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A Study of the Psychological Predictors Controlling the Risk Factors of Cardiovascular Diseases

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Abstract

Background: It seems that more cardinal steps can be taken towards constraining cardiovascular diseases (CVD) through the identification of relevant factors and predictors of behaviors associated with cardiac health.
Objectives: The present study is aimed to investigate the health literacy of cardiovascular diseases (CVD), personality traits, perception of cardiovascular disease risk and their relationships with controlling behaviors associated with cardiac health through playing self-efficient intervention roles.
Methods: The statistical population of the present study consisted of residents of Kermanshah, Iran in 2015. Additionally, due to the possibility of sample attrition and uncooperative subjects during the study, a total sample of 800 subjects was selected using cluster sampling. After data collection, they were analyzed using structural equation modeling (SEM).
Results: The results demonstrated that there were significant correlations between personality traits and controlling the risk factors of cardiovascular diseases. Similarly, significant correlations were found between controlling the risk factors of cardiovascular diseases and self-efficacy, health literacy of cardiovascular diseases (CVD) and perception of cardiovascular diseases. Further, the results showed that controlling behaviors associated with cardiac health had the greatest direct effects on the path of perception of cardiovascular diseases.
Conclusions: It can be concluded that neuroticism, impulsive sensation seeking and hostility result in risky behaviors of cardiovascular diseases (CVD) when self-efficacy is low and the cardiovascular disease (CVD) risk factors are controlled through health literacy and perception of cardiovascular diseases when self-efficacy is high.

Keywords: Cardiovascular Diseases, Personality, Health Literacy, Risk Perception

1. Background

Cardiovascular diseases (CVDs) are the leading causes of death and disability worldwide (1) and considering the significant rises in the growth of this disease, it is predicted that the number of its mortalities would rise from 7.1 million in 1999 to 11.1 million in 2020 (2). According to research, it can be expressed that the growing rate of the disease is due to changes in diet, physical inactivity and lack of exercise, smoking, poor diet, obesity and stress (3-5). Although some of the causes of CVDs such as age are unchangeable, there are methods that can be used to prevent CVDs or at least delay their onset (6). Amongst the preventive practices, the role of CVDs health literacy can be referred to (7). Health literacy embodies one's capacity to acquire, interpret and understand basic information on health services that are required for appropriate decision making (8, 9).

Another protective factor is self-efficacy, which is referred to as the most important determinant of behavior due to the fact that it can affect one's choice through the process of choosing a behavior (10). According to social cognitive theory (SCT), one's self-efficacy beliefs play a prominent role in displaying various behaviors (11). Moreover, the role of self-efficacy in the self-management promotion such as improved diet, physical activity and blood glucose monitoring has been confirmed in various studies (12-14).

According to research, one of the determining factors in the increase in CVDs is impulsive sensation seeking, including anger and negative emotions such as hostility (15). In the present study, personality traits were considered risk factors and predictors of cardiac health, on the grounds that the examination of the psychological factors of the causes of the diseases requires studying personality traits that are constant over time and contexts (16). Some evidence indicates that personality traits are associated with CVDs, and some researchers point to a personality pattern encompassing traits such as anger, hostility as well as haste and also claims that personality traits predispose

one to coronary diseases (17), however the mechanism of this effect is not clear-cut. The question is whether these behaviors have a direct adverse effect on the heart or lead to risky behaviors associated with cardiac health. The results of a study showed that people with these qualities were more apt to adopt behaviors such as smoking, lack of exercise and physical activities as well as unhealthy diets. In fact, these personality traits are behind the risk behaviors of CVDs (16).

It seems that major steps can be taken towards the prevention of CVDs through the clarification of related factors determining behaviors associated with cardiac health. Further, this issue should be given more attention due to the significance of behaviors associated with CVDs, including smoking, physical inactivity, consumption of fatty and salty foods, necessity for identification of the causes of these behaviors and lack of adequate studies to explain the nature of these factors in Iran. Therefore, the present study is aimed to propose a comprehensive model.

2. Objectives

The present study is aimed to investigate health literacy of CVDs, personality traits, perception of CVDs and their relationships with controlling behaviors associated with cardiac health through playing self-efficient mediating roles.

