Review Article

Application of health education and promotion theory-based interventions on patients with cardiovascular disease: A systematic review

Bahram Mohebbi, Maryam Sabouri[1], Azar Tol[2]

Abstract:

BACKGROUND: Adopting healthy behaviors can lead to better outcomes which can deeply impact cardiovascular diseases (CVDs) development; consequently, tailoring appropriate theory-based interventions may improve various outcomes among patients at CV risks. This study aimed to assess published researches on the application of health education and promotion of intrapersonal and interpersonal theories/models' interventions on patients with CVD.

MATERIALS AND METHODS: In this systematic review, PubMed, Web of Science, Google Scholar, Scopus, Science Direct, and SID, Magiran databases for English and Persian studies were searched using relevant keywords, respectively. We searched for interventional studies published with no time limits until the end of 2020 assessing the application of health education and promotion theories/models interventions on adult patients with CVDs. Two reviewers individually reviewed abstracts/full-text articles to assess inclusion according to predefined criteria. In case of discrepancy between the two researchers, a third expert was requested to assess papers, and final selection decision was made based on the agreement among the three evaluators. This systematic review was conducted using the following data extraction steps and assessing the quality of the studies and results.

RESULTS: From 60 articles, 35 studies met inclusion criteria. Most interventions improved at least some educational including models constructs (20%), clinical (14.2%), and practical (88.5%) outcome related to CVDs. It is noted that attention to educational, practical, and clinical outcomes was focused in published papers, respectively. Furthermore, based on the study categorization using models, some CVDs and theories/models were more concerned compared to others.

CONCLUSIONS: Health education and promotion theory-based interventions on patients with CVD appeared beneficial in the most published paper.

Keywords:
Cardiovascular disease, education, health education, health promotion, intervention, model, outcome, practice, theory

Rajaie Cardiovascular Medical and Research Center, Cardio-Oncology Research Center, Iran University of Medical Sciences, Tehran, Iran, [1]Department of Health Education, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran, [2]Department of Health Education and Promotion, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

Address for correspondence:
Dr. Azar Tol,
Department of Health Education and Promotion, Tehran University of Medical Sciences, Tehran, Iran.
E-mail: tol.azar@yahoo.com

Introduction

Cardiovascular diseases (CVDs) defined as a leading main reason of death in the worldwide can adversely affect on sustainable human development.[1] All types of CVDs can lead to undesirable effects on individuals which need appropriate interventions in the various levels of prevention and treatment to delay the adverse outcomes.[2,3]

Based on Sadeghi *et al.*, study results, aging process might affect Disability-Adjusted Life Year related to CVDs and disease outcomes more than two-fold in 2025 compared with 2005.[4] This notable finding should consider to set appropriate designing, implementation, and evaluation of applied

interventions among population in middle-aged individuals.[5]

As Sharma *et al.* state that primary prevention defines as preventive actions to the onset of a disease to avoid the possibility of happening. Secondary prevention means actions which block the disease progression. Tertiary prevention refers to actions taken after the onset of disease assisting individual with disease/disability. Based on the mentioned meaning of the level of prevention, considering adopting healthy behaviors can be addressed in the daily living with chronic disease as CVD.[6]

Many CVDs and its adverse outcomes are preventable in general. Lack of patients' knowledge, attitude, and practice can be considered as important factors influencing selection and adoption of health-promoting behavior to achieve healthy lifestyle.[5,7]

Evidence noted the important roles of models/theories to modify unhealthy behaviors.[6,8] Based on the confederacy of international health education organizations, models/ theories and technology with aim of educational research should be utilized in methodology design, practice, and assessing of health education programs. Theories and models as concept mapping are beneficial tools for health education experts and policymakers.[6,9]

In this review, some relevant interpersonal and intrapersonal models and theories which fit on CV individual behaviors were utilized. The health belief model (HBM) is recognized as a model/theory for health-related behaviors which has been tested in different health-related situations.[6,10-13] Another model which applied in individual behavior change is transtheoretical model (TTM) or stages of change (SOC) model. TTM as a model of behavior change suggests how individual move through five SOC.[5,6,14,15] Also, TTM presents ten processes of change and three main constructs to support behavior change. Theory of planned behavior (TPB) considers behavioral intention is the most important determinant of behavior. This theory focuses on the role of thought in decision-making about adopting behaviors.[6,8,16,17] Another relevant theory is SCT which defines human behavior can be explained by a triadic reciprocal causation. The angles are behavior, environmental, and personal factors such as cognition, affect, and biological. The interaction among these three dimensions results in behavior change.[5,6,18]

The evidence noted that HBM, TTM, Beliefs, Attitudes, Subjective Norms and Enabling Factors (BAZNEF), TPB, and SCT have been generally used in behavioral studies, primary and secondary preventive health issues.[10-18] In this review, we assessed also other intrapersonal and interpersonal theories/models in three educational, clinical, and practical outcomes among patients with CVDs.

Outcomes mean advantages which individuals gain from an applied intervention program to improve knowledge, skills, attitude, value, behavior, and conditions.[19] Educational outcomes determine that enhancing how knowledge and information can emerge requisite skills to achieve goals.[20] Clinical outcomes adderssed measurable changes in health issues related to researches, clinical experience, and patient preference.[21] Practical outcomes as a multidimensional concept in health issues focus on behavior evaluation such as improving quality of life, health-promoting behavior, health literacy, self-care, adherence, and self-management).[13,22,23] The review will help to health professionals and decision makers to have better understanding of applied theory-based interventions and their results among patients with CVD.

Materials and Methods

This review is in accordance with the recently extended guidelines of the PRISMA statement for reporting systematic reviews [Figure 1].[24] It is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses. The research was approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.SPH. REC.1399.215).

