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Review Article

Health Action Process Approach in Non-Communicable Diseases: A Systematic Review

Sahmad[1]*, Andi Zulkifli Abdullah[2], Muh. Syafar[3], Indahwaty Sidin[4]

ABSTRACT

Background: Epidemiological research has indicated that the deleterious effects of non-communicable disease can be prevented through participation in health behaviours. The HAPA is a dual-phase model that identifies the determinants of the initiation and maintenance of health behaviour. The aim of this study was to systematically map the Health Action Process Approach (HAPA)- based interventions in non-communicable diseases in relation to the type of intervention, the target groups and the constructs of the HAPA model that are used in the study and to assess the clinical relevance of the studies. **Methods:** This review study complies with the Preferred Reporting Items for Systematic review and Meta-analysis (PRISMA) version 2020. The search for relevant literature involved PubMed, Sciencedirect, Willey online Library and Proquest databases for the studies published in 2000 to 2023 period. Quality of the study was assessed using CASP, and the Risk of Bias using Cochrane RoB tool. **Results:** In databases search, there are 912 studies. The results for eligibility resulted in 18 articles consist of 13 observational studies, and 5 experimental studies. **Discussion:** Physical activity, healthy diet behaviour, and medication adherence were the targeted behaviour. In the majority of the studies, the targeted intervention was physical activity and the population consisted of adult patients. **Conclusion:** All studies used only a selection of the HAPA constructs. Therefore, only a minority of the studies can be considered real HAPA intervention studies.
Keywords: Behaviour change, Health action process approach, Non-communicable diseases.

Sahmad[1]*, Andi Zulkifli Abdullah[2], Muh. Syafar[3], Indahwaty Sidin[4]

[1]Phd student, College of public health, Hasanuddin University, Makassar, INDONESIA.

[2]Professor, Department of Epidemiology, College of public health, Hasanuddin University, Makassar, INDONESIA.

[3]Professor, Department of Health behavioral science, College of public health, Hasanuddin University, Makassar, INDONESIA.

[4]Associate Professor, Department of Hospital Management, College of public health, Hasanuddin University, Makassar, INDONESIA.

Correspondence

Sahmad

Jalan Perintis Kemerdekaan Km. 10 Tamalanrea,. Kota: Makassar. Kode Pos: 90245. Provinsi: Sulawesi Selatan, INDONESIA.

E-mail: sahmad.poltekkes@gmail.com

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INTRODUCTION

Non-communicable diseases (NCDs) account for more than 70% of global mortality [1]. Low-income and middle-income countries (LMICs) bear a disproportionate NCD burden, with a 1·5 times higher risk of premature mortality than high-income countries [2–4]. In 2013, all 194 WHO member states endorsed a menu of cost-effective NCD so-called best-buy policies [5], and in 2015 UN member states unanimously committed to reduce premature NCD mortality by a third by 2030 as part of the Sustainable Development Goals [6].

Epidemiological research has indicated that the deleterious effects of these illnesses can be prevented through participation in health behaviors [7]. This has led health promotion organizations to advocate long-term illness prevention through population-level behavior change [8]. However, development of effective behavior change interventions necessitates identification of potentially modifiable behavioral determinants that can be targeted by intervention content [9]. a social– cognitive model that identifies the motivational and volitional determinants of health behavior and related processes. The HAPA is a dual-phase model that identifies the determinants of the initiation and maintenance of health behavior (see Figure 1 for a schematic representation of the model). Behavioral intention is a pivotal construct in the model that reflects the extent to which individuals will invest effort in enacting a given health behavior in future [10–12]. The model differentiates between two distinct stages or phases each comprising sets of constructs and processes that determine behavioral enactment: a motivational phase and a volitional phase [13,14]. The motivational phase encompasses three sets of social– cognitive constructs implicated in intention formation: outcome expectancies, action self-efficacy, and risk perceptions. Outcome expectancies reflect beliefs about whether engaging in the behavior will result in desired outcomes, action self-efficacy represents beliefs in capacity to perform the behavior, and risk perceptions are beliefs regarding personal risk or susceptibility to particular conditions or outcomes. Research has identified positive relations between these factors and intentions, particularly outcome expectancies and action self-efficacy [15–17].