3. Methods

3.1. Study Design and Setting

The study design is cross-sectional. The statistical population of the present study consisted of people from the city of Kermanshah, Iran within the age range of 30 to 60 in 2015. In addition, only people who were free from any psychotic disorders and their informed consent were received in advance were involved in this study. Cluster sampling was the sampling technique used in the present study. Three out of the seven divisions were randomly selected (municipality categorizations) and then 250 subjects were chosen in each region based on the statistical blocks of the census in 2013 through multi-stage cluster sampling. After adjusting the questionnaires and selecting subjects, they were distributed amongst the subjects. Furthermore, instructions on how to complete the questionnaires were supplied by the researchers and the participants were requested to ask for more clarification if and in case they encountered any problems filling out the questionnaires. Then the participants were assured that their information would remain confidential and their informed consent was taken. Moreover, the questionnaires were completed individually and collectively in the presence of the researchers.

3.2. Participants

Given the likelihood of anticipated sample dropouts and lack of cooperation, a sample of 800 subjects was chosen, of which 771 subjects were considered after the completion of the study. Lack of cooperation, distorted questionnaires and lack of enough people to participate were some reasons for sample dropouts.

3.3. Instruments

3.3.1. Zuckerman-Kuhlman Personality Questionnaire

This questionnaire consisted of 50 items, falling into five dimensions: neuroticism-anxiety, impulsive sensation seeking, activity, sociability and hostility. Each of the scales was composed of 10 questions in the form of two-point Likert Scale (true or false). On some occasions, true and false denoted a value of one or zero and vice versa (18). In a study conducted by Lamei et al. (2013), the test-retest reliability coefficient and split-half correlation were 0.79 and 0.68, respectively (19). In the present study, Cronbach's alpha of the questionnaire was 0.78.

3.3.2. Cardiovascular Health Literacy Questionnaire

To measure cardiovascular health literacy, a scale was developed in the field of cardiac health based on the experts' viewpoints and previous studies. After gathering the items from the existing studies (8, 20, 21), they were examined by five experts in psychology (three Masters of Arts and two PhDs), one social welfare major (M.A.), one health education major (M.A.) and one with a Ph.D. in cardiovascular diseases. Then, the unrelated items were removed and finally, 26 items remained, which were scored on a Likert scale of 0 to 5. The numbers zero to five denote "not at all", "very little", "little", "to some extent", "much" and "very much," respectively. For example, one of the items incorporated in the questionnaire is "written subjects about cardiovascular health in books and journals are perceptible." In this questionnaire, a higher score means higher health literacy.

3.3.3. General Self-Efficacy Scale (GSE)

This 10-item scale has originally been developed by Matthias Jerusalem and Ralf Schwarzer in 1981, which its maximum and minimum scores are in the range of 10 to 40. Moreover, its Cronbach's alpha was reported to be within the range of 0.81 to 0.91. The internal consistency coefficient of this tool was reported to be between 0.81 and 0.91 (22). In addition, the scale was standardized in Iran by Rajabi (2006), in which its Cronbach's alpha was reported

to be 0.82 (23) and in the present study the Cronbach's alpha was 0.87.

3.3.4. Perception of Cardiovascular Disease Risk Questionnaire

A scale was developed for measuring subjects' perception of cardiovascular disease risk based on the experts' viewpoints and previous studies (24). After gathering the items from the existing studies, they were examined by five experts in psychology (three Masters of Arts and two PhDs), one social welfare major (M.A.), one health education major (M.A.), and one with a Ph.D. in cardiovascular diseases. Then, the unrelated items were removed and finally, 20 items remained, which were scored on a Likert Scale of 0 to 4. Scoring was done on the basis of a five-point Likert scale (0 = totally disagree, 1 = disagree, 2 = partly agree, 3 = agree, 4 = totally agree). In this questionnaire having a high score shows a better perception of CVDs risk.

3.3.5. Controlling the Risk Factors of Cardiovascular Disease Questionnaire

A scale was developed for measuring subjects' controlling risk factors of cardiovascular diseases based on the experts' viewpoints and previous studies (3-5). After gathering the items from the existing studies they were examined by five experts in psychology (three Masters of Arts and two PhDs), one social welfare major (M.A.), one health education major (M.A.), and one with a Ph.D. in cardiovascular diseases. Then, the unrelated items were removed and finally, 23 items remained, which were scored on a Likert scale of 0 to 5. Scoring was done on the basis of a six-point Likert scale (0 = not at all, 1 = very little, 2 = little, 3 = to some extent, 4 = much, 5 = very much). Scoring more on this questionnaire means more control on CVDs risk factors.