Data sources and search strategies selection
The review was completed by PubMed, Web of Science, Google Scholar, Scopus, Science Direct, and SID, Magiran databases for English and Persian studies using relevant keywords, respectively. The search strategies included keywords as well as medical subject headings (MESH) terms depending on the database and were supplemented by synonyms and glossary terms. We searched for interventional studies published with no time limits until the end of 2020 assessing the application of health education and promotion theories/models interventions on adult patients with cardiovascular diseases. The search was limited to theory/ model-based interventional studies targeting adults' patients with cardiovascular disease except congenital diseases. Inclusion criteria for eligibility included (1) randomized control trials/quasi-experimental educational interventional studies on educational, clinical, and practical outcomes on cardiovascular patients; (2) used intrapersonal and interpersonal health education/promotion theories/models; (3) conducted in patients with cardiovascular disease (≥18 years); and (4) published in English or Persian language. Exclusion criteria included (1) performed on patients with congenital heart disease and (2) conducted on patients with cardiovascular disease as a complication of another
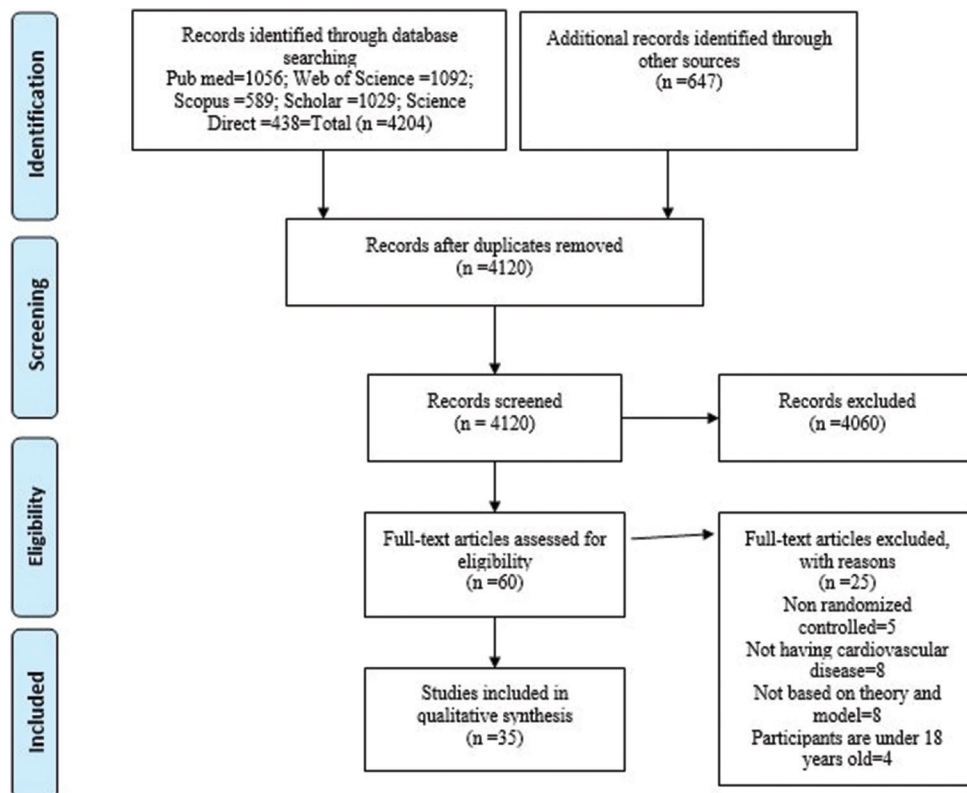
Figure 1: PRISMA flow diagram of systematic review inclusion and exclusion process

chronic disease for example patients with diabetes and cardiovascular complication.

Searched studies were organized and classified based on study designing, methodology, and utilized theory/model. Titles and abstracts were assessed independently by two reviewers. Data extraction and analysis were conducted by mentioned above reviewers on full-text articles. To control studies' quality, two reviewers assessed methodological sections and quality of reporting for each article separately. Any doubtful case was determined by a third reviewer.

To achieve the relevant studies, initially, a wide range of keywords listed in the MeSH, such as evaluation, program evaluations, outcome and process assessment, educational assessment, and educational measurements, were searched. With the aim of increase the likelihood of finding relevant studies, the terms intervention and specific name of theories/models were searched both as separate and a blend word.

The literature search was conducted using MeSH terms. The MeSH terms utilized in the search were as Educational intervention [Title/Abstract] OR Theory-based interventions [Title/Abstract] OR Educational Program [Title/Abstract] AND Health education models [Title/Abstract] AND Cardiovascular disease [Title/Abstract] OR Cardiovascular risk

factors include (lipid profiles OR LDL OR HDL AND blood pressure OR hypertension AND smoking OR smoking abuse AND Anthropometric indices OR obesity OR overweight) AND quality of life [Title/Abstract] OR Physical dimension OR Mental dimension AND Health-promoting behaviors [Title/Abstract] (nutrition OR diet AND physical inactivity OR Lack of physical activity AND health responsibility AND stress management OR stress OR Interpersonal relationships) AND health literacy [Title/Abstract] AND self-care [Title/Abstract] OR self-management AND adherence. The filters set for the search included (1) text availability: full text, (2) article type: clinical study, clinical trial, controlled clinical trial, quasi-experimental study, experimental study, randomized controlled trial; (3) species: human only; and (4) languages: English and Persian.

In order to select proper papers, two researchers extracted the relevant information independently using a standard data mining form. They checked any mismatches in data mining, which was followed by a complementary analysis performed by a third researcher to confirm the precision of the extracted information. The studies were reviewed and selected based on three following stages: (1) citation information and the papers abstract of extracted from the databases were transferred to endnote, studies titles of selected papers were reviewed, repetitive or irrelevant to the main topic papers were

removed; (2) reading abstracts of remained papers, studies related were selected [Figure 1]; (3) full texts were analyzed based on the inclusion and exclusion criteria. Finally, 35 studies that were in line with the purpose of the study, were written in English or Persian, and had full texts available to the researcher were selected and qualitatively analyzed in 6 months.

Data extraction and quality assessment

This systematic review was conducted using the following data extraction steps and assessing the quality of the studies and results. Articles were included through screening titles and abstracts of all publications passing the title/abstract screen by two independent reviewers. In case of discrepancy between the two researchers, a third expert was requested to assess papers, and final selection decision was made based on the agreement among the three evaluators. All papers were categorized according to their characteristics including their aims, participants, instruments, theory/model, educational strategies and materials, interventions, and its duration versus comparator and intervention effect. Furthermore, a quality assessment according to the specifications of the reporting guidelines for survey research was performed. It includes reporting items in eight subdomains such article background, methods used, sample selection criteria, research instrument, presentation of findings, interpretation, and discussions of results and ethical considerations [Table 1 and Figure 2].[25]

Results

The PRISMA flow chart in Figure 1 reviews the search process results.

Search findings

A total of 4204 articles were identified and screened through three steps for eligibility [Figure 1]. A total of 4060 full-text articles published in English were retrieved for screening. Twenty-five articles were excluded using selection criteria and poor methodological quality. Finally, 35 studies were included in this review [Table 2].
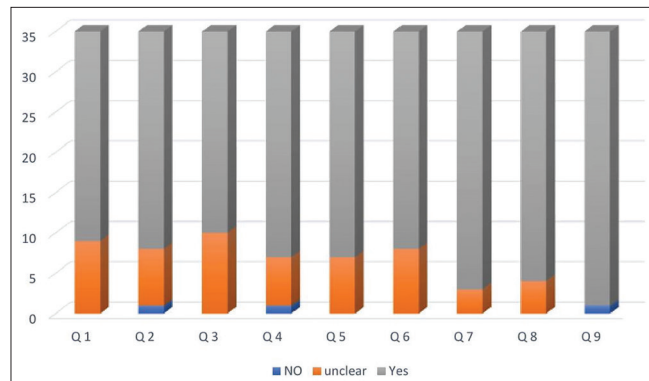

Figure 2: Analysis of studies quality assessment

Table 1: Characteristics of reviewed articles

Theories/models	Model explanation in introduction	Model conceptual framework	Study outcomes			Using appropriated educational strategies	Follow-up	Ethics and ethical considerations	Discussion based on model constructs	Model-based conclusions
			Educational	Clinical	Practical					
HBM	8	9	4	1	8	10	8	8	10	10
Theory of planned behavior	3	3	0	1	3	3	4	3	3	4
SCT	2	2	0	0	2	0	2	2	1	2
BASNEF model	8	8	1	2	7	5	7	4	6	7
TTM	3	3	1	1	3	3	2	3	2	2
HPM	1	1	0	0	1	1	1	1	1	1
Self-care management	2	2	0	0	2	1	2	2	2	2
Partnership care model	2	2	0	0	2	2	2	1	2	2
Self-care program model based on Orem's	1	1	0	0	1	1	1	0	1	1
Family-centered empowerment model	1	1	0	0	1	1	1	0	1	1
IMB skills model	1	1	1	0	1	1	0	0	1	1
Article total (35)	32	33	7	5	31	28	30	24	30	33

