 25, 26, and 27) on Factor 3 (social dimension). The explanatory power was 57.92% of the total variance (Table 2).

Known-group validity was tested by comparing the mean score of the K-MacNew according to the KASI classification and diagnosis (Table 3). The results showed that the average global score was significantly higher in KASI Class 1 than KASI Class 2 or higher ( $t = 5.76, p < 0.001$ ). Also average scores in all three dimensions were significantly higher in KASI Class 1 than KASI Class 2 or higher. The MID of 0.5 was exceeded.

The average global score was significantly higher in the myocardial infarction group than in the unstable angina group ( $t = 2.14, p = 0.034$ ). Among the dimensions, the average scores for the emotional and physical dimensions, except social, were also significantly higher in the myocardial infarction group than in the unstable angina group. However, the MID of 0.5 was not exceeded.

### **Criteria and convergent validity**

To test concurrent validity, correlations between the physical and emotional dimensions of the K-MacNew and the physical and mental components of the SF-36 were analyzed (Table 4). According to analysis, the K-MacNew's physical score showed a medium-sized correlation with the SF-36's physical component ( $r = 0.517, p < 0.001$ ), and the K-MacNew's emotional showed a strong correlation with the SF-36's mental component ( $r = 0.745, p < 0.001$ ).

Next, to test convergent validity, the correlations between the K-MacNew and HADS were analyzed. The K-MacNew's global and dimensional scores showed a medium-sized correlation with depression ( $r = -0.702$  to  $-0.530$ ) and anxiety ( $r = -0.730$  to  $-0.520$ ). Thus, concurrent and convergence validity was established (Table 4).

### **Reliability**

Cronbach's alphas for K-MacNew were acceptable, with 0.95 for the global, 0.93 for emotional, 0.90 for social, and 0.93 for physical dimensions.

## **Discussion**

The MacNew is used to assess HRQOL in patients with CAD and comprises three dimensions: physical, emotional, and social [7]. Since being validated at the time of development for use in patients with heart disease, it has been translated from English into several other languages (macnew.org). In this study, we tested the construct validity, criterion validity, convergent validity, and reliability of the K-MacNew to determine whether the instrument can be used among patients with CAD in Korea.

As the MacNew comprises three dimensions, we also performed an EFA to verify the construct validity of the K-MacNew. Generally, an eigenvalue greater than 1 has been used as the criterion to determine the number of factors in factor analysis in studies testing the construct validity of multidimensional instruments. However, owing to concerns that this may overestimate the number of factors, parallel tests have been performed in recent studies to determine the appropriate number of factors [28]. Hence, we determined that the K-MacNew has three factors based on theoretical evidence, PCA with varimax rotation, and a parallel test. The EFA yielded an explanatory power of 57.92% of the total variance

The MacNew was used with a factor loading threshold of  $> 0.40$  in the factor structure analysis [13, 14]. Therefore, as the MacNew allows cross-loading of items, one item is often cross-loaded onto different factors during factor analysis to test construct validity. The original tool has 12 items that are cross-loaded onto two or more factors [13]. Furthermore, although it varies across studies, previous studies reported that at least three items are cross-loaded onto two or more factors [6, 7, 12, 26]. The K-MacNew also features seven items that are cross-loaded onto two factors, and one item is cross-loaded onto three factors. However, some researchers have questioned the validity of including all items with a factor weight  $> 0.40$  [12, 29]. This is because the results vary across studies, in which 27 items are loaded onto different factors depending on the language, and some items are loaded onto dimensions not explained in the original instrument.

Of the 27 items included in this study, 15 were loaded onto the emotional dimension. All 14 items from the emotional dimension of the original MacNew were included in the emotional dimension of the Korean version, along with one additional item (Item 11, more dependent). Item 11 was loaded onto the social dimension in the original version and the physical dimension in the Sri Lankan version [12], and was not loaded onto any of the three dimensions in the Chinese [6] and Turkish versions [27]. The factor loadings of Item 11 across studies may be attributable to the cultural differences that occur when interpreting the statements of the instrument. In other words, similar to Sri Lanka, in Korean patients, becoming more physically dependent owing to a heart problem may have been perceived as becoming an emotional burden for significant others such as one's family [12]. Of the 15 items, the loading value was the highest for Item 4 (down in the dumps), followed by Items 1 (frustrated), 2 (worthless), and 10 (tearful). This is similar to the results of a previous study in which the emotional dimension addresses with emotional responses generally experienced by patients with CAD, such as depression [26].