3.4. Statistical Analysis

After data collection, the percentages relevant to nominal variables and mean and standard deviation of continuous variables were reported. Before the main analysis, no violation of defaults including normality was reviewed and then approved using the Kolmogorov-Smirnov test. Finally, the data was analyzed using Pearson correlation coefficientby and the structural equation modeling (SEM) (SPSS-21 Chicago, Illinois, USA and AMOS-18 were used). The P value level of less than 0.05 was set as statistically significant.

3.5. Ethical Considerations

After receiving the authorization of the research ethics committee (REC) of Kermanshah University of Medical Sciences, the present study was conducted in the research center of the said university with the registered number 94321.

4. Results

4.1. Instruments Reliability and Validity

Cardiovascular health literacy questionnaire: the results of the reliability test showed that there was a correlation coefficient of 0.81 between the first and second stages of the test-retest and the Cronbach's alpha was 0.86. To check the validity of items, the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used. Therefore, the reliability and validity were both approved.

Perception of cardiovascular disease risk questionnaire: the results of the reliability test showed that there was a correlation coefficient of 0.80 between the first and second stages of the test-retest and the Cronbach's alpha was 0.86. To check the validity of items, the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA) were used. Therefore, the reliability and validity were both approved.

Controlling the risk factors of cardiovascular disease questionnaire: the results of the reliability test showed that there was a correlation coefficient of 0.76 between the first and second stages of the test-retest and the Cronbach's alpha was 0.80. To check the validity of the items, the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were both used. Therefore, the reliability and validity were both approved.

4.2. Main Analyzing

Data analysis was performed amongst 771 subjects, of whom 42.6% were women (327 subjects); with the average age of the subjects being 42.5 $\pm$ 92.33. The demographic characteristics of the sample under study are shown in Table 1. To investigate the relationship between the psychological factors and controlling the risk factors of CVDs, the Pearson Correlation Test was used. Further, the relationship between the psychological factors and controlling the risk factors of CVDs, mean and standard deviation of controlling the risk factors of CVDs in the sample under study are shown in Table 2. The results of the analysis showed that there were significant correlations between the personality traits and controlling the risk factors of cardiovascular diseases. Similarly, there was a significant correlation between controlling the risk factors of cardiovascular diseases and each of factors such as self-efficacy, health literacy associated with heart and perception of cardiovascular disease. Accordingly, the total mean of the variable "controlling the risk factors of cardiovascular diseases" was 82.14 with a standard deviation of 14.85.

Table 2 results showed that neuroticism and hostility-aggression were related to diet, i.e. controlling healthy diets is less common amongst the ones with personality

Table 1. The Demographics of the Study Sample

Variable		No. (%)
Sex	Female	327 (42.4)
	Male	444 (57.6)
Age	30 - 40	211 (27.36)
	40.1 - 50	354 (45.91)
	50.1 - 60	206 (26.71)
Marriage Status	Married	182 (23.6)
	Single	589 (76.4)
Employment Status	Employee	515 (66.78)
	Unemployed	256 (33.2)

traits of neuroticism and hostility. In addition, the results demonstrated that people with high self-efficacy and health literacy pursued healthier diets. Of the variables under study, perception of CVDs had the greatest relationship with diet control, which means that the better one is perception of CVDs and the more popular one is control over consuming unhealthy foods (fatty and salty). In addition, Table 2 results showed that, except for impulsive sensation seeking, other personality traits were related to exercise and weight control. The results also showed that self-efficacy, health literacy and perception of CVDs were positively related to exercise and weight control components. Accordingly, it can be expressed that sociability had the greatest relationship with exercise and weight control in comparison with other predictors.

The results demonstrated that the variables under study were related to stress management and the greatest relationship was related to neuroticism. Table 2 results demonstrated that, except for impulsive sensation seeking, all personality traits and other variables under study were related to medical measures and the greatest correlation was related to self-efficacy. The results also demonstrated that, except for activity, all personality traits were related to smoking. Additionally, the greatest correlation coefficient belonged to cardiac health literacy. Finally, the results from Table 2 demonstrated that, except for activity, all personality traits were related to planning.

