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Effectiveness of behavior change techniques in eHealth-based cardiac rehabilitation in patients with coronary artery disease: A systematic review Effective behavior change techniques in eHealth CR

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HIGHLIGHTS

- This review identifies the effective behavior change techniques (BCTs) of eHealth-based cardiac rehabilitation.
- *Action planning* is effective for medication adherence and dietary habits, whereas systematically *reducing prompts/cues* during an intervention is unlikely to elicit behavior change in physical activity, medication adherence and smoking cessation.
- Matching a BCT with the target behavior is likely to increase the effectiveness of eHealth-based CR.

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ABSTRACT

Background: Participation in cardiac rehabilitation (CR) reduces risk of cardiovascular mortality, improves functional capacity and enhances quality of life in patients with coronary artery disease (CAD). eHealth-based CR can increase participation rates, but research into effective components is necessary. The objective of this systematic review was to identify effective behavior change techniques (BCTs) used in eHealth-based CR interventions.

Methods: A search of four databases (CINAHL, PubMed, PsychINFO, and MEDLINE) was conducted until January 10, 2023. Randomized controlled trials investigating eHealth-based interventions for patients with CAD were included. Risk of bias was assessed using the Effective Public Healthcare Practice Project tool. BCTs were coded following the Behavior Change Taxonomy. A best-evidence synthesis was conducted to determine the effectiveness of BCTs, with ratings ranging from A (strong evidence indicating either a positive effect (+) or no effect (-)) to D (no data collected).

Results: A total of 88 studies (25,007 participants) met the eligibility criteria. The interventions in these studies used 31 different BCTs. The most common BCTs were *instructions on how to perform the behavior* (k = 86), *social support* (k = 69) and and information about health consequences (k = 56). The evidence for *action planning* was rated as A+ for medication adherence and diet. Conversely, for systematically decreasing the number of prompts/cues sent during an intervention, the evidence was rated as A- for physical activity, medication adherence and smoking cessation. The evidence for *feedback on behavior* was rated as A+ for medication adherence and A- for smoking cessation.

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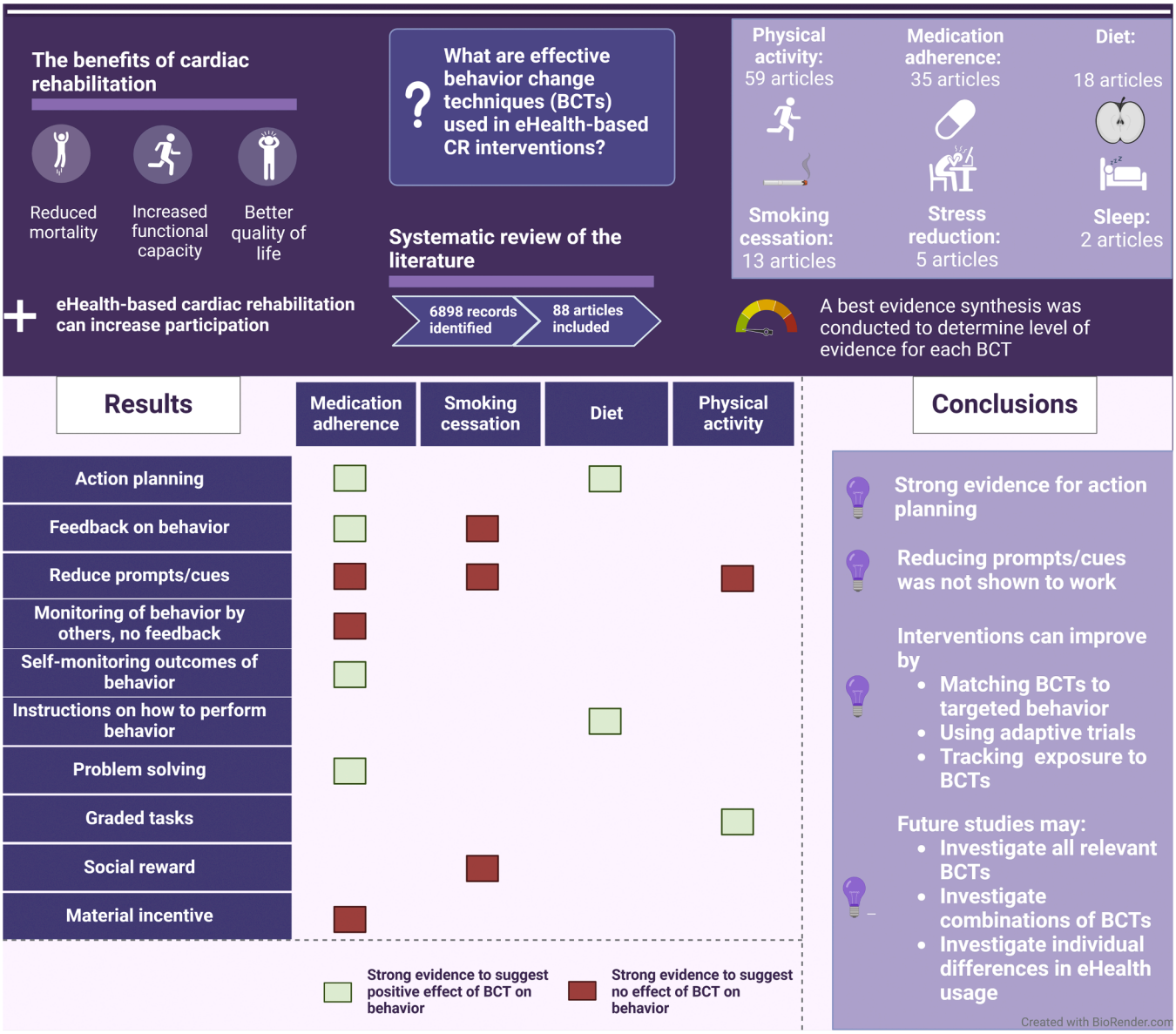
Conclusions: Action planning is effective as a BCT in eHealth-based CR, whereas reducing prompts/cues is not. *Feedback on behavior* may, depending on the behavior targeted, exert both positive and no effect, suggesting that BCT-behavior matching is important to optimize effectiveness of eHealth-based CR.

