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Predictors of adherence to self-care behaviors among patients with coronary heart disease

Manal Al-Sutari[1*], Muayyad Ahmad[2]

[1]Department of Acute and Chronic Care Nursing, Faculty of Nursing, Al-Ahliyya Amman University, Amman, Jordan
[2]Department of Clinical Nursing, School of Nursing, University of Jordan, Amman, Jordan

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***Corresponding Author:**
Manal Al-Sutari, Department of Acute and Chronic Care Nursing, Faculty of Nursing, Al-Ahliyya Amman University, Amman, Jordan.
E-mail: m.alsatari@ammanu.edu.jo, manal.s33@gmail.com

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ABSTRACT

Background & Aim: Coronary Heart Disease (CHD) was responsible for 7.4 million deaths globally. Self-care is an integral element of standard medical management for CHD. The aims of this study were: (1) to describe self-care maintenance, self-care monitoring, self-care management, and self-care confidence among patients with CHD patients; and (2) to identify predictors of self-care maintenance, self-care monitoring, self-care management, and self-care confidence in Jordanian CHD patients.
Methods & Materials: A descriptive cross-sectional design was used. A sample of 193 patients with CHD was interviewed. Self-care behaviors were measured by the Self-Care Coronary Heart Disease Index (SC-CHDI). Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HAD), and social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS).
Results: The mean age of the participants was 60.4 years (SD=10.61). 139 (72%) of the participants were males. Female patients were significantly worse than male patients in self-care management (P=0.045) and self-care confidence (P=0.014). Significant predictors for better self-care maintenance were older age and higher self-care confidence. The prediction model explained 17.6% of the variance in self-care maintenance (F= 4.188, P=. <001). The significant predictors for self-care confidence were self-care maintenance, self-care management, and BMI. The prediction model explained 29% of the variance in the self-care confidence (F= 7. 137, P=. <001).
Conclusion: The study revealed that self-care maintenance was adequate while self-care management and self-care confidence were suboptimal. Older age, higher educational level, and better self-care confidence were predictors of higher self-care maintenance.

Introduction

Coronary Heart Disease (CHD) was responsible for 7.4 million deaths globally, among which three quarters took place in low and middle–income countries (1). In Jordan, CHD is a public health problem, which was responsible for 42.36% of total deaths among Jordanians (2). It is also expected to witness an increase in the incidence of CHD in the future years due to the alarming prevalence of CHD risk factors such as; hypertension, hyperglycemia, overweight and obesity, dyslipidemia, and diabetes mellitus (3).

Coronary Heart disease is a lifelong condition that requires active patient involvement in the disease management plan to ensure optimal treatment outcomes. The majority of CHD management strategies are performed by patients with CHD. Therefore, self-care is an integral element of standard medical management for CHD (4).

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According to the Middle Range Theory of Self-Care of Chronic Illness, self-care is defined as "a process of maintaining health through health-promoting practices and managing illness" (5). Self-care involves three aspects: self-care maintenance (refers to patients' behaviors that aim to maintain physical and emotional stability), self-care monitoring (refers to observing oneself for changes in signs and symptoms), and self-care management (refers to the response to symptoms when they occur. According to the Middle Range Theory of Self-Care of Chronic Illness, self-care confidence is a crucial factor that influences self-care (5).

Evidence has shown that adherence to self-care behaviors improves CHD patients' survival, decreases recurrence of cardiac events, prevents disease complications, and enhances the quality of life (6, 7). However, insufficient adherence to self-care behaviors among patients with CHD is a main problem in Jordan and other countries (8, 9).

Adherence to self-care is a multi-dimensional phenomenon that can be better understood when examining theoretical relationships among various related variables. The Middle Range Theory of Self-Care of Chronic Illness proposes that demographic, cultural, and psychosocial factors influence self-care behaviors (5). Consistent with the theory propositions, research evidence found that age, marital status (10,11), and educational level (12) were determinants of adherence to self-care. Psychological factors such as anxiety and depression are also contributed to adherence to self-care; studies found that anxious patients were less compliant to smoking cessation and were less adherent to medications (13, 14); depressed patients as well found to be less adherent to medications and physically less active (15). Social support is another factor that was found to positively influence self-care among patients with CHD (16). However, some studies found that social support was not associated with adherence to self-care (11).