To investigate the relationship between personality traits, health literacy, perception of cardiovascular diseases and the factor "controlling the risk factors of cardiovascular diseases through self-efficacy," structural equation modeling (SEM) was used. The direct coefficients of this analysis are summarized in Table 3. The results of Table 3 indicate that all direct paths are significant. Accordingly, it can be stated that the greatest direct effect belongs to the path between risk perception and behavior control ($\beta = 0.36$) and the smallest direct effect belongs to the path between impulsive sensation seeking and self-efficacy ($\beta = -0.08$). The indirect coefficients of this analysis are shown in Table 4.

The results demonstrated that the proposed model enjoyed acceptable fitting (RMSEA = 0.053, TLI = 0.88, CFI = 0.85, GFI = 0.88). The results of Table 4 show that all indirect paths, except for activity, leading to components of controlling the risky behaviors of cardiac health are significant. More to the point, of all paths leading to components, the greatest coefficient effect belongs to risk perception path. The proposed model of the research is presented in figure 1.

5. Discussion

The present study is aimed to investigate the relationship between psychological factors and controlling the risk factors of CVDs. The risk factors of cardiac health fell into six categories. The results showed that controlling healthy diets is less common amongst the ones with personality traits of neuroticism and hostility. Of the variables under study, perception of CVDs had the greatest relationship with diet control. Studying literature review demonstrated that the trait of neuroticism was positively related to unhealthy eating behaviors (25). In addition, the results of a study indicated that neuroticism and eating styles were related (26). Other research has shown that neuroticism is positively related to behaviors such as excluding breakfast and a lack of enjoying vegetables and fruits and it is also negatively associated with the consumption of healthy foods (27).

In the present study, the second item of the CVDs risk factors was exercise and weight control. The results of this study showed that ones with personality traits of neuroticism and hostility are less inclined to physical activities and those with personality traits of sociability are more inclined to exercise and weight control. Some researchers are of the opinion that the neurotic and introverted ones have fewer tendencies towards exercise and physical activity (28, 29) because most of these activities need withdrawn ones to socialize with others. Additionally, sports activities require motivation in which the neurotic ones are lacking. In fact, lack of motivation, energy and embarrassment are obstacles in the way of those who try to play sports (30). Similar results were observed in a study conducted on patients with CVDs (31). Studies indicate that personality traits such as neuroticism play prominent roles in predicting success and failures in weight loss. Personality traits play a role in weight changes and certain personality traits are accompanied by better responses to treating weight

Table 2. The Relation Between the Psychological Factors and Controlling the Risk Factors of CVDs

		Diet	Exercise and Weight Control	Stress Management	Medical Measures	Smoking Controlling	Planning	Total Grade
Neuroticism	r	-0.18	-0.30	-0.16	-0.36	-0.23	-0.30	-0.41
	P Value	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sensation seeking	r	0.05	-0.02	0.04	0.02	-0.20	-0.13	-0.08
	P Value	0.16	0.59	0.22	0.53	0.001	0.001	0.02
Socializing	r	0.05	0.33	0.11	0.15	0.10	0.25	0.27
	P Value	0.18	0.001	0.002	0.001	0.007	0.001	0.001
Activity	r	0.02	0.16	0.13	0.09	0.07	0.08	0.14
	P Value	0.67	0.001	0.001	0.01	0.06	0.02	0.001
Aggressive	r	-0.17	-0.15	-0.08	-0.17	-0.18	-0.13	-0.22
	P Value	0.001	0.001	0.04	0.001	0.001	0.001	0.001
Self-efficacy	r	0.13	0.22	0.13	0.47	0.32	0.32	0.38
	P Value	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Health literacy	r	0.22	0.24	0.03	0.25	0.52	0.24	0.35
	P Value	0.001	0.001	0.34	0.001	0.001	0.001	0.001
Risk perception	r	0.23	0.29	0.06	0.25	0.47	0.37	0.46
	P Value	0.001	0.001	0.10	0.001	0.001	0.001	0.001
Descriptive	M	22.93	16.22	3.60	7.51	10.66	20.93	82.14
	SD	4.28	4.17	1.40	3.55	2.45	6.29	14.85