HBM=Health belief model, SCT=Social cognitive theory, TTM=The Transtheoretical Model, HPM=Health Promotion Model, IMB=Information Motivation Behavioral, BAZNEF=Beliefs, Attitudes, Subjective Norms And Enabling Factors

Table 2: Characteristics of included studies

Study (years)	Study design, country, language	Aims	Participants (*n*)	Instruments
Baghianimoghadam *et al.*, (2013)[30]	Cohort experimental study, Iran, English	To assess content and concurrent validity of HBM constructs to promote self-care behaviors in HF patients	HF patients (90 in each group), mean age 53.41±10.7	Researcher-made questionnaire
Kaveh *et al.*, (2017)[31]	Controlled quasi-experimental study, Iran, English	To examine the effect of a hospital-based educational program based on HBM constructs on self-care behaviors among patients with HF	HF patients (42 in each group), mean age 55.04	European HF self-care behavior and a researcher-made questionnaire
Maghoul *et al.*, (2018)[50]	Randomized controlled trial, Iran, Persian	To determine the effect of educational intervention based on HBM on nutritional behaviors among patients with MI	Patients with MI (43 in each group), mean age 57.60	Researcher-made questionnaire on HBM and nutritional behaviors
Shojaei *et al.*, (2016)[45]	Semi-experimental clinical trial, Iran, English	To examine the effects of education based on HBM on dietary behaviors of patients following CABG	CABG patients (32 in each group), mean age 59.2±7.43	Researcher-made questionnaire
Zighaimat *et al.*, (2010)[46]	Quasi-experimental study, Iran, Persian	To examine the effects of an education based on HBM on dietary behaviors of CABG patients	CABG patients (32 in each group)	Researcher-made questionnaire and checklist of nutrition behaviors
Mohseni *et al.*, (2017)[20]	Quasi-experimental study, Iran, Persian	To examine the effects of an education based on HPM on self-efficacy of CABG patients	CABG patients (110 in each group), mean age 60.16±9.09	Researcher-made questionnaire
Baghaee *et al.*, (2017)[39]	Quasi-experimental study, Iran, English	To determine the effect of an educational intervention based on the BASNEF model on medication adherence in patients with hypertension	Patients with HTN in two groups (80 in each group), mean age 54.40±10.85	BASNEF model questionnaire, Hill-Ben questionnaire for hypertensive patients' diet follow-up
Abbaszadeh *et al.*, (2012)[51]	Quasi-experimental, Iran, Persian	To assess the effects of face-to-face training about cardiac risk factors based on HBM on knowledge and attitude of patients with MI	Discharged patients with MI (80 in each group), mean age 53.58±8.06	Researcher-made questionnaire in knowledge and physical activity, CVDs risk factors
Sieben *et al.*, (2019)[34]	Prospective, controlled clinical trial, Netherlands, English	To examine the process and effect of a nurse-led, web-based intervention based on behavioral change strategies to improve medication adherence in patients with CVD	Patients with CVD (79 in each group)	MMS® and the BMQ
Hatami *et al.*, (2020)[49]	Quasi-experimental study, Iran, English	To assess the effect of an intervention based on the BASNEF model on quality of life among patients with MI	Patients with MI in two groups (80 in each group), mean age 54.60±9.83	QoL Frans and power questionnaire
Yazdanpanah *et al.*, (2019)[13]	Randomized controlled trial, Iran, English	To determine the effect of an educational program based on HBM on medication adherence in older adults with HTN	Hypertensive elders referred to health centers (30 in each group), mean age 66.35±9.7	MMAS-8 on medication adherence
Mohammadi *et al.*, (2019)[35]	Double-blinded-randomized-controlled clinical-trial, Iran, English	To explore the effect of empowerment program based on HBM on ADL of patients with ACS	Patients with ACS (40 in each group), mean age 52.5	ADL questionnaire
Baghianimoghadam *et al.*, (2010)[40]	Clinical trial, Iran, English	To determine the effectiveness of education on BP self-monitoring in patients with hypertension based on the BASNEF model	Outpatients with HTN (150 in each group), mean age 57.9±9.9	A researcher-made questionnaire

Contd...

Table 2: Contd...

Study (years)	Study design, country, language	Aims	Participants (n)	Instruments
Zarani *et al.,* (2014)[48]	Randomized controlled study, Iran, English	To test the extent of IMB model constructs explain the variability in adherence behaviors in CABG patients, and the relationship between IMB model constructs among CABG patients	77 patients undergoing CABG in intervention and 75 in standard care control groups, age range 40–60 years old	HPA-IMBS, general and specific adherence scales
Alsaleh *et al.,* (2016)[36]	Parallel randomized controlled trial, Jordan, English	To assess the efficacy of a behavioral intervention to increase physical activity in patients with CHD who not attending structured cardiac rehabilitation programs	Patients with CHD in two groups (71 in intervention and 85 in control), mean age 57.85±9.6	IPAQ, ESES, Health-related quality of life, DBP and SBP, BMI
Babaei *et al.,* (2020)[37]	Quasi-experimental study, Iran, Persian	To evaluate the effect of a theory-based intervention based on HBM on health-promoting lifestyle behaviors in individuals susceptible to cardiovascular diseases	Patients with cardiovascular risk factors (180 in each group), mean age 37.62±9.3	HPLQ, GHQ
Azadi and Mohammadi, (2006)[38]	Randomized controlled trial, Iran, Persian	To assess the effect of PCM on QoL among patients with CADs	Patients with CADs (30 in each group) mean age 53.1	SF-36
Torknejad *et al.,* (2020)[47]	Randomized clinical trials, Iran, English	To assess the effect of an educational intervention based on the BASNEF model on adherence to treatment in patients after CABG surgery	Patients after CABG surgery in two groups (69 in each group), mean age 62.24±8.96	MATQ, a researcher-made BASNEF model questionnaire
Aghakhani *et al.,* (2018)[29]	Randomized controlled trial, Iran, Persian	To assess the effect of self-care program model based on Orem's pattern on QoL in patients with HF	Patients with HF (30 in each group)	Researcher-made questionnaire about heart failure patient's needs, mac New QoL questionnaire
Torabi *et al.,* (2018)[52]	Randomized controlled trial, Iran, Persian	To examine the effects of a family-based intervention using empowerment model on QoL among patients with pacemaker	Patients with pacemaker (35 in each group), mean age 61.36±13.03	Researcher-made questionnaire, SF-36
Karimy *et al.,* (2016)[19]	Randomized controlled trial, Iran, Persian	To assess the effectiveness of educational intervention effect on lifestyle modification among patients with MI	Patients with MI in two groups (40 in each group), mean age 51.5±7.07	HPLP II, a researcher-made scale based on TPB constructs
Wyer *et al.,* (2001)[17]	Randomized control trial, UK, English	To develop and implement a psychological intervention to influence patients' beliefs about recovery and cardiac rehabilitation to increase attendance rates at a CR program	Patients post MI in two groups (43 in intervention and 44 in control group), mean age 62.75	Acceptance and attendance rates at a CR program
Abedini *et al.,* (2020)[42]	Quasi-experimental study, Iran, English	To determine the impact of an educational program-based BASNEF model on knowledge and self-care behaviors for hypertensive patients	Patients with HTN in two groups (90 in each group), mean age 50.62±7.54	Knowledge, and BASNEF model constructs, self-care behaviors questionnaire
Moradi *et al.,* (2017)[26]	Clinical trial, Iran, Persian	To evaluate the effect of applying follow-up care model on self-care management the quality of life in patients with HF	Patients with HF (40 in each group)	Specific questionnaire of self-care heart failure index

Contd...