Many studies have investigated adherence to self-care among patients with CHD. However, some limitations are found. Previous studies focused on a restricted number of self-care behaviors (i.e., medication adherence, exercise) (17) and have lacked a theoretical framework (12); hence, the multi-dimensional aspects of self-care have not been fully investigated. Additionally, current studies lacked theoretically grounded instruments to measure self-care in CHD (18). In the light of existing gaps in the literature, the aims of this study were: (1) to describe self-care maintenance, self-care monitoring, self-care management, and self-care confidence in Jordanian CHD patients; and (2) to identify predictors of self-care maintenance, self-care monitoring, self-care management, and self-care confidence in Jordanian CHD patients. A better understanding of the multi-dimensional aspects of self-care and the factors which contribute to inadequate adherence to self-care can help health care professionals to develop interventions to effectively enhance self-care in patients with CHD.

Methods

Study design and setting

A descriptive cross-sectional design was used in this study. Participants were recruited from cardiac clinics at two hospitals in Amman (representing governmental and educational health care sectors). Patients who attended the cardiac clinics between May 2018 and September 2018 were approached and asked to participate.

Sample

A convenience sample of 193 patients with CHD was enrolled in the study. Patients

were included if they were: (1) 18 years or older; (2) have a confirmed diagnosis of CHD (had a history of myocardial infarction (MI) or angina, post percutaneous coronary intervention); (3) able to understand Arabic. Patients are excluded if they have terminal illnesses or cognitive impairments.

The G* power 3.0.9.2 software (19) was used to calculate the sample size using the following parameters, a power level of 0.90, an alpha level of 0.05, and an effect size of 0.15 for multiple linear regression. Accordingly, the required sample size was 175 participants. To handle the problem of missing data and to increase the generalizability of the results, a total of 200 patients with CHD were finally recruited.

Data collection

Participants were screened for eligibility before enrollment. After obtaining the informed consent, data were collected by the principal investigator using face-to-face structured interviews technique to standardize the data collection, the average time needed to fill the questionnaires was 20 minutes. From a total of 200 patients who were approached, 193 participants agreed to take part in this study (96.5% response rate), and seven patients refused to participate due to time constraints.

Participants' sociodemographic data, including age, gender, education, marital status, employment status, were collected using a survey developed by the researchers. Clinical data such as medications taken, body mass index (BMI), presence of co-morbidities were collected from the patients' medical records. Data regarding self-care behaviors, anxiety and depression, and social support were completed by interviewing the patients.

Patients' self-care behaviors

Participants' self-care behaviors were assessed using the Self-Care Coronary Heart Disease Index (SC-CHDI) (20). The Self-Care Coronary Heart Disease Index (SC-CHDI) is a 22- item instrument that was developed based on the Middle Range Theory of Self-Care of Chronic Illness (5). The use of a theoretically derived measure helps researchers to cover the various aspects of self-care behaviors and to identify individuals vulnerable to poor self-care. The SC-CHDI comprises of three separate subscales that evaluate self-care maintenance, which is defined by the Middle Range Theory of Self-Care of Chronic Illness as those behaviors used to maintain health, stability, and enhance well-being (5). Self-care management, which reflects patients' ability to evaluate changes in signs and symptoms of the chronic illness to determine the action needed, and self-care confidence which reflects patients' confidence in performing self-care (5).

The Self-Care maintenance scale has ten items that reflect patients' health-promoting practices. The self-care maintenance scale has two dimensions; the "consultative behaviors," which involve those behaviors prescribed by healthcare providers (e.g., taking Aspirin), and the "autonomous behaviors," which involves behaviors that are performed by patients to modify lifestyle and to decrease risk (e.g., exercise for 30 minutes). The self-care maintenance scale uses a 4-point scale that ranges from one (never) to four (always).