The HAPA incorporates two components that operate in the volitional phase involved in the enactment of intentions: self-efficacy and planning. Maintenance or coping self-efficacy reflects an individual's beliefs in their capability to cope with barriers that might derail the intended action [18,19]. Similarly, recovery self-efficacy reflects an individual's capacity to overcome setbacks and recover from failed attempts to enact the target behavior. Maintenance and recovery self-efficacy are proposed to have direct effects on behavior, and are also expected to be related to each other, and to action self-efficacy. The forms of self-efficacy in the HAPA are, therefore, phase-specific, with action self-efficacy relevant to intention formation, and maintenance and recovery self-efficacy implicated in the enactment and maintenance of behavior [14,20]. The HAPA identifies two forms of planning relevant to behavioral enactment: action and coping planning. Action planning assists individuals in identifying salient cues that lead to action [21].

To the best of our knowledge, there has been no review study that discusses the application of HAPA

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in cases of non-communicable diseases. For this reason, this study aims to systematically map the Health Action Process Approach (HAPA)-based interventions in non-communicable diseases in relation to the type of intervention, the target groups and the constructs of the HAPA model that are used in the study and to assess the clinical relevance of the studies.

METHOD

Protocol

This study complies with the 2020 version of Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guidelines [22].

Eligibility Criteria

The studies included in this study were observational, involving adult having non-communicable disease except for pregnant women. Experimental studies and Observational studies also included in the study. In contrast, Reviews, editorial reports, theses/dissertations, and non-English were excluded from this study.

Search Strategy

A literature search was carried out on four databases, including PubMed, ScienceDirect, Willey online library, and Proquest, ranging from 2000 to 2023. The keywords adjusted to the Medical Subject Heading (MeSH) include Health Action Process Approach/HAPA, non-communicable diseases, Hypertension, Diabetes Mellitus, Cancer, Haemoglobin/Hb/ Hemoprotein. These keywords are then combined using the help of Boolean OR/AND operators. Hand-searching is done through reference lists of relevant articles and common databases such as Google Scholar and Research Gate.

Study Selection

In the first step, two independent reviewers were asked to review relevant articles separately, and then filtered the articles based on titles and abstracts that met the requirements. After that, the two reviewers assessed whether the studies that were screened were relevant or not. To resolve disagreements, the lead author decides when differences occur between the two reviewers.

Data Extraction

To answer the questions of this systematic review, the data chart includes references, year of publication, country/region, study design, sample size, outcome, measurement, intervention, and main findings. Two authors independently extracted data from studies that were declared eligible. The first author will recheck the extraction results to ensure completeness.

Study quality and risk- of- bias assessments

Study quality was assessed by two authors independently using the Critical Appraisal Skills Program (CASP) for the Randomized Controlled Trial (Critical Appraisal Skills Program, 2022). This tool consists of 11 questions which are divided into four sections with the choices of Yes, No, and Can't Tell checklist columns. We categorize the quality of studies into High, Medium, and Low. High quality studies if you have answers YES 10 – 11/11, medium quality if you have answers YES 7 – 9/11, and Low quality if answers YES ≤6/11.

To assess the risk of bias in randomized controlled trial (RCT) studies, the RoB2 tool was used, and for the observational studies, the ROBINS-I tool was used. These evaluations were performed independently by two of the reviewers with the focus on the effect of assignment to the intervention at baseline. After the assessment, the two reviewers discussed their findings to reach agreements regarding conflicting assessments. The third reviewer was consulted when conflicts were not resolved.

RESULT

In the initial search of the entire database, there were 912 studies. After removing 623 studies because they were duplicative and non-English, 289 studies entered the screening stage on titles and abstracts. The results for eligibility resulted in 18 articles which were then extracted. This entire process is illustrated in figure 1 concerning the PRISMA flow diagram for selecting eligible studies.

Study Characteristics

The studies included in this review came from several countries including Iran (n=4), United States (n=3), Canada (n=3), Australia (n=3), Hungary (n=2), Germany (n=1), Indonesia (n=1), and Italy (n=1). Most of the included studies were observational studies (n=13 (Cross-sectional and Longitudinal)), and the rest were experimental studies (n=5 (RCT, pre-experimental, and Quasi-experimental)).

The samples involved in the included studies were sufferers of non-communicable diseases such as Multiple sclerosis [23], Cardiac diseases [24–28], Colorectal cancer [29], Hypertension [30–32], Type 2 Diabetes [33–37], Breast cancer [38,39], and Bowel cancer [40].