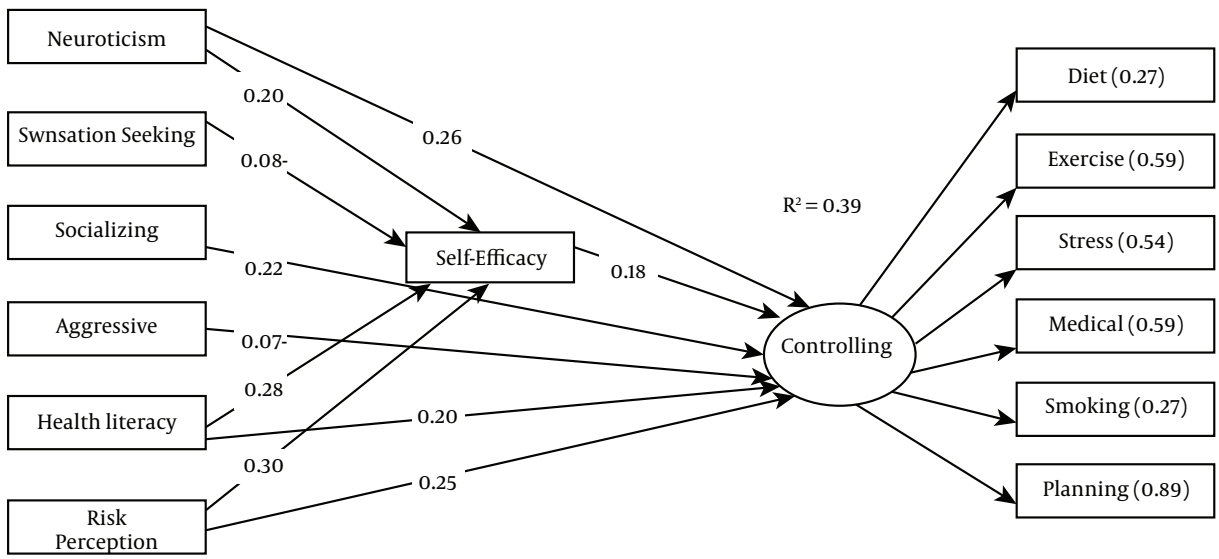

Figure 1. The Proposed Model of the Research

loss (32-35). However, some studies suggest that personality is not associated with weight (32, 36). In addition, the our results showed that self-efficacy, health literacy and perception of CVDs were positively related to exercise and weight control components. According to the previous studies, self-efficacy is a predicting index for weight loss

Table 3. Direct Coefficients of Path Analysis

Direct Paths	Direct		
	B	β	P Value
Health literacy- Self-efficacy	0.08	0.28	0.001
Risk perception- Self-efficacy	0.14	0.30	0.001
Neuroticism- Self-efficacy	-0.40	-0.19	0.001
Sensation seeking- Self-efficacy	-0.22	-0.08	0.007
Self-efficacy- controlling	0.05	0.22	0.001
Risk perception- controlling	0.04	0.36	0.001
Neuroticism- controlling	-0.12	-0.27	0.001
Socializing- controlling	0.16	0.22	0.001
Aggressive- controlling	-0.05	-0.10	0.001
Health literacy- controlling	0.01	0.20	0.001

(37) and successful weight management programs (30).

The third component of the risk factors of CVDs was stress management in the present study. The results demonstrated that the variables under study were related to stress management, and the greatest relationship was related to neuroticism. Therefore, it can be stated that the more this feature, the lower the stress management will be. Additionally, it can be expressed that the more the levels of self-efficacy, health literacy and perception of CVDs the more the stress management will be and vice versa. From the viewpoints of some researchers, personality is an important factor in the relationship between stress and health as well as how one assesses one's stressful events depend on one's personality traits (38). Therefore, it can be concluded that stress, personality and health interact with each other (39). Given that neurotic ones exaggerate small levels of stress based on their cognitive system and personality and also shows them as excessively threatening, one will be more exposed to damage from small levels of stress (40).