The self-care management scale consists of six items that include the concepts of monitoring (symptom perception and interpretation) and management (behaviors implemented when recognizing symptoms of CHD and evaluation of behaviors implemented to manage the symptoms). Patients rated their recognition of symptoms using an ordinal scale; patients' responses range from 0 (not recognized) to 4 (very quickly). Management behaviors are scored using a 4-point Likert scale to evaluate how likely the patient

performed interventions to manage symptoms of CHD; scores range from 4 (very likely) to 1 (not likely). The self-care confidence scale consists of six items that measure patients' confidence in their abilities to carry out self-care maintenance and self-care management behaviors. The self-care confidence scale uses a 4-point scale that ranges from one (never) to four (always). The content validity of SC-CHDI subscales was tested using the content validity index. The Cronbach alpha was 0.9 for self-care maintenance, self-care management scales, and self-care confidence. For the purposes of this study, the SC-CHDI was translated into the Arabic language by an assistant professor in adult health nursing, then an expert panel of three assistant professors in adult health nursing conducted back translation. No significant incongruence between the original and the translated questionnaires was found. Pretesting was done on 15 patients with CHD, who were excluded from the sample. The pilot study population raised no comments or questions, and the average time required to complete the instrument was 10 minutes. In this study, the Cronbach alpha was 0.61 for the self-care maintenance scale, 0.52 for the self-care management scale, and 0.87 for self-care confidence. The content validity of SC-CHDI subscales was tested using the content validity index. The Cronbach alpha was 0.9 for self-care maintenance, self-care management scales, and self-care confidence which indicate high content validity.

Patients' anxiety and depression

The Hospital Anxiety and Depression Scale (HAD) was used to assess participants' anxiety and depression (21). The HAD is a 14-item scale composed of two subscales: anxiety subscale (7 items) and depression subscale (7 items). Each item in the scale is scored on a four-point Likert scale of 0 (not at all) to 3 (very often). Participants are classified according to their results on HAD scale as follows; normal (0–7), mild anxiety/depression (8–10), moderate anxiety/ depression (11–15), and severe anxiety/ depression ≥ 16 (22). The reliability of the Arabic version of the HAD has been supported (α =0.75) for the anxiety subscale and (α= 0.82) for the depression subscale (23). Construct validity of the Arabic HAD was supported by testing its correlation with the Quality of Life Index (r= - 0.518) (23).

Patients' perceived social support

To measure social support, the Multidimensional Scale of Perceived Social Support was used (MSPSS) (32). The MSPSS is a 12 items scale that is designed to assess the perceived social support across three sources of support: family, friends, and significant others (four items for each scale). A seven-point Likert scale is used to rate the items; the responses range from (one) very strongly disagree to (seven) very strongly agree. Total scores can range from 12 to 84; higher scores indicate higher perceived social support. The MSPSS has been demonstrated to be psychometrically sound, with adequate reliability (α= 0.85), strong factorial validity, and moderate construct validity (24). The MSPSS has been translated into the Arabic language, and it was found to be reliable in the Arabic context, Cronbach's (α= 0 .87) (25). Construct validity of the Arabic MSPSS was ensured by factor analysis, and discriminant validity was supported by its correlation with European Emotion Regulation Scale cognitive reappraisal (r=0.17) (25).

Ethical considerations

The study was reviewed and approved by the ethical research committee at the School of Nursing, The Applied Science Private University (ref. 24/4/2018), and the

Institutional Review Boards of the targeted hospitals. In line with the Declaration of Helsinki, participants were provided comprehensive information about the study and were assured that their participation was voluntary, withdrawal from the study would have no effect on their medical care, and their responses would be confidential. Participants were provided comprehensive information about the study and were assured that their participation was voluntary, withdrawal from the study would have no effect on their medical care, and their responses would be confidential.

Statistical analysis

Data analysis was conducted using IBM SPSS software version 21 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including means, standard deviations (SD), frequencies, and percentages, were used to describe participants' demographic and clinical characteristics along with study variables based on the level of measurement of the variables. Pearson correlation coefficient (r) statistics were used to test the relationships between selected factors and self-care behaviors. Multiple linear regression models were constructed to detect the prediction power of the independent variables (demographic and clinical characteristics, anxiety and depression, and social support) on self-care scales. The underlying assumptions of normality, linearity, multicollinearity, homoscedasticity, homogeneity, and independence of residuals were tested and were met. A priori alpha level of < 0.05 was considered statistically significant.