Summary of Quality and Risk of Bias Assessment

Each of the selected studies was screened against the eleven questions forming the CASP method. The results of the screening are outlined in table. From these result, most of the eligible studies are in the Medium quality category (7-9/11). There are two studies in High quality (10-11/11), and two studies in Low quality (≤6/11).

The results of the Risk of Bias assessment in observational studies show that there are only four studies that are in the Moderate category, and there are four studies that are in the Critical risk of bias category (Figure 2).

As for experimental studies, there are three studies that are in the High risk of bias category, and the rest are in the Some concerns category (Figure 3).

Outcomes of the eligible studies

All studies have the same outcomes related to the HAPA constructs, and are associated with a variety of main outcomes from each study. The outcomes in question include physical activity [23,28,29,31,34,38,39], participation in program [24,40], Knowledge [25], Self-care management [30], healthy diet [27,35–37], and Medication adherence [26,33].

Measurement of the outcome

All studies used questionnaires with Likert scale answering options to measure the HAPA constructs, and self-administered questionnaires to measure the targeted health behavior in each of the included studies. The questions used to measure the HAPA constructs differed between the studies in the number of questions per construct (from one to seven items), the range of the Likert scales (4- to 7- point scales) and the formulation and sentence structures.

Physical activity measurement uses various standard instruments such as PASC [23], The ActiGraph GT9X Link [29], the extensively validated GLTEQ [34], a self-report instrument designed for the Women's Health Initiative [38,39], IPAQ [31], HAPA scale [28].

Healthy dietary measurement uses several instruments such as the DGI (MacPhail et al., 2014), The Dietary adherence questionnaire [37], The nutrition style Questionnaire [36], modified MDS [32], FFQ [27]. For Medication adherence measurement used MMAS-8 [26,33]. For knowledge, the instrument used is the CADE-QII [25].

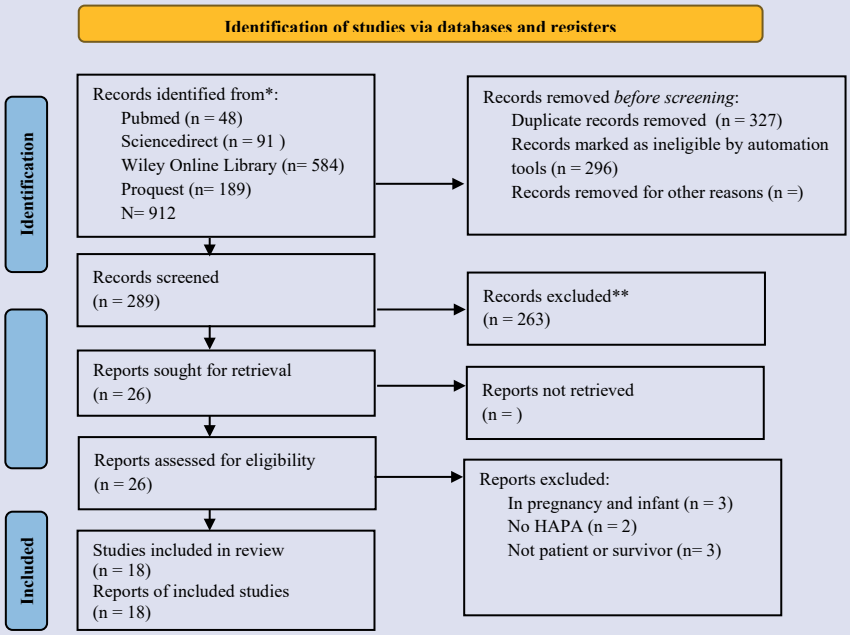

Figure 1. PRISMA Flowchart.

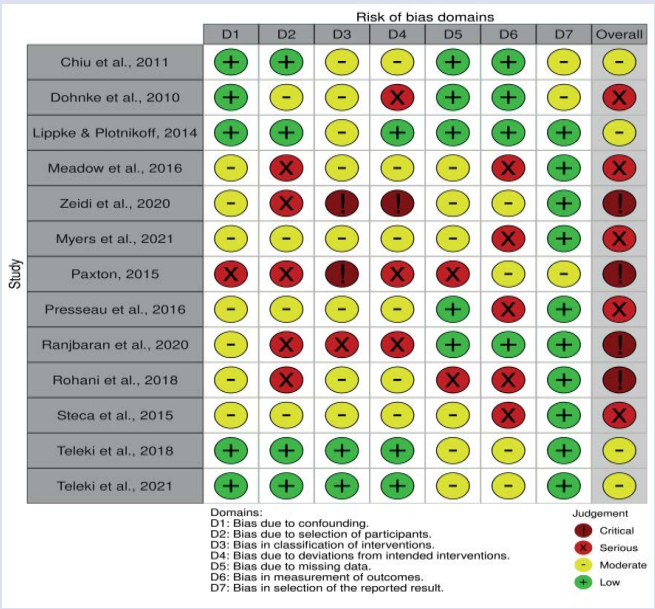

Figure 2. Traffic-light Plot of ROBINS I Tool for Observational Study.