Cardiac rehabilitation (CR) is a class I recommendation for patients with coronary artery disease (CAD), as it reduces risk of cardiovascular mortality, improves functional capacity and enhances quality of life [1–4]. After the in-hospital phase of CR (Phase I), secondary prevention of CAD is addressed by fostering and maintaining health behavior change, providing education, optimizing medical treatment and optimizing psychosocial wellbeing [2,5]. Despite the substantial benefits of CR programs, participation rates among eligible patients remain low, ranging from 24 % in the United States to 37 % in Europe [6,7]. These low participation rates can be attributed to barriers such as travel-related burdens, psychological distress, or low social support [8–11].

The use of eHealth interventions has been proposed as a solution to combat these barriers, as it allows for more flexibility in terms of location, time and intensity [4,12,13]. Participation in eHealth-based CR, implemented during either Phase II (aimed at improving physical functioning) or Phase III (maintenance phase), improves health behaviors, quality of life, and reduces the likelihood of rehospitalization [14–17]. Accordingly, eHealth-based CR achieves similar results in terms of reduced mortality and cardiac events, and increased exercise capacity as center-based CR [18]. In terms of cost-effectiveness, eHealth-based CR is also equal to, or in some cases superior to, center-based CR [19–22]. To further optimize delivery of these eHealth-based CR programs, it is imperative to expand the evidence base for eHealth-based CR [23].

Health behavior modification in eHealth-based CR often incorporates one or more behavior change techniques (BCTs), meaning



Central illustration summarizing the key findings of the systematic review.

observable and replicable components specifically designed to change behavior, the use of which has been investigated in previous research [24–28]. Research on the effectiveness of BCTs is sparse and predominantly focuses on isolated behaviors [29–31]. The aim of this systematic review is therefore to identify effective BCTs for the different behaviors targeted in eHealth-based CR interventions for people with CAD. We conducted a systematic review of randomized controlled trials (RCTs) investigating eHealth-based interventions with a focus on health behaviors targeted during CR. These behaviors include physical activity, medication adherence, dietary habits, smoking cessation, stress reduction and sleep improvement [14,32].

1. Method

The systematic review of the literature was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and was published in the International Prospective Register of Systematic Reviews (PROSPERO) prior to the start of the study (protocol CRD42021267652).

1.1. Selection of relevant articles

A systematic review of the literature was first conducted on July 15th, 2021, and updated on January 10th, 2023. Four databases were searched for relevant records: EBSCOhost was used to search CINAHL (Cumulative Index to Nursing and Allied Health Literature), PsycINFO and MEDLINE (Medical Literature Analysis and Retrieval System Online), and PubMed was searched separately. Search terms relating to cardiovascular diseases (CVD), eHealth, physical activity, medication adherence, dietary habits, smoking cessation, stress reduction and sleep improvement were used. The term CVD was used to ensure inclusion of all articles including patients with CAD. The search strategies used in all databases are provided in the supplemental materials (S1). No filters were used in the databases. All identified articles were exported to a reference library (EndNote [33]) and combined into one library. Duplicates were removed, as well as all records that were more than 10 years old (published in 2011 or earlier) as the landscape of eHealth interventions has changed substantially since then. If the search identified protocols, relevant articles describing the results were included if they had not been already.