Results

A total of 193 patients agreed to participate and formed the sample of this study. The mean age of the participants was 60.4 years (SD=10.61). Most of the participants were male (72.0%, *n*=139), married (87.0%, *n*=168), and nonsmoker (43.0%, *n*=83). Almost half of the participants have a low level (primary or secondary) of education (67.9%, *n*= 131) and were active workers (37.3 %, n=72). The participants had CHD for an average of six years (SD=6.51), and the vast majority have undergone previous cardiac interventions (96.4%, *n*=186) and had dyslipidemia (79.8%, *n*=154) (Table 1).

Table 1. Sociodemographic and clinical characteristics of patients (N=193)

Variable	Mean (SD)	N (%)
Age	60.4 (10.61)	
Gender		
Male		139 (72)
Female		54 (28)
Marital status		
Single		5 (2.6)
Married		168 (87)
Divorced		2 (1.0)
Widowed		18 (9.3)
Educational level		
Less than high school (Primary)		88 (45.6)
High school (Secondary)		43 (22.3)
University degree and higher		62 (32.1)
Occupation		
Working		72 (37.3)
Not working		49 (25.4)
Retired		72 (37.3)
Diabetes mellitus		
Yes		111(57.5)
No		82 (42.5)
Hypertension		
Yes		138 (71.5)
No		55 (28.5)

Dyslipidemia		
Yes		154 (79.8)
No		39 (20.2)
Duration of CHD	6.30 (6.51)	
BMI	29.39 (5.19)	
Smoking		
Current smokers		51(26.4)
Ex-smokers		59 (30.6)
Non-smokers		83 (43.0)
Drinking alcohol		
Yes		5 (2.5)
No		188 (97.4)

The mean scores for patients' depression were 7.22 (SD=4.64), and the mean scores for patients' anxiety were 6.39 (SD=4.67). The mean score for social support was 5.83 (SD=1.13), which indicated that the participants received high social support. More than half of the participants were recruited from the governmental hospital (53.4%, *n*=103), and 90 participants (46.3%) were recruited from the educational hospital.

Adherence to self-care behaviors

Self-care maintenance, management, and confidence

Mean scores on the self-care maintenance, management, and confidence scales were 71.79 (SD=14.81), 53.72 (SD=17.56), and 68.19 (SD=22.08), respectively. Overall self-care subscales scores were found to be normally distributed. Female patients were significantly worse than male patients in self-care management (P=0.045) and self-care confidence (P=0.014). Participants with a low educational level (primary and secondary) were significantly worse in self-care maintenance and self-care confidence compared with participants with higher educational level (bachelor and postgraduate); t (191), 2.54, P =0.012; t (191), 3.77, P <0.001, respectively.

Descriptive statistics for the self-care maintenance subscale are summarized in Table 2**.** The least performed behavior in the self-care maintenance scale is the exercise for 30 minutes; thirty-six percent of the participants (*n*=70) have never performed an exercise, and 20.7% (*n*=40) sometimes performed an exercise. Female participants were significantly worse in performing exercise than male participants, P<0.001. The two most performed behaviors in the self-care maintenance scale were: take medications as prescribed, and take Aspirin or other blood thinners; 88.6% (*n*=171) and 87.0% (n=168) of the participants reported that they take their medications as prescribed and take Aspirin or other blood thinners daily.

Table 2. Descriptive statistics for individual items of the self-care maintenance scale (N=193)

Self-care maintenance	Never or Rarely N(%)	Sometimes N(%)	Frequently N(%)	Always or daily N(%)
1. Keep doctor or nurse appointments?	2 (1.0)	6 (3.1)	22(11.4)	163 (84.5)
2. Take Aspirin or another blood thinner?	2 (1.0)	3 (1.6)	20 (10.4)	168 (87.0)
3. Check your blood pressure?	6 (3.1)	96 (49.7)	58 (30.1)	33 (17.1)
4. Exercise for 30 minutes?	70 (36.3)	40 (20.7)	33 (17.1)	50 (25.9)
5. Take your medicines as prescribed?	1(0.5)	4 (2.1)	17(8.8)	171 (88.6)
6. Ask for low-fat items when eating out or visiting others?	40 (20.7)	32 (16.6)	51 (26.4)	70 (36.3)
7. Use a system to help you remember your medicines?	35 (18.1)	14 (7.3)	43 (22.3)	101 (52.3)
8. Eat fruits and vegetables?	00 (0)	23 (11.9)	32 (16.6)	138 (71.5)
9. Avoid cigarettes and/or smokers?	74 (38.3)	15 (7.8)	24 (12.4)	80 (41.5)
10. Try to lose weight or control your body weight?	26 (13.5)	25 (13.0)	45 (23.3)	97(50.3)