Table 2: Contd...

Study (years)	Study design, country, language	Aims	Participants (*n*)	Instruments
Izadirad *et al.*, (2014)[43]	Quasi-experimental study, Iran, Persian	To evaluate the impact of training programs based on the BASNEF model on BP	Patients with HTN in two groups (96 in each group), mean age 63.62±13.65	A researcher-made questionnaire based on knowledge and BAZNEF model
Mahboobifar *et al.*, (2019)[53]	Semi-experimental study, Iran, Persian	To determine the effect of cognitive-social based care program on adherence to treatment in patients undergoing heart valve surgery in military hospitals	Patients undergoing heart valve surgery in two groups (15 in each group), mean age 54.83±11.37	MATQ
Wu *et al.*, (2012)[32]	Randomized controlled trial, USA, English	To determine whether an education intervention improved medication adherence and cardiac event-free in patients with HF	Patients with HF in three groups (27, 27, and 28 in each group), mean age 60±13	Cardiac event-free survival, Minnesota LHFQ, medication adherence
MaslakPak *et al.*, (2017)[27]	Quasi-experimental study, Iran, Persian	To assess the effectiveness of an educational intervention based on the BASNEF model on lifestyle of patients with HF	Patients with HF in two groups (30 in each group), mean age 64.35±10.68	A researcher-made questionnaire based on the BAZNEF model and lifestyle dimensions
Borhani *et al.*, (2012)[28]	Clinical trial, Iran, English	To evaluate the effect of PCM on QoL in patients with HF	Patients with HF (45 in each group) mean age 52.92	Minnesota QoL questionnaire for HF patients
Baghaei *et al.*, (2015)[33]	Clinical trial, Iran, Persian	To evaluate the effect of CCM on quality of life in patients with HF	Patients with HF (30 in each group) mean age 65	Minnesota quality-of-life questionnaire for HF patients
Li *et al.*, (2020)[14]	Randomized controlled trial, China, English	To determine the effects of the transtheoretical model-based intervention and MI on the management of depression in hospitalized patients with CHD	patients with CHD in two groups (*n*=55 in each), mean age 63.3±7.89	Hamilton Rating Scale for depression, depression prevention and management survey items (stages of change, perceived benefits, perceived barriers, process of change, and self-efficacy)
Motlagh *et al.*, (2017)[41]	Randomized controlled trial, Iran, English	To evaluate the effect of a TTM based intervention on PA in hypertensive patients	Hypertensive patients in two groups (n=60), mean age 53.9±7.64	PA change questionnaire, processes of change, IPAQ, Borg Scale for intensity of walking
Zareipour *et al.*, (2018)[44]	Quasi-experimental study, Iran, English	To determine the effect of an educational intervention based on BASNEF to control BP	Patients with HTN in two groups (80 in each group), mean age 54.83±12.37	Knowledge, self-control behaviors, a researcher-made questionnaire based on BASNEF model
Flora *et al.*, (2015)[18]	Randomized controlled trial, Canada, English	To compare illness perceptions on baseline differences in theory-based exercise cognitions and HRQL and to examine illness perception group differences in cardiac rehabilitation after 3 months follow-up of exercise therapy	Cardiac rehabilitation participants in two groups (*r*=49), mean age 61.82±9.30	IPQ-R, self-regulatory efficacy, outcome expectations, and HRQL
Zhu *et al.*, (2014)[15]	Randomized controlled trial, China, English	To determine whether a TTM-based ESMI has positive effects on the exercise behavior of sedentary patients with CHD	patients with CHD in three groups (*n*=196), mean age 63.8±9.6	Exercise Stages of Change Scale, Exercise Self-Efficacy Scale, EBS, EBBS, Borg's RPE Scale, Exercise decisional balance, moderate exercise duration

Contd...

7

Table 2: Contd...

Study (years)	Theory/model	Educational strategies, materials	Interventions, duration/comparator	Intervention effect
Baghianimoghadam *et al.*, (2013)[30]	HBM	Lecture, group teaching, CD educational film	A 40 min session based on HBM/received routine hospital care	Significant in self-behavior related to HF and in all HBM constructs
Kaveh *et al.*, (2017)[31]	HBM	Face-to-face training, educational booklets, an educational video on self-care education	Educational intervention performance in four phases (admission discharge, 2 and 6 weeks later)/received routine hospital method	Significant in self-care behaviors related to HF, knowledge, and all HBM constructs
Maghoul *et al.*, (2018)[50]	HBM	Lecture, small group discussion, brainstorming, educational slides, and printed materials and posters	Three 60 min sessions during 3 weeks/received routine hospital method	Significant in nutritional behaviors, CVDs nutritional knowledge, and all HBM constructs
Shojaei *et al.*, (2016)[45]	HBM	Face-to-face training, nutrition pamphlets	Two face-to-face lasting 1 h training sessions/received routine hospital method	Significant in nutritional behaviors, nutritional knowledge, and perceived benefits and barriers constructs
Zighaimat *et al.*, (2010)[46]	HBM	Face-to-face training, nutrition pamphlets	Two face-to-face in 30 min training sessions/received routine hospital method	Significant in nutritional behaviors, nutritional knowledge, and perceived severity, perceived benefits and barriers constructs
Mohseni *et al.*, (2017)[20]	HPM	Small group discussion, question and answer, role-playing, educational clips, educational booklet	Six sessions lasting 60–90 min during 6 weeks/received routine hospital method	Significant in self-efficacy construct and self-care behaviors
Baghaee *et al.*, (2017)[39]	BAZNEF	Lectures, educational package, group discussions	Group six sessions discussion lasting 90 min/received routine care	Significant in time of physical activity, medication, nutrition and exercise, BMI
Abbaszadeh *et al.*, (2012)[51]	HBM	Face-to-face training	Intervention in two phases (24 h after admission and at discharge time), training individually in 20 min/received routine hospital care	Increasing knowledge and attitude about cardiac risk factors
Sieben *et al.*, (2019)[34]	HBM	Group consultation between 10–12 patients about knowledge and risks, peer's education with possibility to discuss adherence behavior and learn from each other. Patients could see his conditions and lifestyle. Question and answer, possibility to ask questions by email, enter changes in their medication	personalized website and personal consultations based on HBM with 12 months up versus usual care	Any significance in intervention group on adherence SBP and LDL
Hatami *et al.*, (2020)[49]	BASNEF	Individually based on BAZNEF model constructs	Three 45 min training/received routine care	Significant in all QoL dimensions
Yazdanpanah *et al.*, (2019)[13]	HBM	Lecture, question and answer, group discussion, behavior role model, supplementary tools, and guide sheets with assignments	Training sessions included 8 sessions held lasted 60 min with close contact with patients' families/received typical routine health centers	Significant in medication adherence
Mohammadi *et al.*, (2019)[35]	HBM	Group discussions and group problem solving in small groups	Empowerment program according to HBM in 7-session 15–30 min/usual care	Significant in ADL in intervention group
Baghianimoghadam *et al.*, (2010)[40]	BAZNEF	Group discussion, question and answer using pamphlets, CD, and PowerPoint based on the BASNEF model	Each educational session lasting 30–40 min/received routine care	Significant in self-monitoring behavior, attitude, subjective norms, intention, and enabling factors