All records were independently screened and labelled by two out of three researchers (ERD, VD, RU), based on title and abstract using the Rayyan [34] software. Records were labelled as 'include' or 'exclude' and were given a reason for exclusion, for example 'no focus on behavior'. Subsequently, the full texts of the included articles were screened for inclusion and labelled independently by two out of three researchers (ERD, VD, TR). Inconsistencies between the researchers regarding inclusion were discussed until consensus was reached. A third researcher (WJK) was consulted if uncertainty regarding inclusion remained.

The inclusion criteria were: (1) the study described an RCT, (2) the intervention used at least one form of eHealth, meaning information and communication technologies in support of health [35], including phone calls, web-based or smartphone-based apps or text-messages, (3) the study reported behavioral or broader physical wellbeing outcomes related to physical activity, medication adherence, dietary habits, smoking cessation, stress reduction and/or sleep improvement, (4) at least 66.6 % of the sample consisted of patients with CAD. No restrictions were set at which time during CR (phase I, II, or III) the eHealth intervention was conducted or for length of intervention.

We excluded studies that: (1) did not have behavior change as one of the goals of the intervention, (2) did not evaluate a distinctly different eHealth intervention (i.e., the content of the eHealth component did not differ between the control group and the intervention group), (3) described the same RCT (in terms of both intervention and sample) as another included article; (4) only described a process evaluation, (5) were not available full-text in English. As an example of criterion 3, an article by Sieben et al. (2015) was excluded as both conditions in the RCT received an eHealth intervention, of which one condition additionally received nurse consultations, preventing clear assessment of the eHealth intervention's effectiveness [36]. As an example of criterion 5, an article by Lear et al. (2015) [37], was excluded as it described the same RCT as another included article by Lear et al. (2014) [38]. In the event of criterion 5 occurring, the article describing the necessary outcomes was included, or the article with the lowest risk of bias in case of similar reported outcomes.

1.2. Data extraction

For each of the included articles, the following information was extracted by one of the researchers (ERD, TR, ZA, MS, IO): first author, year of publication, number of patients included (N), targeted behavior (s), BCTs used in intervention group that were not present in the control group, length of intervention, type of eHealth used, risk of bias and outcomes of the trials. BCTs were coded by two separate authors (ERD and TR) following the Behavior Change Taxonomy [39]. Inconsistencies in BCT coding were discussed until consensus was reached. Extracted outcomes of the trials were related to: physical activity, medication adherence, dietary behavior, smoking cessation, stress reduction and sleep improvement. In case of multiple assessments within one health behavior domain, the outcomes that gave the most complete overview of the target behavior were extracted. For example, if both steps per day and minutes of moderate to vigorous activity were reported for physical activity, then minutes of moderate to vigorous activity were reported as it encompassed the entire spectrum of physical activity, rather than only walking and running. If studies had three conditions, only the outcomes for the intervention group using eHealth in comparison with the control group were used. For example, if a third condition received eHealth in addition to a nurse-led intervention, this condition was not considered for the current review. Only the first available measurement after stopping the intervention was used, but not long-term follow-up outcomes, as the objective was to first establish whether BCTs work in changing behavior. If behavioral outcomes were not available, physiological outcomes (e.g., blood pressure, VO_2max) or broader measures of wellbeing (e.g., health-directed activity, physical health-related quality of life) were extracted. If the required data were not available, authors were emailed to request the data.

1.3. Risk of bias

Risk of bias was independently assessed by two authors (ERD and TR) using the Effective Public Healthcare Practice Project (EPHPP) quality assessment tool for quantitative studies [40]. Studies were rated as "strong", "moderate" or "weak" in eight categories: study design, analysis, withdrawals and dropouts, data collection practices, selection bias, intervention integrity, blinding as part of a controlled trial and confounders. A study was given a "strong" (low risk of bias) rating if none of the sections were rated as weak, a "moderate" rating if one of the sections was rated as weak, and a "weak" (high risk of bias) rating if two or more sections were rated as weak. Disagreements were solved by discussion between ERD and TR until consensus was reached. A third researcher (WJK) was consulted if uncertainty remained. The overall judgment (S2), and the full evaluation of every article (S3) are reported the in the supplemental materials.