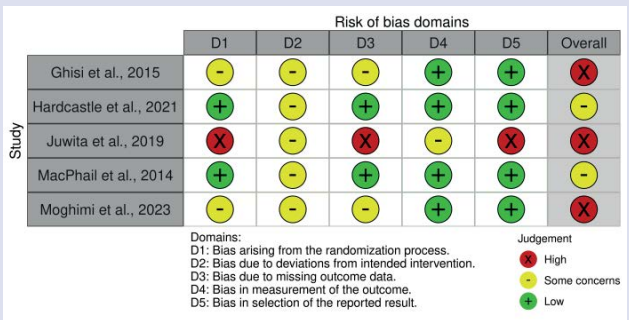

Figure 3. Traffic-light Plot of ROB 2 Tool for Experimental Study.

Table 1. Search string in databases.

Databases	Keywords
Pubmed	((adult[MeSH Terms]) AND (((("health action process approach"[Title/Abstract]) OR ("health action process approach constructs"[Title/Abstract])) OR ("health action process approach hapa"[Title/Abstract])) OR ("hapa"[Title/Abstract]))) AND (((((("noncommunicable diseases"[MeSH Terms]) OR ("hypertension"[MeSH Terms])) OR ("diabetes mellitus"[MeSH Terms])) OR ("cancer survivors/education"[MeSH Terms])) OR ("cardiovascular diseases"[MeSH Terms]))
Sciencedirect	((("health action process approach"[Title/Abstract]) OR ("hapa"[Title/Abstract]))) AND (((((("noncommunicable diseases"[MeSH Terms]) OR OR ("diabetes mellitus"[MeSH Terms])) OR ("cancer survivors/education"[MeSH Terms])) OR ("cardiovascular diseases"[MeSH Terms]))
Willey online library	Health action process approach AND non-communicable disease AND adult AND Schwarzer
Proquest	Health action process approach AND non-communicable disease AND adult AND Schwarzer

Table 2. Extraction of the eligible studies.

Author, Year, Country	Study Design	Participants	Outcome	Measurement	Intervention	Main findings
Chiu et al., 2011, US	Cross-sectional	195 individuals with Multiple Sclerosis	physical activity self-management	MRD, ASES-PE, OES-PE, HRPS, HEBS, BHADP, MSESPE, APCPS-PE, HBIS, RSES-PE, PASC	N/A	– Recovery self-efficacy, action and coping planning, and perceived barriers directly contributed to the prediction of physical activity – Outcome expectancy significantly influenced intention – the relationship between intention and physical activity is mediated by action and coping planning – Action self-efficacy, maintenance self-efficacy, and recovery self-efficacy directly or indirectly affected physical activity – perceived barriers influenced physical activity
Dohnke et al., 2010, Germany	Longitudinal	456 patients based on the 6-month follow-up of the longitudinal CARO	Participation	simple count of perceived risk factors obtained, items specific for "regular phase III CR programme participation", frequency measure	N/A	– Intenders expected more positive consequences and reported higher self-efficacy than patients who are not intenders. – higher self-efficacy in relation to regular phase III CR programme participation than patients who only intended to participate
Ghisi et al., 2015, Canada	Quasi experimental	Traditional Curriculum n=92, Theoretically-Based Curriculum n=81 of cardiac rehabilitation patients	Knowledge, exercise	METER, CADE-QII, psychometrically-validated scales to assess exercise, HAPA constructs, and knowledge	Group education	– Significant increase in overall knowledge ($p < 0.001$) – Significant improvement in some HAPA constructs and exercise behavior
Hardcastle et al., 2021, Australia	RCT	64 colorectal cancer survivors	Physical activity changes	ActiGraph GT9X Link accelerometer	WATAAP trial	– Action self-efficacy ($p < 0.001$) and risk perceptions ($p = 0.003$) were significant predictors of intentions – Effects of outcome expectancies on intention were not statistically significant ($p = 0.322$) – Intention ($p = 0.031$) and action planning ($p = 0.039$) significantly predicted MVPA
Juwita et al., 2019, Indonesia	Pre-experimental	23 Hypertensive patients	Self-care management	Measuring Blood Pressure Knowledge, Self Care Behaviors of African American Peters and Templin	the combination of the Home Care Pharmacy Approach and Nurse's HAPA	There is an effect of the Home Pharmacy Care and HAPA on self-care management ($p = 0.006$)
Lippke & Plotnikoff, 2014, Canada	Longitudinal study	1,193 adults with Type 2 diabetes	Physical activity	13-item scale by Plotnikoff, Five items for positive statements, the extensively validated GLTEQ	N/A	– Self-efficacy, outcome expectancies were related to goals positive and significant – Risk perception and goals were significantly interrelated – outcome expectancies were significantly correlated with action planning – Goals and action planning were significantly interrelated
MacPhail et al., 2014, Australia	RCT	77 participants (39 in intervention group and 38 in the control group)	Healthy eating behaviour, Health-related emotional distress	DGI, with the Diabetes Distress Scale	theory-based workbook ("Ready, Set, Go"), two telephone calls	– HAPA is effective in predicting health outcomes – There is no effect of the intervention on healthy eating and emotional distress