Contd...

Table 2: Contd...

Study (years)	Theory/model	Educational strategies, materials	Interventions, duration/comparator	Intervention effect
Zarani *et al.,* (2014)[48]	IMB skills model	Motivational interview techniques and behavioral skills components related to lifestyle and self-administer medications.	Received one session (120 min) of IMB-based intervention/standard care control	IMB model-based intervention improved motivation can enhance adherence
Alsaleh *et al.,* (2016)[36]	TPB	Face-to-face individualized consultation, 6 telephone support calls (for goal-setting, feedback, and self-monitoring), and 18 reminder text messages	6-month multicomponent behavioral change intervention versus usual care	Significant in moderate physical activity and walking, exercise self-efficacy and health-related quality of life, blood pressure, BMI
Babaei *et al.,* (2020)[37]	HBM	Lecture, group discussions	Five training sessions based on HBM/usual care	Significant in some domains of lifestyle. BP, tobacco use, significant in some HBM constructs (perceived susceptibility, perceived severity, and perceived benefits)
Azadi and Mohammadi, (2006)[38]	PCM	Different methods based on the three stages of PCM as small group discussions, question and answer, educational images	Intervention based on the three stages of model lasting 60–80 min/received routine care	Significant in all domains of QoL
Torknejad *et al.,* (2020)[47]	BAZNEF model	Providing educational package in five phases	Received four 40 min educational sessions based on BASNEF model/received routine hospital care	Significant in adherence to treatment and BAZNEF model constructs
Aghakhani *et al.,* (2018)[29]	Orem self-care model	Participation in some patients' actions, counseling, and facilitating actions	Intervention program designed based on patients' needs, 4–6 educational sessions lasting 30–45 min/received routine care	Significant in all domains of QoL
Torabi *et al.,* (2018)[52]	Family-centered Empowerment model	Small group discussion, question and answer, problem-solving, involving family, phone call as recalls, educational booklet	Training sessions differed from each stage of the empowerment model during 6 weeks including 3 sessions lasting 30 min/received routine hospital method	Significant in all domains of QoL
Karimy *et al.,* (2016)[19]	TPB	Group discussion, question, and answer, educational film, education in small group	Four educational sessions 50 min a session, one session per week/received routine care	Significant in lifestyle modification and TPB constructs
Wyer *et al.,* (2001)[17]	TPB	None	Receiving 1 intervention letter at 3 days and 2 letters 3 weeks post-MI plus standard letter detailing course/receiving nominal letter 3 days and receiving a standard letter detailing course dates 3 weeks post-MI	Significant in attendance rates for the intervention group
Abedini *et al.,* (2020)[42]	BAZNEF	Question and answer, educational film, lecture, booklet	Lecture, question and answer, pamphlet, a self-care booklet for blood pressure monitoring, these materials were given to families/received routine care	Significant in knowledge and all BAZNEF model constructs, self-care behaviors
Moradi *et al.,* (2017)[26]	CCM	Blended strategies for four stages of model based on patients' needs, phone call, printed educational package, lecture, question, and answer, group discussions	Visits, lecturing for patients and their families, giving feedback to patients' behavior, being informed on patients' participation rate/received routine care	Significant in self-care behaviors

9

Table 2: Contd...

Study (years)	Theory/model	Educational strategies, materials	Interventions, duration/comparator	Intervention effect
Izadirad *et al.*, (2014)[43]	BAZNEF	Lecture, group discussion, question and answer, education in small groups, pamphlets	Two educational sessions 30–45 min, one session for their family/received routine care	Significant in self-care behaviors, subjective norms, and enabling factors, SBP and DBP
Mahboobifar *et al.*, (2019)[53]	SCT	In person and virtual intervention based on each phase	Intervention in four mutual phases based on educational needs assessment/received routine care	Improved treatment compliance among participants
Wu *et al.*, (2012)[32]	TPB	Teaching and counseling MEMS, phone booster, phone call on collecting outcome data (ED visits, hospitalization, or death(	Intervention for patients in two groups with 9 months follow-up: 1. Theory-based education plus MEMS feedback; 2. Theory-based education only/received routine care	More adherent over follow-up and lower cardiac events in both intervention groups after 9 months follow-up, trend of quality of life was not significant during 9 months
MaslakPak *et al.*, (2017)[27]	BAZNEF	Group discussions, question, and answer, educational film, education in small groups, brainstorming, lecture peer education based on model constructs	Six educational sessions 60 min, a session in small groups/received routine care	Significant in some domains of lifestyle modification except stress management, physical activity, and smoking, all BAZNEF model constructs
Borhani *et al.*, (2012)[28]	PCM	Partnership visits (three times), Ongoing partnership visits (two times)	Visits, lecturing taking 60–90 min, giving feedback to patients' behavior, being informed on patient's participation rate lasting 3 months/received routine care	Significant in all domains of QoL
Baghaei *et al.*, (2015)[33]	CCM	Different strategies in four stages of CCM based on patients' needs, printed educational package	Visits, lecturing 90–120 min for patients and their families, giving feedback to patient's behavior, being informed on patient's participation rate/received routine care	Significant in all domains of quality of life
Li *et al.*, (2020)[14]	TTM	Face-to-face, MI	Two sessions of 20 min in MI, three sessions of 30 min face-to-face contact in TTM/received usual care	Significant in stages of change, higher scores for the cognitive and behavioral levels, the perceived benefits, and self-efficacy, and lower perceived barriers and depression
Motlagh *et al.*, (2017)[41]	TTM	Small group education, role play, educational video, A four-session training program totaling 8 h, phone and short message	A four-session training program totaling 8 h, education based on strategies of processes of change appropriate content and teaching methods, after training sessions, members were followed by phone and short message system once every 2 weeks for first 3 months and every month for 3 next month's/received routine care	Significant in physical activity stages of change, processes of change, duration, and intensity of walking
Zareipour *et al.*, (2018)[44]	BAZNEF	Lecture, question, and answers, posters, booklets, pamphlets, using a whiteboard.	45 min educational sessions/received routine care	Significant decreasing in SBP and DBP
Flora *et al.*, (2015)[18]	SCT, common sense model	Cardiac rehabilitation exercise	Cardiac rehabilitation exercise/received routine care	Significant in cardiac rehabilitation exercise, significant differences on negative outcome expectations. strong illness perception significantly lower physical and mental HRQL

Table 2: Contd...