1.4. Best-evidence synthesis

To draw conclusions regarding the effectiveness of different BCTs, a best-evidence synthesis was conducted for all BCTs that were used for each of the behaviors. The best-evidence synthesis considers the number of articles, the risk of bias and consistency of the outcomes [41]. The RCTs were first grouped according to the behavior targeted and

subsequently according to the BCTs that were included. The evidence level was rated as follows: (A) strong evidence when there were consistent findings across ≥2 studies with a low risk of bias; (B) moderate evidence when there were consistent findings in one study with a low risk of bias and in ≥1 study with a high risk of bias, or across ≥2 studies with a high risk of bias; (C) insufficient evidence when there were inconsistent findings across ≥2 studies (C1) or when only one study was available (C2); or (D) when no data were collected on the BCT [41,42]. As most interventions used more than one BCT, at least 75 % of the studies had to show results in the same direction (i.e., 75 % of the results of RCTs targeting physical activity using the BCT *action planning* had to demonstrate a significant difference in physical activity behavior over time between the intervention and control group), for results to be considered consistent. Category A and B were subdivided into A+ or B+ (positive), meaning there was evidence to suggest the BCT had a positive effect on the behavior targeted, and A- or B- (null), meaning there was evidence to suggest the BCT did not result in significant improvements to the behavior targeted. BCTs were grouped according to the categories proposed in the Behavior Change Taxonomy [39].

As the primary aim of this study was to investigate which BCTs are effective in eHealth interventions targeting behavior change, results for RCTs with a behavioral outcome are presented here. If studies reported only on physiological outcomes or broader health-related outcomes, such as quality of life, but not on health behaviors, then those were not