Meadow et al., 2016, US	Observational study	259 African American breast cancer survivors	Physical activity	Self-report instrument designed for the Women's Health Initiative	N/A	– Motivational self-efficacy scores is lower in motivational phase than in the volitional phase – Intention scores were significantly lower in the motivational phase than in the volitional phase – intentions to be physically active between phases was moderate (P <0.017)
Moghimi et al., 2023, Iran	Quasi-experimental	105 diabetic patients in the intervention group and 105 patients in the control group	Dietary adherence, HAPA constructs	The dietary adherence questionnaire, HAPA questionnaire	the four 40-minute sessions of educational intervention in the form of lectures, educational booklets, and behavior self-report booklets	– risk perception and action planning had a positive effect on self-care behaviors in dietary adherence (P<0.001) – Coping self-efficacy had a direct effect (P < 0.001)
Zeidi et al., 2020, Iran	Cross-sectional	176 Hypertension patients	Physical activity	IPAQ	N/A	– physical activity behaviour significantly related to HAPA model structures – the highest correlation was between behavioural intention and action self-efficacy (r = 0.62, p = .01), the lowest was between behavioural intention and coping self-efficacy (r = 0.19, p = .001)
Myers et al., 2021, Australia	Cross sectional	377 bowel cancer patients	FOBT participations, invitees' attitudes	PAMS scale, UR-MSI scale	User-informed	– The indirect paths from intention, positive outcome expectancies, negative outcome expectancies and action self-efficacy to participation were all significant – The indirect path from risk perception to participation was non-significant
Paxton, 2015, US	Cross-sectional	304 African American breast cancer survivors	Physical activity	self-administered instrument designed for the Women's Health Initiative	N/A	– PA was not significantly associated with coping self-efficacy and recovery self-efficacy (P>0.005)
Presseau et al., 2016, Canada	Cross-sectional	201 MI patients	Medication adherence	MMAS-8, a structured questionnaire informed by the HAPA	N/A	– Difference in adherence scores over time (p = .04) – Adherence scores correlated with Self-efficacy, Social Support, Action Planning and Age, lending support to the volitional phase – Intention was correlated with HAPA-specified constructs as expected, including Self-efficacy, Outcome Expectancies, Risk Perceptions, Action Planning and Coping Planning
Ranjbaran et al., 2020, Iran	Cross-sectional	734 patients with type 2 diabetes	Medication adherence	HAPA self-structured questionnaire, the MMAS-8-Item	N/A	– significant correlations were found between the medication adherence behavior and HAPA constructs, except for recovery self efficacy, action planning, barriers and resources
Rohani et al., 2018, Iran	Cross-sectional	203 Isfahan diabetics	Healthful diet behavior	the nutrition style questionnaire, HAPA Questionnaire	N/A	– Behavioral intention was associated with action self-efficacy (p<0.001) and outcome expectancy (p<0.001) – Behavioral intention (p<0.001) and maintenance self -efficacy (p<0.001) were associated with action and coping planning – Action and coping planning (p=0.027), and recovery self -efficacy (p=0.021) were associated with nutrition behavior