A quarter of the participants had no symptoms in the previous month; thus, self-care management could not be evaluated in these participants (*n*=49) (Table 3). In regard to self-care monitoring, thirty-two percent of the participants quickly recognized the symptoms of CHD (*n*=62). The most frequent intervention taken by participants once they recognized CHD symptoms changed their activity level while taking Aspirin is the least frequent intervention performed. Female participants scored significantly worse than their male counterparts in taking Aspirin in case of symptoms (Mann-Whitney Z= -2.463, P=.014). In evaluating the treatment effectiveness item, 83 participants (43.0%) were somewhat sure of the effectiveness of the intervention they had implemented.

Table 3. Descriptive statistics for individual items of the self-care management scale (N=144).

Item	I did not recognize it N (%)	Not quickly N (%)	Somewhat Quickly N (%)	Quickly N (%)	Very quickly N (%)
11. How quickly did you recognize it as a symptom of heart disease?	1(0.5)	15(7.8)	27(14.0)	62(32.1)	39(20.2)
Item		**Not likely**	**Somewhat likely**	**Likely**	**Very likely**
12. Change your activity level		6 (3.1)	13 (6.7)	14 (7.3)	111 (57.5)
13. Take nitroglycerin		78 (40.4)	10 (5.2)	12 (6.2)	44 (22.8)
14. Call your doctor or nurse for guidance		75 (38.9)	20 (10.4)	22 (11.4)	27 (14.0)
15.Take an aspirin		94 (48.7)	5 (2.6)	9 (4.7)	36 (18.7)
Item		**Not sure**	**Somewhat sure**	**Sure**	**Very sure**
16. How sure were you that the action helped or did not help?		15(7.8)	83(43.0)	45(23.3)	1(0.5)

In regard to the self-care confidence scale, half of the participants were extremely confident in their ability to follow treatment advice (51.8%, n=100) and their ability to recognize symptoms of CHD (49.7%, n=96). On the other hand, participants' confidence in their ability to keep themselves free of CHD symptoms was the least scored item (Table 4). Male participants have higher confidence in their ability to keep themselves free of symptoms compared with female participants (Mann-Whitney Z=-2.799, P=0.005).

Table 4. Descriptive statistics for individual items of the self-care confidence scale (N=193)

	Not confident N (%)	Somewhat confident N (%)	Very confident N (%)	Extremely confident N (%)
17. Keep yourself free of symptoms?	18 (9.4)	67 (34.7)	62 (32.1)	46 (23.8)
18. Follow the treatment advice you have been given?	1 (.5)	32 (16.6)	60 (31.1)	100 (51.8)
19. Recognize changes in your health?	2 (1.0)	42 (21.8)	53 (27.5)	96 (49.7)
20. Evaluate the importance of your symptoms?	7 (3.5)	53 (27.5)	58 (30.1)	75 (38.9)
21.Do something that will relieve your symptoms?	5 (2.6)	52 (26.9)	80 (41.5)	56 (29.0)
22. Evaluate how well a remedy works?	5 (2.6)	54 (28.0)	80 (41.4)	54 (28.0)

Correlates of adherence to self-care maintenance, management, and confidence

Pearson correlation coefficient was used to examine the relationships among variables of the study. The analysis showed that better self-care maintenance is significantly correlated with older age (r=.225, P=0.002) higher educational level (r=.203, P=0.005) history of previous cardiac interventions (r=-.162, P=0.024), higher self-care confidence (r=.332, P<0.001), and lower depression level (r=-.158, P=0.029). On the other hand, higher adherence to self-care management is significantly associated with self-care confidence (r=.259, P=0.002). Regarding self-care confidence, higher level of education (r=271, P<0.001), lower BMI (r=-.234, P=0.001), better social support (r=.212, P=0.003), lower depression (r= -.403, P<0.001) and lower anxiety (r=-.316, P<0.001) levels, better self-care maintenance (r=.332, P<0.001), and better self-care management (r=.259, P=.002) are significantly correlated with higher self-care confidence (Table 5).