Nine out of the 27 items were loaded on the physical dimension. Of these items, eight items were consistent with the original MacNew, and Item 15 (lack self-confidence) was added. Item 15 was cross-loaded onto the emotional and social dimensions in the original version, but cross-loaded onto the emotional and physical dimensions in the Korean version. This may be attributable to the ambiguity of the original tool. For instance, Item 3—loaded onto the emotional dimension—specifically asks about one's confidence and decision-making regarding the management of heart problems. However, Item 15 asks about overall lack of confidence, without specifying to what that confidence is related. Therefore, it is possible that participants understood Item 15 to be asking about self-confidence of symptom management; however, considering that Item 15 was cross-loaded onto the emotional and social

dimensions in previous studies [6, 7, 12], it is necessary to conduct replication studies with a larger sample to further confirm the construct validity of the K-MacNew.

The physical dimension assesses the level of physical symptoms of heart disease and resulting physical limitations. The items with the highest loading values for the physical dimension in our study were items pertinent to physical symptoms (Item 9: shortness of breath, Item 14: chest pain, Item 16: aching legs, and Item 19, dizzy or lightheaded). However, five items that had been loaded onto the physical dimension in the original instrument (Items 12, 24, 25, 26, and 27) were instead included in social dimension in our study. This results was similar to the versions from other Asian countries, including the Sri Lankan [12] and Chinese versions [6]. This suggests that patients perceive items related to physical limitations to be pertinent to engaging in less of social activity as a result of such limitations. Thus, subsequent studies should make multinational comparisons of how items related to physical symptoms are perceived among patients with CAD in various Asian countries.

Finally, 11 of the 27 items of the K-MacNew were loaded onto the social dimension. Ten of these items were consistent with the original, and Item 27 (sexual activity) was included. A number of previous studies excluded Item 27 when testing construct validity owing to cultural reasons [15]. However, sexual activity is important to consider when examining the HRQOL of patients with heart disease. This is because it can affect one's physiological needs as well as the intimate relationship with spouse. Item 27, which was classified into the physical originally, loaded into the social dimension in this study. This is similar to the results of a previous study that tested the construct validity of the English version of the MacNew in patients with angina and ischemic heart failure [15]. The loading of Item 27 onto the social dimension is related to the fact that this dimension of the MacNew assesses social situations experienced in a physical or emotional context [15]. However, it is necessary to confirm the appropriateness of the K-MacNew factor loadings via a confirmatory factor analysis. In the present study, Items 24 (excluded), 26 (physical activity), and 25 (unable to socialize) had the highest factor loadings in the social dimension. These items also had high factor loadings and were cross-loaded in the physical and social dimensions in the original version. However, these items were only loaded onto the social dimension in this study, presumably owing to cultural differences in how disease impact was perceived. Therefore, participants seemed to perceive their physical symptoms as physical health problems and disease-related limitations to social and other activities as social health problems.

In the analysis of known-group validity, the low KASI class, which have little limitation physical activities, scored significantly higher for the K-MacNew compared to the high KASI class, and the MID of the K-MacNew between the two groups exceeded 0.5 [17]. This is similar to the finding of a previous study in which the severe symptoms group reported significantly higher MacNew scores compared to the non-severe symptoms group among patients with ischemic heart disease, and that the difference was beyond the MID [8]. Consequently, the K-MacNew would be a useful instrument in clinical settings to examine HRQOL according to the level of physical activity and symptom severity in patients with CAD, as well as to assess cardiac rehabilitation therapies.

To test the concurrent validity of the K-MacNew, we analyzed the physical and emotional dimensions of the K-MacNew and the physical health and mental health domains of the SF-36, respectively. The correlation coefficients ranged from 0.53 to 0.75, showing a moderate correlation. This finding is in line with prior studies [7, 15]. Additionally, the K-MacNew had a moderate or higher negative correlation with depression and anxiety, thus establishing convergent validity. This is consistent with previous reports that HRQOL decreases as depression and anxiety increase [6, 8, 27].

Regarding reliability, Cronbach's alphas ranged from 0.88–0.93, and the Cronbach's alphas for the global and dimensional scores were similarly high. This is similar to the level of internal consistency reported by previous studies that applied the MacNew in Asia [6, 12]. The K-MacNew is a homogeneous tool for measuring HRQOL in patients with CAD in Korea. However, we could not verify its test-retest reliability; therefore, subsequent studies to ensure scoring stability in addition to item homogeneity are needed.

This study had a few limitations. As participants were selected using convenience sampling, the sample is not representative of all patients with CAD. Second, most participants were women and those with unstable angina; thus, caution should be taken when interpreting the validity of the K-MacNew with men and those with myocardial infarction. However, despite these limitations, this study is significant in that it helps to cross-culturally validate the MacNew. Therefore, accumulating further evidence on the validity and reliability of the K-MacNew through replication studies would enhance the sensitivity of the K-MacNew to assess HRQOL in patients with CAD and promote its wide use in clinical settings.