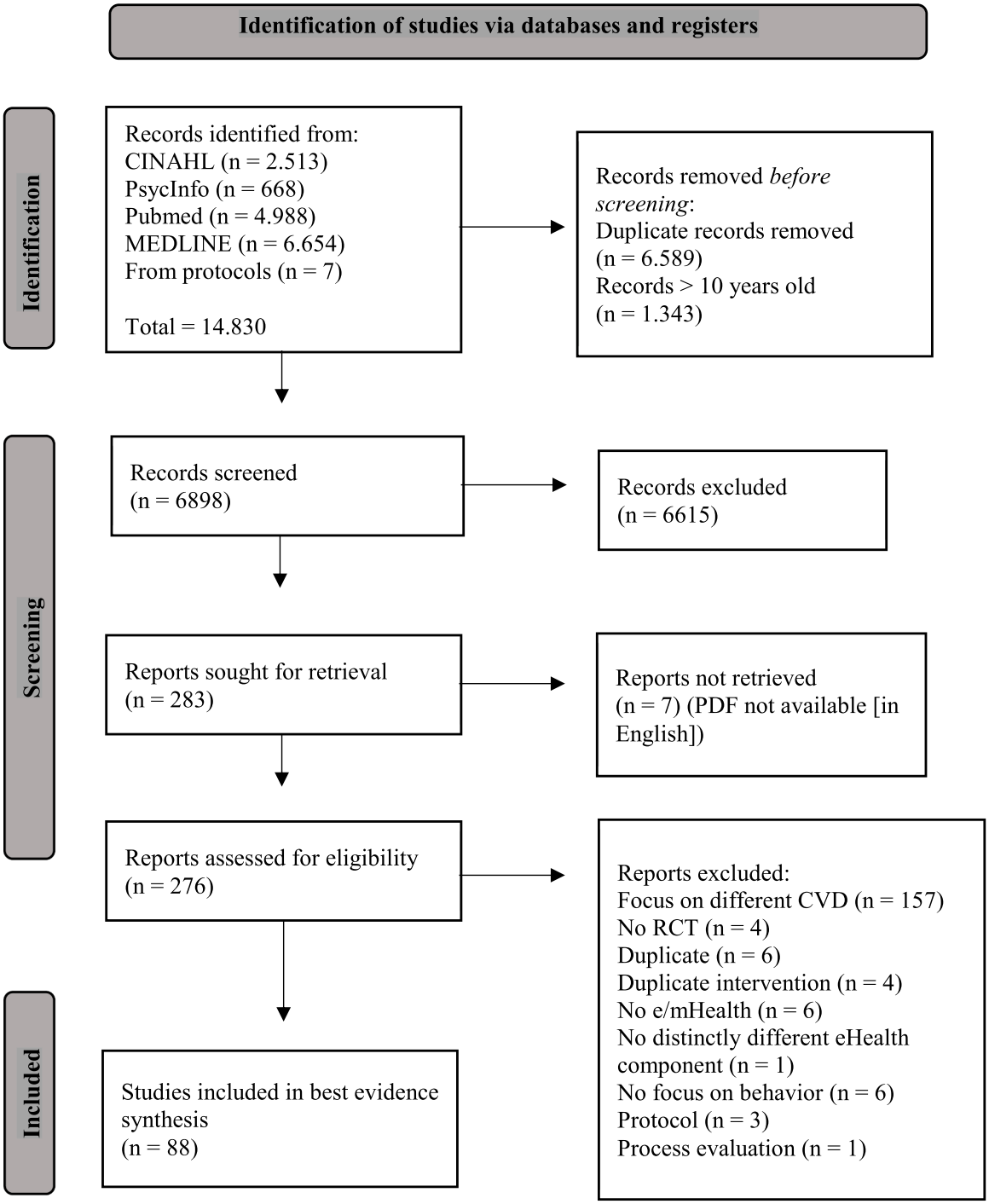


Fig. 1. Flowchart of included articles [43].

included in the main analyses. Results including the physiological or broader health-related outcomes are presented in the supplemental materials (S4) and indicated a few differences in the best-evidence synthesis from the studies that reported on health behavior outcomes.

2. Results

Fig. 1 depicts the inclusion and exclusion of articles identified through the database search, including reasons for exclusion. In total, the database search yielded 6898 records. Of the 276 articles that remained after the title and abstract screening, 88 were included in the present review following the full-text screening. Of the 88 included articles, 59 focused on physical activity, 35 on medication adherence, 18 on diet, 13 on smoking cessation, five on stress reduction and two on sleep improvement. Eighteen articles focused on more than one behavior.

The interventions were most often delivered through text-messages (41 interventions) or a smartphone app (30 interventions), and 31 interventions made use of an additional telemonitoring device (e.g., a blood pressure monitor, a smartwatch, or an electronic pill bottle). Other modes of delivery included a website (18 interventions), phone calls (18 interventions), video's (5 interventions), a tablet app (4 interventions), voice messages (4 interventions), emails (3 interventions), video conferencing (2 interventions) and virtual reality (1 intervention). Thirty-eight interventions used more than one mode of eHealth. The studies evaluated a total of 31 BCTs in 25007 participants. The median duration of the interventions was 26.1 weeks (IQR = 12 - 26.1 weeks). The characteristics of the 88 RCTs are further described in the supplemental materials (Table S2).

The quality of the studies was rated as follows: most of the RCTs exhibited either moderate (39 RCTs) or strong (31 RCTs) study quality. Eighteen studies were rated as weak in terms of study quality.

2.1. BCTs used in eHealth-based cardiac rehabilitation

In total, 31 different BCTs were used across the 88 RCTs included in this review. Interventions employed on average 4.8 BCTs per health behavior. An overview of all identified BCTs is presented in Fig. 2. We identified most BCTs for medication adherence (k = 24) and physical activity (k = 22), followed by dietary behavior (k = 17) and smoking cessation (k = 14). The least BCTs were identified for stress reduction (k = 10) and sleep improvement (k = 5). Fig. 2 shows that the most frequently used BCTs were *instructions on how to perform the behavior* (k = 86), *social support* (k =69) *and information about health consequences* (k = 56). The BCTs mainly fell into the *feedback and monitoring* and the *goals and planning* category.

Table 1 displays the results of the best evidence synthesis. *Action planning* was used in interventions that consistently resulted in both medication adherence and dietary related improvements (effective in 6 out of 8 studies). Interventions using *action planning* employed a strategy whereby participants were prompted to plan their performance of the behavior step-by-step and in detail. *Reduce prompts/cues* consistently yielded no significant changes across interventions that targeted physical activity, medication adherence and smoking cessation (1 out of 8 studies showed positive effects). Interventions that used the *reduce prompts/cues* strategy systematically decreased the number of prompts/cues that patients received during the intervention (e.g., patients would receive seven messages encouraging physical activity in the first 12 weeks, and five messages per week in the following 12 weeks).