The fourth component of CVDs risk factors was medical measures in the present study. The results demonstrated that the more the sociability and activity, the more one's inclination towards medical measures such as checkups for controlling CVDs will be. In addition, the more the neuroticism and hostility, the fewer the medical measures will be. Moreover, the results demonstrated that the more the self-efficacy, the more one will be inclined towards medical measures to control one's cardiac health.

The fifth component of CVDs risk factors was smoking in the present study. The results demonstrated that the more the neuroticism, hostility and impulsive sensation seeking, the more the smoking will be and vice versa. Additionally, the greatest correlation coefficient belonged to cardiac health literacy, i.e., the more this feature, the less one will smoke. The results of a study showed that impulsive sensation seeking was related to smoking and health planning, however it was not related to other unhealthy behaviors, i.e., the higher one's impulsive sensation seeking, the more inclined one will be towards smoking and the less planning for one's cardiac health. The results of some studies have demonstrated that ones with higher health literacy enjoy greater self-efficacy to control health-related behaviors such as physical activity, diet and medical measures (41, 42).

Planning was the sixth component of CVDs risk factors in the present study. The results demonstrated that the more the neuroticism, hostility and impulsive sensation seeking, the more the planning for cardiac health will be and vice versa. Additionally, the greatest relationship was related to risk perception, i.e., the more this feature, the more one's planning for cardiac health will be. It is believed that personality traits are related to health outcomes (43, 44) and another study concluded that health promoting behaviors such as exercise and healthy diets were connected with cognitive factors such as self-efficacy (45). The specific self-efficacy such as self-efficacy in controlling risky behaviors refers to circumstances for when to perform a particular task at hand. Further, it is assumed that high levels of specific self-efficacy would better act as a predictor of avoidance of risky behaviors than low levels of self-efficacy (46).

A model was presented in this study in which self-efficacy played a mediating role and the role was confirmed (no strong results on some paths though). In general, it can be concluded that self-efficacy plays a mediating role in the relationship between personality traits, health literacy, perception of CVDs and other factors such as controlling the risk factors of CVDs i.e. neuroticism, impulsive sensation seeking and hostility would result in risky behaviors of CVDs provided that self-efficacy is low, and health literacy, perception of CVDs would cause one to control the risk factors of CVDs when one self-efficacy is high. Therefore, to control CVDs and cardiac health, the role of self-efficacy is important and should be taken into consideration. According to the results of the present study, it is recommended that the role of self-efficacy be taken into account to prevent CVDs and unhealthy behaviors amongst people; educational and psychological interventions should also be considered. Given that the present study was conducted in Iran, necessary precautions must be taken into consideration against generalizing the results. Therefore, it is recommended that this research be done in other countries as well.

Table 4. The Effect Coefficients of Indirect Paths

Variable		Diet	Exercise and Weight Control	Stress Management	Medical Measures	Smoking Controlling	Planning
Neuroticism	β	-0.08	-0.18	-0.17	-0.18	-0.08	-0.26
	P Value	0.001	0.001	0.001	0.001	0.001	0.001
Sensation seeking	β	-0.05	-0.01	-0.009	-0.01	-0.005	-0.01
	P Value	0.002	0.003	0.003	0.002	0.002	0.002
Socializing	β	0.06	0.13	0.12	0.13	0.06	0.18
	P Value	0.001	0.001	0.001	0.001	0.001	0.001
Activity	β	0.01	0.03	0.03	0.03	0.02	0.04
	P Value	0.19	0.21	0.21	0.20	0.21	0.21
Aggressive	β	-0.03	-0.06	-0.05	-0.06	-0.03	0.08
	P Value	0.006	0.008	0.008	0.006	0.006	0.007
Health literacy	β	0.04	0.08	0.08	0.08	0.04	0.11
	P Value	0.01	0.02	0.02	0.02	0.02	0.02
Risk perception	β	0.11	0.25	0.23	0.25	0.12	0.34
	P Value	0.001	0.001	0.001	0.001	0.001	0.001

5.1. Conclusions

It can be concluded that neuroticism, impulsive sensation seeking and hostility result in risky behaviors of cardiovascular diseases (CVD) when self-efficacy is low and the cardiovascular disease (CVD) risk factors are controlled through health literacy and perception of cardiovascular diseases when self-efficacy is high.

Footnotes

Conflict of Interest: The authors declared no conflicts of interest.

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