Study (years)	Theory/model	Educational strategies, materials	Interventions, duration/comparator	Intervention effect
Zhu *et al.*, (2014)[15]	TTM	A 2 h patient education session plus a booklet, 8 weekly sessions face-to-face or telephone; sessions of ESMI together with exercise stage-matched pamphlets	Intervention in two groups; In one group, a 2 h patient education session plus a booklet about cardiac rehabilitation, and 8 weekly sessions of general patient education about exercise either via face-to-face or telephone; patients in the ESMI a 2 h patient education session including the booklet about cardiac rehabilitation plus sessions of ESMI together with exercise stage-matched pamphlets/received routine care	Significant in exercise behavior of sedentary CHD patients in TTM-based ESMI group

BMQ=Beliefs about Medicines Questionnaire, MMS=Modified Morisky Scale, ADL=Activity daily living, IMB=Information-Motivation-Behavioral, HPA-IMBS=Heart Patients Adherence-IMB Scale, IPAQ=International physical activity questionnaire, ESES=Exercise Self-Efficacy Scale, HPLQ=Health-promoting lifestyle questionnaire, GHQ=General health questionnaire, MATQ=Modanloo adherence to treatment questionnaire, BAZNEF=Beliefs, attitudes, subjective norms and enabling factors, HPLP=Health-promoting lifestyle profile, MATQ=Modanloo adherence to treatment questionnaire, SCT=Social cognitive theory, LHFQ=Living with heart failure questionnaire, MEMS=Medication Event Monitoring System, IPQ-R=Illness perception questionnaire- revised, ESMI=Exercise stage-matched intervention, EBS=Exercise Benefits Scale, , EBBS=Exercise Benefits/Barriers Scale, RPE=Rating of perceived exertion, HBM=Health belief model, HF=Heart failure, CD=Compact disk, MI=Myocardial infarction, CABG=Coronary artery bypass graft, HTN=Hypertension, BMI=Body mass index, CVD=Cardiovascular disease, SBP=Systolic blood pressure, DBP=Diastolic blood pressure, BP=Blood pressure, LDL=Low-density lipoprotein, QoL=Quality of life, ACS=Acute coronary syndrome, CHD=Coronary heart disease, TPB=Theory of planned behavior, PCM=Partnership care model, CAD=Coronary artery disease, CR=Cardiac rehabilitation, CCM=Continuous care model, ED=Emergency department, TTM=Transtheoretical model, PA=Physical active, HRQL=Health-related quality of life, ESMI=Exercise stage-matched intervention

Thirty-five studies [Table 2] were included in this review to examine the application of health education and promotion theory-based interventions on patients with CVD. The mean age of participants ranged from 37 to 65 years. Around 80% ($n = 28$) of the studies were conducted in Iran.

The participants with heart failure (HF),[26-33] coronary heart disease (CHD),[14,15-34-38] hypertension (HTN),[13,39-44] coronary artery bypass graft (CABG),[20,45-48] myocardial infarctions (MI),[17,19,49-51] patients with pacemaker,[52] heart valve disease,[53] and cardiac rehabilitation[18] were highest and lowest target groups in studied papers, respectively. The detailed characteristics of included studies are revealed in Table 2. Only one study did not use a comprehensive health education intervention.[17]

Of 35 studies, 11 studies employed HBM; BAZNEF model ($n = 8$), Theory of Planned Behavior ($n = 4$), Trans Theoretical Model ($n = 3$), Social Cognitive Theory ($n = 2$), Continuous Care Model (CCM) ($n = 2$), Information-Motivation-Behavioral Skills model ($n = 1$), Orem Self-care model ($n = 1$), Partnership Care Model ($n = 2$), and Family-centered Empowerment model ($n = 1$) [Table 1]. Most of the studies used comprehensive theory-based interventions with booster, but very rare ones utilized appropriate educational strategies based on the nature of model constructs. The duration of the health education interventions ranged from a few days during hospitalization to 1 year [Table 2].

Knowledge and awareness about systolic and diastolic blood pressure using BAZNEF model,[42] increasing average time of physical activity among hypertensive patients based on TTM,[41] intervention HBM-based on nutritional behavior among patients with MI,[50] HBM-based educational program on nutritional knowledge and behaviors among CABG patients,[45,46] improving motivation for health behaviors,[48] and active education and prevention of recurrent MI[51] revealed significant difference on educational outcomes after interventions.

Systolic and diastolic blood pressure control based on the BAZNEF model,[42,44] modifications in blood pressure (BP), and body mass index[36] confirmed the effect of theory-based intervention on clinical outcomes.

Improving self-monitoring of BP among patients with HTN using BAZNEF model,[40] increasing average time of physical activity among hypertensive patients based on TTM,[41] belief change and adherence to treatment among elders with HTN,[13] using CCM in self-care management among patients with HF[26] and promoting quality of life (QoL) in CHD patients,[38] improving QoL

with BAZNEF model in patients with MI,[49] lifestyle modifications and health-promoting behaviors by TPB among patients with MI,[19] enhancing self-efficacy using TPB in CABG patients,[20] improving dimensions of QoL with CCM in patients with HF,[33] enhancing some dimensions of lifestyle behaviors except stress management, physical activity, and smoking based on BAZNEF model,[27] using PCM on improving QoL in HF patients, adherence to treatment using SCT in patients with valvular surgery[53] were some examples of the effectiveness of theory-based interventions on promoting practical outcomes. Table 2 represents all types of outcomes in detail.

Discussion

In this review, most of the studies confirmed positive relations between theory-based interventions and educational, clinical, and practical outcomes among patients with CVD. In general, study results revealed that theory-based interventions were effective in all types of outcomes among studies target groups.[13-15,20,26-33,35-53] Improving awareness and information in chronic conditions as CVDs results in achieving practical outcomes such as follow-up, adherence to self-care and self-management behaviors, promoting QoL, and healthy lifestyle. A targeted multimedia educational intervention can be effective in reducing the adverse effects of chronic diseases.[54,55] It is necessary to utilize appropriate educational strategies based on the nature of each theory/model constructs to gain the most effect of using theories as a research implementing map. One of the important study results was about target groups. We found that some diagnosis was more used in theory-based interventions among CVD. Patients with HF, CVD, MI, HTN, and CABG were used relevantly, but it seems that to patients undergoing heart valve surgery, permanent pacemaker, and cardiac rehabilitation did not pay enough attention. Given that these recent diagnosis and treatment need permanent self-care in lifelong as other chronic diseases. This point was so highlighted in this study results which need more attention to mention research priority in inpatient/outpatient study designs. It seems that considering long follow-up can be more helpful assessing the sustainability of theory-based interventions which was less mentioned in studies reviewed. Another notable result which needs more consideration is shifting from traditional educational materials to multimedia materials.[54,55] But selecting educational materials should be based on target groups' need assessments, accessibility, and availability, but considering new design educational materials should be assessed in tailoring interventions. In theory-based intervention, selecting appropriate model to fit in the study subject can reflect in study results. We found that very few studies in this review used TTM, SCT,

CCM, PCM, and Orem self-care model. It is suggested researchers utilized a theory or combination of theories to cover all aspects of health-related issues. This study had two limitations as selecting only adults' patients (more than 18 years old) with CVDs except congenital ones. This study was the first review in Iran which assessed all three educational, clinical, and practical outcomes related to CVD.