## Conclusions

We systematically translated the MacNew—an HRQOL tool widely used in international studies—into Korean and validated it in patients with CAD in Korea. The K-MacNew had established construct validity, criterion validity, and convergent validity. It was also highly reliable; therefore, the K-MacNew is a validated instrument for measuring HRQOL in patients with CAD. Based on our findings, the K-MacNew would be useful in developing and assessing intervention programs to enhance HRQOL in patients with CAD in Korea.

## Abbreviations

CAD: Coronary artery disease; EFA: exploratory factor analysis; HADS: The Hospital Anxiety and Depression Scale; HRQOL: Health-related quality of life; K-MacNew: Korean version of the MacNew Heart Disease HRQOL questionnaire; KASI: The Korean Activity Scale Index; KMO: Kaiser-Meyer-Olkin; MacNew: The MacNew Heart Disease HRQOL questionnaire; PCA: principal component analysis; SF-36: The 36-Item Short Form Health Survey Instrument.

## Declarations

### Ethics approval and consent to participate

The present study was approved by the institutional review board of the authors' affiliated university hospital (no. AJIRB-SBR-SUR-17-503). Informed consent was obtained from all participants before their participation in this study.

### **Consent for publication**

As part of the informed consent process, permission was sought from the participants to be able to use the data collection in publication, with the participants remaining anonymous.

### **Availability of data and materials**

All data generated or analysed during this study are included in this published article

### **Competing interests**

The authors declare that they have no competing interests.

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### **Authors' contributions**

SHB conceptualised and designed the study, carried out data curation, performed data analysis, and wrote the manuscript. J-HP carried out data curation, performed data analysis, and wrote the manuscript. M-HY carried out data collection and MAY provided critical comments on the manuscript. All authors read and approved the final manuscript.

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## Tables

Table 1  
Participants' General Characteristics (N = 200)

Characteristic	Category	n (%)	Mean $\pm$ SD (range)
Sex	Women	170 (85.0)	
	Men	30 (15.0)	
Age (years)	< 55	55 (27.5)	59.79 $\pm$ 9.46
	$\geq$ 55–64	81 (40.5)	(12–78)
	$\geq$ 65	64 (32.0)	
Educational level	$\leq$ Middle school	37 (18.5)	
	High school	79 (39.5)	
	$\geq$ University	84 (42.0)	
Marital status	Single	33 (16.5)	
	Married	167 (83.5)	
Perceived economic level	Good	35 (17.5)	
	Average	137 (68.5)	
	Poor	28 (14.0)	
Employment status	No	57 (28.5)	
	Yes	143 (71.5)	
Current smoking	No	162 (81.0)	
	Yes	38 (19.0)	
Current alcohol drinking	No	90 (45.0)	
	Yes	110 (55.0)	
Body mass index	< 23	45 (22.7)	25.09 $\pm$ 2.69
	23–24.99	53 (26.8)	(17.65–36.33)
	$\geq$ 25	100 (50.5)	
Diagnosis	Unstable angina	125 (62.5)	
	Myocardial infarction	75 (37.5)	
KASI class	Class $\boxtimes$	143 (71.5)	55.87 $\pm$ 18.74
	Class $\boxtimes$	42 (21.0)	(15.30–76.80)

KASI, Korean Activity Scale Index.

Characteristic	Category	n (%)	Mean ± SD (range)
	Class ⓧ	15 (7.5)	
KASI, Korean Activity Scale Index.			

Table 2  
Factor weights and variance explained from factor analysis (N = 200)

No.	Item abbreviated descriptors	Emotional	Physical	Social	K-MacNew domains	MacNew domains
1	Frustrated	<b>0.712</b>	0.196	0.227	E	E
2	Worthless	<b>0.710</b>	0.192	0.211	E	ES
3	Confident	<b>0.502</b>	0.111	0.191	E	E
4	Down in the dumps	<b>0.793</b>	0.229	0.222	E	E
5	Relaxed	<b>0.640</b>	0.275	0.048	E	E
6	Worn out	<b>0.581</b>	<b>0.450</b>	0.268	EP	EP
7	Happy with personal life	<b>0.681</b>	0.249	-0.024	E	E
8	Restless	<b>0.654</b>	0.308	0.244	E	E
9	Shortness of breath	0.221	<b>0.725</b>	0.253	P	P
10	Tearful	<b>0.692</b>	0.100	0.267	E	E
11	More dependent	<b>0.624</b>	0.206	0.343	E	S
12	Social activities	<b>0.480</b>	0.230	<b>0.500</b>	ES	EPS
13	Others/less confidence in you	<b>0.512</b>	0.115	<b>0.420</b>	ES	ES
14	Chest pain	0.274	<b>0.709</b>	0.168	P	P
15	Lack self-confidence	<b>0.582</b>	<b>0.493</b>	0.255	EP	ES
16	Aching legs	0.202	<b>0.644</b>	0.190	P	P
17	Sports/exercise limited	0.182	<b>0.455</b>	<b>0.593</b>	PS	PS
18	Frightened	<b>0.612</b>	0.370	0.368	E	E
19	Dizzy or lightheaded	0.396	<b>0.530</b>	0.122	P	P
20	Restricted or limited	0.321	<b>0.451</b>	<b>0.586</b>	PS	PS
21	Unsure about exercise	0.213	<b>0.509</b>	<b>0.419</b>	PS	PS
22	Overprotective family	0.219	0.299	<b>0.609</b>	S	S
23	Burden on others	<b>0.488</b>	0.126	<b>0.525</b>	ES	ES
24	Excluded	0.267	0.170	<b>0.781</b>	S	PS