Table 5. Correlations between Self Care-Coronary Heart Disease Inventory subscales

	Self-care maintenance	**Self-care management**	**Self-care confidence**
Self-care maintenance	1	0.13	0.33*
Self-care management	0.13	1	0.26**
Self-care confidence	0.33	0.26	1

* Correlation is significant at the 0.05 level (2-tailed) ** Correlation is significant at the 0.01 level (2-tailed)

Predictors of self-care behaviors

Three different (separate) stepwise multiple linear regression analyses were used to determine (demographic, clinical, and psychosocial) variables that would predict better adherence to self-care maintenance, self-care management, and self-care confidence. For self-care maintenance, variables entered in the first block analysis were age, educational level, history of previous cardiac interventions. In the second block, self-care confidence and depression were entered. As shown in Table 6, significant predictors for better self-care maintenance were older age and higher self-care confidence. The total variance explained by the final model was 17.6 %, R^2=.176, F (4, 188)= 10.064, p <0.001. variables in step 2 (self-care confidence and depression) explained an additional .079 of variance in self-care maintenance. For self-care management, better self-care management is predicted only by higher self-care confidence (Table 6).

To examine the proposed predictors of self-care confidence, level of education, and BMI were entered in block I. Social support, depression, anxiety, self-care maintenance, and self-care management were entered in block II. The results of the analysis demonstrated that BMI, self-care maintenance, and self-care management were significant predictors of self-care confidence. The total variance explained by the final model was 29 %, R^2=.292, F (7, 137)= 8.015, p <0.001. The strongest predictor of self-care confidence was self-care management (Beta =0.23, P=0.002).

Table 6. Regression analysis on the self-care maintenance, self-care management, and self-care confidence (N=193)

Variables	Standardized β	t	P-value
Predictors of self-care maintenance			
Age	.229	3.45	.001
Self-care confidence	.301	4.11	.001
Depression	.029	.38	.704
Educational level	.144	1.99	.048
Predictors of self-care management			
Self-care confidence	.259	3.19	.002
Predictors of self-care confidence			
Educational level	.031	.394	.694
Anxiety	-.103	-1.005	.317
Depression	-.213	-1.96	.052
Social support	.114	1.555	.122
Self-Care maintenance	.189	2.55	.012
Self-care management	.230	.230	.002
Body mass index	-.166	-2.206	.029

Discussion

The study was done using the Middle Range Theory of Self-Care of Chronic Illness; this theoretical framework provided a context to understand and interpret the findings of this study. Additionally, the framework addresses the various aspects of the multi-dimensional self-care process among patients with CHD, which enabled us to identify the specific areas of weakness in the self-care process among this sample.

According to the Middle Range Theory of Self-Care of Chronic Illness, the first component of the Self-care process is self-care maintenance which refers to behaviors performed to enhance well-being, preserve health, and maintain overall health stability (5). The results of this study show that the least carried out behavior in the self-care maintenance scale was performing an exercise for 30 minutes; this finding emphasizes that low exercise performance is a prevalent problem among patients with CHD in Jordan and worldwide (8, 9). However, the concerning finding in this study is that more than one-third of the participants had never performed an exercise for 30 minutes, which is far away from the current CHD management guidelines (7).

Several factors such as knowledge, self-efficacy, and social support were found to influence CHD patients' involvement in exercise (16). Unfortunately, there is a paucity of studies investigating factors that influence Jordanian patients' involvement in exercise. Given the negative consequences of inadequate exercise on health outcomes among patients with CHD, not only factors that can enhance CHD patients' adherence to exercise need further exploration, but also that merit a recommendation to change practice in cardiac clinics to emphasize practices such as exercise importance, and adherence to aspirin taking.