Only English and Persian-language literature were searched for and included in this review. Articles written in other languages were excluded. Thus, language bias might be a factor in this study. In addition, due to this real that many journals do not have a tendency to publish papers with negative results, the possibility of publication bias may also can be considered.

Conclusions

This review presented that intrapersonal and interpersonal health education and promotion theories/models had overall positive impact on various health outcomes among patients with CVD. Few theoretical underpinning studies were conducted for changing clinical aspects with educational and practical outcomes among patients with CVDs. Cause of few using of some theories/model as TTM and SCT; short follow-up even for clinical outcomes, using traditional educational materials and limited using standard instruments, especially for assessing practical outcomes must be considered by research designers and set as priority to tailor future interventional studies. In this study, most of the researches focused on practical outcomes which can be as study strength. But, based on the nature of CVDs as an important chronic disease, paying more attention to all types of CVD outcomes such as educational and clinical simultaneously to achieve living with less complications and setting tangible educational and clinical outcomes of CVDs should be considered. Further studies with high-quality design and implementation based on several health education and promotion theories/models are suggested to target health outcomes among patients with CVDs.

Conflicts of interest
There are no conflicts of interest.

References

1. Roth GA, Johnson C, Abajobir A, Abd-Allah F, Abera SF, Abyu G, *et al*. Global, regional, and national burden of cardiovascular diseases for 10 causes, 1990 to 2015. J Am Coll Cardiol 2017;70:1-5.

2. Firouzi A, Mohebbi B, Shafiei A. Endovascular repair of interrupted aortic arch: Approach with hope for fewer complications. Arch Iran Med 2017;20:756-9.

3. Abbasi M, Poorzand H, Zirak N, Hosinikhah H, Parsaee M, Mohebbi B, *et al*. Hydatid cyst mimicking heart tumor. Iran Heart J 2011;12:51-6.

4. Sadeghi M, Haghdoost AA, Bahrampour A, Dehghani M. Modeling the burden of cardiovascular diseases in Iran from 2005 to 2025: The impact of demographic changes. Iran J Public Health 2017;46:506-16.

5. Mohebbi B, Tafaghodi B, Sadeghi R, Tol A, Yekanenejad M. Factors predicting nutritional knowledge, illness perceptions, and dietary adherence among hypertensive middle-aged women: Application of transtheoretical model. J Edu Health Promot 2021. [In this issue].

6. Sharma M. Theory of reasoned action and theory of planned behavior. In: Text Book of Theoretical Foundations of Health Education and Health Promotion. 2nd ed. Massachusetts: Jones and Bartlett Publishers; 2016. p. 130-6.

7. Tol A, Farhandi H, Mohebbi B, Sadeghi R. BASNEF model intervention on blood pressure modification among hypertensive diabetic patients. J Educ Health Promot 2017;6:47.

8. Sabouri M, Shakibazadeh E, Mohebbi B, Tol A, Yaseri M, Babaee S. Effectiveness of an educational intervention using theory of planned behavior on health care empowerment among married reproductive-age women: A randomized controlled trial. J Educ Health Promot 2020;9:293.

9. DeBarr KA. Review of current health education theories. Calif J Health Promot 2004;2:74-87.

10. Tavassoli E, Hasanzadeh A, Ghiasvand R, Tol A, Shojaezadeh D. Effect of health education based on the Health Belief Model on improving nutritional behavior aiming at preventing cardiovascular disease among housewives in Isfahan. Journal of School of Public Health and Institute of Public Health Research 2010;8:12-23.

11. Saffari M, Sanaeinasab H, Jafarzadeh H, Sepandi M, O'Garo KN, Koenig HG, *et al*. Educational intervention based on the health belief model to modify risk factors of cardiovascular disease in police officers in Iran: A quasi-experimental study. J Prev Med Public Health 2020;53:275-84.

12. Shen Y, Wang TT, Gao M, Hu K, Zhu XR, Zhang X, *et al*. Effectiveness evaluation of health belief model-based health education intervention for patients with hypertension in community settings. Zhonghua Yu Fang Yi Xue Za Zhi 2020;54:155-9.

13. Yazdanpanah Y, Saleh Moghadam AR, Mazlom SR, Haji Ali Beigloo R, Mohajer S. Effect of an educational program based on Health Belief Model on medication adherence in elderly patients with hypertension. Evid Based Care 2019;9:52-62.

14. Li X, Yang S, Wang Y, Yang B, Zhang J. Effects of a transtheoretical model-based intervention and motivational interviewing on the management of depression in hospitalized patients with coronary heart disease: A randomized controlled trial. BMC Public Health 2020;20:420.

15. Zhu LX, Ho SC, Sit JW, He HG. The effects of a transtheoretical model-based exercise stage-matched intervention on exercise behavior in patients with coronary heart disease: A randomized controlled trial. Patient Educ Couns 2014;95:384-92.

16. Rahimdel T, Morowatisharifabad MA, Salehi-Abargouei A, Mirzaei M, Fallahzadeh H. Evaluation of an education program based on the theory of planned behavior for salt intake in individuals at risk of hypertension. Health Educ Res 2019;34:268-78.

17. Wyer S, Earll L, Joseph S, Harrison J, Giles M, Johnston M. Increasing attendance at a cardiac rehabilitation programme: An intervention study using the theory of planned behaviour. Coronary Health Care 2001;5:154-9.

18. Flora PK, Anderson TJ, Brawley LR. Illness perceptions and adherence to exercise therapy in cardiac rehabilitation participants. Rehabil Psychol 2015;60:179-86.

19. Karimy T, Saffari M, Sanaeinasab H, Khalagi K, Hassan-Abadi M. Impact of educational intervention based on theory of planned behavior on lifestyle change of patients with myocardial infarction. Iran J Health Educ Health Promot 2016;3:370-80.

20. Mohseni PH, Majlessi F, Shojaeizadeh D, Rahimi FA. The Effect of educational intervention based on the Pender's health promotion model on patients' self-efficacy for self-care behaviors following heart surgery. Iran J Nurs Res 2017;12:16-23.

21. Mirsafaei L, Kaviani H. Explaining factors affecting the effectiveness of self-care education interventions in cardiac patients. Journal of Payavard Salamat 2020;13:476-91.

22. Mannion R, Goddard M. Impact of published clinical outcomes data: Case study in NHS hospital trusts. BMJ 2001;323:260-3.

23. Meslot C, Gauchet A, Hagger MS, Chatzisarantis N, Lehmann A, Allenet B. A Randomised controlled trial to test the effectiveness of planning strategies to improve medication adherence in patients with cardiovascular disease. Appl Psychol Health Well Being 2017;9:106-29.

24. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. J Clin Epidemiol 2009;62:1006-12.