2.2. Effects of BCTs stratified by specific health behaviors

With regard to BCTs used in eHealth interventions targeting physical activity, there was only strong evidence for one BCT: *graded tasks* consistently led to improvements in physical activity (2 out of 2 studies). *Graded tasks* included manageable tasks that increased in difficulty

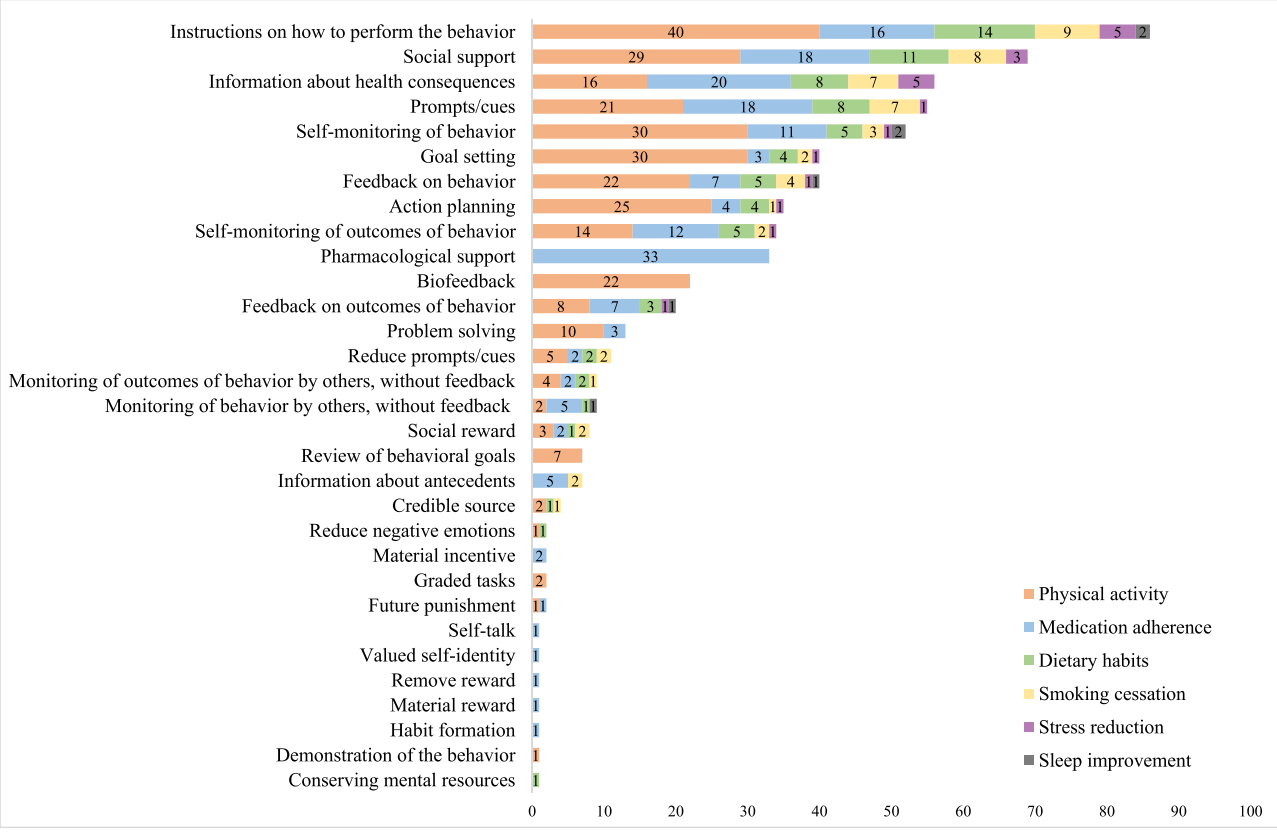


Fig. 2. Frequency of BCT use per behavior.

Table 1
Best evidence synthesis of BCTs used per behavior (only behavioral outcomes), note: A = strong evidence, B = moderate evidence, C1 = inconsistent evidence, C2 = only one study available, D = no data.