Several variables have been found to be significant predictors for self-care maintenance in many studies; however, the findings were inconsistent (12, 27). The results of our study revealed that being older, having a higher level of education, and having higher self-care confidence were significant predictors for better self-care maintenance. Similar findings were shared by Kang, Yang, and Kim, who found that older age and higher self-efficacy were significant predictors for better health behaviors among patients with CHD (27). Furthermore, our study found that the level of education, history of cardiac interventions, and depression were correlated with self-care maintenance, but none was a

significant predictor of self-care maintenance. The discrepancy among the studies' findings might be attributed to the various ways of defining and measuring self-care maintenance behaviors (17, 27). Up to the best of our knowledge, no studies have evaluated the predictors of CHD self-care maintenance by applying the SC-CHDI, which makes it difficult to compare results among various studies.

According to The Middle Range Theory of Self-Care of Chronic Illness, the second component of the self-care process is self-care monitoring. Self-care monitoring is defined as the process of observing oneself and recognizing changes in signs and symptoms (5). In this study, half of the participants have 'quickly and very quickly' recognized symptoms of CHD. Despite that, participants' scores were very poor in self-care management, which is the third component of the self-care process, and it reflects patients' ability to evaluate changes in signs and symptoms of the chronic illness to determine the action needed. The Middle Range Theory of Self-Care of Chronic Illness attributed poor self-care management to the complexity of decision making involved in the self-care management, which is influenced by several factors; among those factors are knowledge and experience (5). In this study, most of the participants have a low educational level and short duration of CHD; a quarter of the participants have CHD for one year.

Furthermore, the lack of cardiac rehabilitation programs and the absence of comprehensive medical follow-up for patients with CHD in most of the Jordanian hospitals make patients faced with lack of knowledge; thus, it may hide their abilities to make decisions regarding deteriorating symptoms of CHD when they occur (8); therefore, there is an urgent need for self-care management education programs that enhance problem-solving skills to enable patients to recognize, interpret, and manage symptoms of CHD. The most frequently performed behavior when participants recognized CHD symptoms was changing the activity level, while the least performed intervention was taking Aspirin. This finding was expected since most of the participants reported taking their medication as prescribed, and self-adjustment of medication is usually not recommended in Jordanian cardiac clinics.

Regarding the Middle Range Theory of Self-Care of Chronic Illness, confidence is essential to enhance patients' ability to perform each stage of the self-care process (5). This study revealed that participants had a high level of self-care confidence in their ability to follow treatment advice as they had been given, followed by confidence in their ability to recognize changes in their health. On the other hand, participants were least confident in their ability to keep themselves free of symptoms. A similar finding was found among patients with heart failure (26). The low confidence in keeping oneself free of CHD could be attributed to the lack of formal education regarding self-care of such disease, which also makes patients feel they lack control over CHD. Therefore, it is important to design and implement educational programs for patients with CHD that incorporate symptoms recognition, interpretation, and management in order to enhance patients' confidence in their ability to perform self-care in general and increase their confidence to keep themselves free of symptoms.

The significant predictors of higher self-care confidence in the current study were low BMI, better self-care maintenance, and better self-care management. The findings of this study support the results of others showing that maintenance and management are highly interrelated with self-care confidence (28). This finding is further consistent with the Middle

Range Theory of Chronic Illness (5), which indicates that self-care confidence is a key factor in the self-care process. Furthermore, our results support the finding of Kang and Yang (2013), which revealed that normal BMI is a significant predictor of better self-care confidence (29). The findings of our study imply that promoting self-care confidence is a promising approach to enhance self-care among patients with CHD. In line with our findings, Ausili and his colleagues found that self-care confidence plays a significant role in enhancing self-care behaviors among patients with type two diabetes (28).

The study has limitations. There are other variables that may affect self-care behaviors among patients with CHD, such as income level, number of family members, and availability of health services. These variables should be taken into consideration in future studies.

Conclusion

The findings of this study fit the Middle Range Theory of Self-Care of Chronic Illness assumptions as the results showed that self-care confidence was the most significant predictor of self-care behaviors. Therefore, there is room for improvement in self-care for patients with CHD by developing interventions that enhance confidence among this group of patients. Further studies are needed to better understand the relationship between self-care monitoring and management since it is observed in this study that patients may have high self-care monitoring scores, but they could not translate their observations to satisfactory interventions to manage CHD symptoms.

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Conflict of interest

The author declares no conflict of interest, financial or otherwise.

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