E, Emotional; P, Physical; S, Social; Factor loading (loading  $\geq 0.40$ ), for each MacNew item in the Korean version (in bold); together with the factor loadings (loading  $\geq 0.40$ ) from the original factor analysis (in bold).

No.	Item abbreviated descriptors	Emotional	Physical	Social	K-MacNew domains	MacNew domains
25	Unable to socialize	0.192	0.153	<b>0.747</b>	S	PS
26	Physical activity	0.210	0.315	<b>0.772</b>	S	PS
27	Sexual activity	0.081	0.045	<b>0.731</b>	S	P
	Variance explained	<b>24.26%</b>	<b>18.86%</b>	<b>14.80%</b>		
E, Emotional; P, Physical; S, Social; Factor loading (loading $\geq 0.40$ ), for each MacNew item in the Korean version (in bold); together with the factor loadings (loading $\geq 0.40$ ) from the original factor analysis (in bold).						

Table 3  
Differences mean scores for the K-MacNew by KASI Classification and Diagnosis (N = 200)

Characteristic	Global Mean $\pm$ SD	Emotion Mean $\pm$ SD	Social Mean $\pm$ SD	Physical Mean $\pm$ SD
KASI class				
Class $\square$ (n = 143)	6.19 $\pm$ 0.73	6.04 $\pm$ 0.84	6.46 $\pm$ 0.71	6.22 $\pm$ 0.78
$\geq$ Class $\square$ (n = 42)	5.54 $\pm$ 0.86	5.26 $\pm$ 0.97	5.68 $\pm$ 1.03	5.38 $\pm$ 0.99
t (p)	5.76 (< 0.001)	5.73 (< 0.001)	5.28 (< 0.001)	5.72 (< 0.001)
Diagnosis				
Myocardial infarction (n = 75)	6.14 $\pm$ 0.75	5.99 $\pm$ 0.84	6.35 $\pm$ 0.84	6.22 $\pm$ 0.75
Unstable angina (n = 125)	5.89 $\pm$ 0.87	5.72 $\pm$ 0.98	6.18 $\pm$ 0.91	5.84 $\pm$ 0.99
t (p)	2.14 (0.034)	1.98 (0.049)	1.35 (0.179)	3.06 (0.003)

Table 4  
Correlation between the K-MacNew and the SF-36 domains and the  
HADS anxiety and depression subscales (N = 200)

Variable	Global <i>r</i> ( <i>p</i> )	Emotion <i>r</i> ( <i>p</i> )	Social <i>r</i> ( <i>p</i> )	Physical <i>r</i> ( <i>p</i> )
SF-36				
Physical component	0.493 ( <i>&lt; 0.001</i> )	0.434 ( <i>&lt; 0.001</i> )	0.490 ( <i>&lt; 0.001</i> )	0.517 ( <i>&lt; 0.001</i> )
Mental component	0.726 ( <i>&lt; 0.001</i> )	0.745 ( <i>&lt; 0.001</i> )	0.582 ( <i>&lt; 0.001</i> )	0.646 ( <i>&lt; 0.001</i> )
HADS				
Anxiety	-0.689 ( <i>&lt; 0.001</i> )	-0.730 ( <i>&lt; 0.001</i> )	-0.520 ( <i>&lt; 0.001</i> )	-0.594 ( <i>&lt; 0.001</i> )
Depression	-0.673 ( <i>&lt; 0.001</i> )	-0.702 ( <i>&lt; 0.001</i> )	-0.530 ( <i>&lt; 0.001</i> )	-0.617 ( <i>&lt; 0.001</i> )
HADS, Hospital Anxiety and Depression Scale; SF-36, Short Form-36.				