	BCT	Physical activity	Medication adherence	Dietary habits	Smoking cessation	Stress reduction	Sleep improvement
Goals and planning	*Goal setting*	C1	C1	C2	C2	C2	D
	Problem solving	C1	A+	D	D	D	D
	Action planning	C1	A+	A+	C2	C2	D
	Review of behavioral goals	C1	D	D	D		D
Feedback and monitoring	*Monitoring of behavior by others, without feedback*	C2	A-	C2	D	D	C2
	Monitoring outcome(s) of behavior by others, without feedback	C1	C1	C2	C2	D	D
	Feedback on behavior	C1	A+	C1	A-	C2	C2
	Self-monitoring of behavior	C1	C1	C1	C1	C2	C1
	Self-monitoring of outcomes of behavior	C1	A+	C1	C1	C2	D
	Feedback on outcomes of behavior	C1	C1	C2	D	C2	C2
	Biofeedback	C1	D	D	D	D	D
Social support	*Social support*	C1	C1	C1	C1	C2	D
Shaping knowledge	*Instructions on how to perform the behavior*	C1	C1	A+	C1	C2	C1
	Information about antecedents	D	C1	D	C2	D	D
Natural consequences	*Information about health consequences*	C1	C1	C1	C1	C2	D
Associations	*Prompts/cues*	C1	C1	C1	C1	C2	D
	Reduce prompts/cues	A-	A-	D	A-	D	D
Repetition and substitution	*Graded tasks*	A+	D	D	D	D	D
	Habit formation	D	C2	D	D	D	D
Reward and threat	*Future punishment*	C2	C2	D	D	D	D
	Social reward	C1	C2	C2	A-	D	D
	Material reward	D	C2	D	D	D	D
	Material incentive	D	A-	D	D	D	D
Regulation	*Pharmacological support*	D	C1	D	D	D	D
	Reduce negative emotions	C2	D	C2	D	D	D
	Conserving mental resources	D	D	C2	D	D	D
Identity	*Valued self-identity*	D	C2	D	D	D	D
Self-belief	*Self-talk*	D	C2	D	D	D	D
Comparison of outcomes	*Credible source*	C1	D	C2	C2	D	D
Comparison of behavior	*Demonstration of the behavior*	C2	D	D	D	D	D
Scheduled consequences	*Remove reward*	D	C2	D	D	D	D

during the span of the interventions (e.g., increasing exercise intensity by 40 % based on heart rate reserve). In contrast, interventions using *reduce prompts/cues* consistently yielded no significant results for most interventions targeting physical activity (1 out of 4 studies).

For medication adherence, four BCTs were used in interventions that consistently demonstrated a positive change in behavior: *problem-solving* (3 out of 4 studies), *action planning* (3 out of 4 studies), *feedback on behavior* (4 out of 5 studies), and *self-monitoring of outcomes of behavior* (7 out of 9 studies). Interventions that used *problem solving* prompted participants to identify what barriers they experienced in attempting to change their behavior and to produce strategies to overcome these barriers. *Feedback on behavior* usually entailed feedback from the medical team via the mode of eHealth on a patient's self-reported performance in taking their prescribed medication. *Self-monitoring of outcomes of behavior* usually implied that patients monitored their blood pressure, to witness the effects of medication adherence. Again, *reduce prompts/cues* consistently did not generate significant improvements in medication adherence (0 out of 2 studies), along with *material incentive* (0 out of 2 studies). An example of a *material incentive* was a daily lottery with a one in five chance of a $5 pay out that patients were entered into.

Improvements in dietary behavior were consistently found in interventions using *action planning* (3 out of 4 studies) and *instructions on how to perform the behavior* (6 out of 8 studies). *Instructions on how to perform the behavior* usually focused on reducing salt and fat intake or increasing fruit and vegetable intake (e.g., eat five servings of fruits and vegetables per day). None of the studied BCTs were found to have no effect on dietary behavior.

None of the BCTs used in interventions targeting smoking cessation consistently resulted in less smoking. However, *feedback on behavior* (0 out of 3 studies), *reduce prompts/cues* (0 out of 2 studies) and *social reward* (0 out of 2 studies) consistently failed to significantly reduce smoking. *Social reward* implied that patients received a compliment after the behavior was improved or achieved.

Analyses revealed no consistent results for any of the BCTs used in interventions aimed at stress reduction or sleep improvement.

3. Discussion

The current review found consistent evidence that *action planning* yielded positive results in interventions targeting medication adherence and dietary behaviors, whereas *reducing prompts/cues* over the course of an intervention did not result in a change in physical activity, medication adherence or smoking cessation. Interventions that used *feedback on behavior* consistently resulted in improvements in medication adherence, but consistently failed to facilitate smoking cessation, and generated inconsistent results for physical activity and dietary habits. For all other BCTs, evidence for effectiveness was either only found for one behavior or the evidence was inconsistent. In short, eHealth-based CR interventions are more likely to be effective in changing behavior if the BCTs used are selected based on the specific behavior that is targeted.

Effective BCTs were primarily found for physical activity, medication adherence and dietary behavior. This could be because these behaviors require enhancement, unlike smoking cessation for which only ineffective BCTs were found. This is consistent with a review that found implementation intentions (*action planning*) to be more effective in promoting healthy eating than in reducing unhealthy eating [44]. Specifically for physical activity, *graded tasks* were found to be effective in increasing physical activity levels, which is consistent with a previous review by Patterson et al. (2022) [31]. For medication adherence, the current study found the strongest evidence for *problem solving* and *action planning* to be effective, which is consistent with a qualitative analysis of apps targeting medication adherence that found a configuration of knowledge with self-efficacy beneficial for improving medication adherence [45]. In terms of dietary behavior, *action planning* was

identified as effective, which corresponds with previous research in adults of retirement age that found evidence for the effectiveness of a similar strategy (barrier identification/problem solving) [46].