25. Bennett C, Khangura S, Brehaut JC, Graham ID, Moher D, Potter BK, *et al*. Reporting guidelines for survey research: An analysis of published guidance and reporting practices. PLoS Med 2010;8:e1001069.

26. Moradi Y, Aghakarimi K, Rahmani A, Sheikhy N. Effect of applying follow-up care model on self-care management in heart failure patients: A randomized clinical trial. J Urmia Nurs Midwifery Fac 2017;15:208-17.

27. Maslakpak MH, Merghati SZ, Didarloo A. Effectiveness of an educational intervention (based on BASNEF Model) on lifestyle of patients with heart failure. Payesh 2017;16:501-10.

28. Borhani F, Khoshab H, Abbaszadeh A, Hamidreza R, Mohammadi E. Study of the effect of partnership care model on the quality of life in patients with heart failure. Iran J Crit Care Nurs 2012;1:43-8.

29. Aghakhani N, Alinejad V, Hemmati Maslak Pak M, Alizadeh S, Khademvatan K. Study of the effect of self-care program model based on Orem's pattern on the quality of life in patients with heart failure. J Urmia Nurs Midwifery Fac 2018;16:65-72.

30. Baghianimoghadam MH, Shogafard G, Sanati HR, Baghianimoghadam B, Mazloomy SS, Askarshahi M. Application of the health belief model in promotion of self-care in heart failure patients. Acta Med Iran 2013;51:52-8.

31. Kaveh MH, Khoramaki Z, Kojouri J, Keshavarzi S. The impact of a hospital-based educational program based on the Health Belief Model on self-care behaviors of heart failure patients. Iran Red Crescent Med J 2017;19:e36676.

32. Wu JR, Corley DJ, Lennie TA, Moser DK. Effect of a medication-taking behavior feedback theory–based intervention on outcomes in patients with heart failure. J Card Fail 2012;18:1-9.

33. Baghaei R, Mashallahi A, Khalkhali H. The effect of applying continuous care model on the quality of life in heart failure patients. Nurs Midwifery J 2015;13:666-75.

34. Sieben A, van Onzenoort HA, van Dulmen S, van Laarhoven C, Bredie SJ. A nurse-based intervention for improving medication adherence in cardiovascular patients: An evaluation of a randomized controlled trial. Patient Prefer Adherence 2019;13:837-52.

35. Mohammadi R, Rahimi Bashar F, Etemadifar S, Salesi M, Masoudi R. Effect of empowerment program based on the health belief model on the activity daily living of patients' with acute coronary syndrome: A clinical trial. Koomesh 2019;21:639-49.

36. Alsaleh E, Windle R, Blake H. Behavioural intervention to increase physical activity in adults with coronary heart disease in Jordan. BMC Public Health 2016;16:643.

37. Babaei S, Shakibazade E, Shojaeizadeh D, Yaseri M, Mohammadzade A. Effectiveness the theory-based intervention based on health belief model on health promotion lifestyle in individuals susceptible to cardiovascular diseases. Iran J Health Educ Health Promot 2020;8:224-39.

38. Azadi F, Mohammadi E. Effects of partnership care model on quality of life. Iranian Journal of Nursing Research 2006;1:23-9.

39. Baghaee R, Khalediyan N, Didarloo A. Changes in the body weight and subsequent physical activity of hypertensive patients using BASNEF model. Biosci Biotechnol Res Commun 2017;10(2):258-63.

40. Baghianimoghadam MH, Rahaee Z, Morowatisharifabad MA, Sharifirad G, Andishmand A, Azadbakht L. Effects of education on self-monitoring of blood pressure based on BASNEF model in hypertensive patients. J Res Med Sci 2010;15:70-7.

41. Motlagh Z, Hidarnia A, Kaveh MH, Kojuri J. Influence of a trans-theoretical model based intervention on physical activity in hypertensive patients: A randomized clinical trial. Asian J Sports Med 2017;8:1-9.

42. Abedini S, Pourjalil F, Mohseni S. The impact of an educational program based on the BASNEF model on knowledge and self-care behaviors of patients with hypertension. Health Scope 2020;9:e95588. [doi: 10.5812/jhealthscope.95588].

43. Izadirad H, Masoudi GR, Zareban I, Shahraki Poor M, Haghshenas D. Effectiveness of an educational program based on BASNEF model on blood pressure in hypertension. Payesh 2014;13:487-95.

44. Zareipour M, Ghelichi Ghojogh M, Mahdi-Akhgar M, Abbasi S, Yoshany N, Hassanalilou T, *et al*. The impact of using BASNEF model on self-control behaviors among patients with hypertension. Intern Med Med Invest J 2018;3:112.

45. Shojaei S, Farhadloo R, Aein A, Vahedian M. Effects of the health belief model (HBM)-based educational program on the nutritional knowledge and behaviors of CABG Patients. J Tehran Heart Cent 2016;11:181-6.

46. Zighaimat F, Ebadi A, Karimi-Zarchi AA, Moradi N, Hajiamini Z, Mehdizadeh S. The effect of education based on health belief model on dietary behavior of coronary artery bypass graft patients. IJN 2010;23:50-60.

47. Torknejad A, Babaei S, Mirmohammadsadeghi M. Effect of an educational intervention based on BASNEF model on treatment adherence after coronary artery bypass surgery: A randomized clinical trial. ARYA Atheroscler 2020;16:105-14.

48. Zarani F, Sarami G, Sadeghian, S. Adherence in CABG patients: An empirical test of a health behavior model. Int J Clin Med 2014;5:225-33.

49. Hatami H, Hasanpoor A, Salehi S, Lotfizadeh M. Investigating the effect of intervention based on BASNEF model on quality of life among myocardial infarction patients. J Clin Nurs Midwifery 2020;8:526-34.

50. Maghoul S, Jalili Z, Farmanbar R. Assessment of the effect of educational intervention based on health belief model on nutritional behavior of patients with myocardial infarction. J Guilan Univ Med Sci 2018;27:54-60.

51. Abbaszadeh A, Borhani F, Asadi N. Effects of face-to-face health-belief oriented education about risk factors on knowledge and attitude of myocardial infarction patients after discharge. Iran J Med Educ 2012;12:638-46.

52. Torabi M, AliAkbari F, Aien F, Deriss F. The effect of family-centered empowerment model on the quality of life of the patients with permanent pacemaker in Chamran hospital in Isfahan. J Clin Nurs Midwifery 2018;7:218-25.

53. Mahboobifar M, Zareiyan A, Aliyari SH. Effect of cognitive-social based care program on patient's compliance in under heart valve surgery in selected military hospital. Mil Caring Sci 2019;6:81-91.

54. Boyde M, Peters R, New N, Hwang R, Ha T, Korczyk D. Self-care educational intervention to reduce hospitalisations in heart failure: A randomised controlled trial. Eur J Cardiovasc Nurs 2018;17:178-85.

55. Gagné M, Legault C, Boulet LP, Charbonneau L, Lemyre M, Giguere AMC, *et al*. Impact of adding a video to patient education on quality of life among adults with atrial fibrillation: A randomized controlled trial. Patient Educ Couns 2019;102:1490-8.