For smoking cessation, the current review identified several BCTs that were unlikely to result in smoking cessation (i.e., *feedback on behavior, reduce prompts/cues* and *social reward*), but no BCTs that showed consistent positive effects. It is possible that for an addictive behavior, a significant life event, such as impending surgery, is required as a catalyst to motivate behavior change. A previous study investigating barriers and facilitators to behavior change found 'experiencing a life event' to be a facilitator to quit smoking for patients with CVD, and a previous review that focused on inducing smoking cessation before surgery also found positive associations between smoking cessation and several BCTs [47,48]. No effective BCTs were identified for stress reduction and sleep improvement in the current study, likely due to the limited number of studies focused on these behaviors, despite the important role that both stress and sleep play in the secondary prevention of CAD [49,50].

The current review needs to be interpreted in light of the limitations of both the current review and the reviewed trials. Because of the complex nature of many of the interventions, it was not possible to attribute intervention effects to any specific BCT. However, by aggregating the results from all the interventions, it was possible to indicate which BCTs would most likely generate a positive effect on behavior. Some BCTs used in the interventions were optional and the original articles did not provide information on how many patients were exposed to the selected BCTs. Furthermore, articles rarely disclosed how often participants had interacted with the eHealth intervention, meaning it was unclear whether there was sufficient exposure to the BCT to elicit change. The insufficient number of instances of BCTs for each health behavior precluded a meta-analysis for BCTs in the present review. The studies reviewed were conducted in high income, middle income and low income settings, but no stratification was applied.

This review could lead to several practical implications in the field of eHealth-based CR in patients with CAD and possibly other CVDs. Results of this review provide information about which BCTs are effective for which behavior, which could be used in the development of future interventions. Furthermore, as the behaviors targeted in CR differ in terms of whether they need to be activated or inhibited, development of interventions could follow the Intervention Mapping approach to determine which BCT fits with which action [51]. These interventions could subsequently be tested using adaptive designs in future trials [52], that allow for modification of the trial's course based on the acquired results from the trial. As interventions differed in terms of mode of delivery, involvement of health care professionals, length of intervention, use of telemonitoring devices and timing (immediately after hospitalization or as part of CR phase II or III), trials could first test the effectiveness of the mode of delivery and subsequently add elements to test for their effectiveness. It is important that these interventions enable tracking of exposure to and use of BCTs to facilitate evaluation of the active intervention components.

In terms of directions for future research, studies could aim to test all relevant BCTs for all health behaviors among patients with CAD as the current review found only 31 of the 93 defined BCTs [25]. Additionally, as BCTs are rarely employed individually it is important to investigate what combination of BCTs leads to improvements in health behaviors. Another important area for future research is to identify individual differences in terms of psychosocial background factors, personal preferences and cultural aspects with regard to the most optimal BCTs to promote health behaviors in patients with CAD. Research could additionally stratify health behavior interventions according to the income level of the country and timing after hospitalization to determine whether these factors are of influence.

In conclusion, the current review found that *action planning* was likely to result in multiple health behavior changes, whereas *reducing prompts/cues* was unlikely to generate health behavior change in patients with CAD. Additionally, the effectiveness of a BCT partially depends on the specific health behavior that is targeted in eHealth-based CR interventions in patients with CAD. It is recommended that future eHealth interventions determine BCTs per targeted behavior and report more thoroughly on the exact implementation of interventions, to establish more accurately which BCTs work best for patients with CAD. It will also be worthwhile to investigate interventions with adaptive trials to determine what aspects of interventions would generate the most beneficial changes in health behavior.

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Publicly available materials

Data collection forms, extracted data, best-evidence synthesis materials and full risk of bias assessments are available upon request.

CRediT authorship contribution statement

Emma R. Douma: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Tom Roovers:** Writing – review & editing, Formal analysis. **Mirela Habibović:** Writing – review & editing, Supervision, Conceptualization. **Gert-Jan de Bruijn:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Jos A. Bosch:** Writing – review & editing, Funding acquisition. **Boris Schmitz:** Writing – review & editing, Funding acquisition, Conceptualization. **Willem J. Kop:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ajpc.2024.100892.

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