Steca et al., 2015, Italy	Longitudinal	CPs (N = 250) and HPs (N = 246)	Dietary behavior	Modified HAPA Questionnaire, modified version of the Mediterranean Diet Scale	N/A	– The intention to change behavior was not predicted by negative outcome expectancies (p > .05) – Self-efficacy did not show a significant direct effect on the MDS score at T2 (p > .05) – CPs: the final behavior showed the highest explained variance (R^2=.29), followed by behavioral intention (R^2=.24), planning and maintenance self-efficacy (R^2=.15) – HPs: the explained variance associated with the MDS score at T2 was the highest (R^2=.31), planning (R^2=.25), intention (R^2=.20), and maintenance self-efficacy (R^2=.13)
Teleki et al., 2018, Hungary	Longitudinal	117 CAD patients	Social support on Dietary behavior	Food frequency questionnaire	N/A	– outcome expectancies and pre-action self-efficacy predicted behavioural intention – Social support served as a mediator between intention and action planning – coping planning mediated the relationship between action planning and dietary behaviour
Teleki et al., 2021, Hungary	Longitudinal	117 CAD patients	Social support on Physical activity	HAPA questionnaire	N/A	– Social support has a significant and strong effect on action planning and action control

Tabel 3. Summary of study quality assessment.

Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Chiu et al., 2011	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Dohnke et al., 2010,	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Ghisi et al., 2015	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Hardcastle et al., 2021	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Juwita et al., 2019	Y	N	Y	N	N	N	N	N	N	Y	Y
Lippke & Plotnikoff, 2014	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
MacPhail et al., 2014	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Meadow et al., 2016	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Moghimi et al., 2023	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y
Zeidi et al., 2020	Y	N	Y	Y	N	N	Y	Y	Y	N	Y
Myers et al., 2021	Y	N	Y	Y	Y	N	Y	N	Y	N	Y
Paxton, 2015	Y	N	Y	N	N	N	N	N	Y	N	Y
Presseau et al., 2016	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Ranjbaran et al., 2020	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Rohani et al., 2018	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Steca et al., 2015	Y	N	Y	N	N	N	Y	Y	Y	Y	Y
Teleki et al., 2018	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y
Teleki et al., 2021	Y	N	Y	N	Y	Y	Y	N	Y	Y	Y

Table 4. HAPA Constructs measured.

Study	Motivational Phase						Volitional Phase			
	ASE	OE	RP	INT	AP	CP	AC	CSE/MSE	RSE	BEH
Chiu et al., 2011	√	√	√		√	√		√	√	√
Dohnke et al., 2010	√	√	√	√				√	√	√
Ghisi et al., 2015	√	√	√	√	√	√				√
Hardcastle et al., 2021	√	√	√	√	√			√		√
Juwita et al., 2019	√							√		√
Lippke & Plotnikoff, 2014	√	√	√		√					√
MacPhail et al., 2014	√	√	√	√	√	√		√	√	√
Meadow et al., 2016	√	√	√	√	√	√		√	√	√
Moghimi et al., 2023	√	√	√	√	√	√		√	√	√
Zeidi et al., 2020	√	√	√	√	√	√		√		√
Myers et al., 2021	√	√	√	√		√				√
Paxton, 2015	√	√	√	√	√	√		√	√	√
Presseau et al., 2016	√	√	√	√	√	√				√
Ranjbaran et al., 2020	√			√	√	√		√	√	
Rohani et al., 2018	√	√	√	√	√	√		√	√	√
Steca et al., 2015	√	√	√	√	√	√		√		√
Teleki et al., 2018	√	√	√		√	√				√
Teleki et al., 2021	√	√	√	√	√	√	√	√	√	√

*ASE=Action Self-Efficacy; OE=Outcome Expectancies; RP=Risk Perception; INT=Intention; AP=Action Planning; CP=Coping Planning; AC=Action Control; CSE/MSE= Coping Self-Efficacy/Maintenance Self-Efficacy; RSE=Recovery Self-Efficacy; BEH=Behaviour

HAPA constructs used as outcome measurements

All studies examine Action self-efficacy (n=18) as shown in the table. Outcome expectancies and risk perception/risk awareness were assessed in 16 studies; two studies that did not simultaneously examine OE also did not examine RP. Intention and Coping planning were assessed in 14 studies. Action planning was assessed in 15 studies. Coping self-efficacy/Maintaining self-efficacy was assessed in 13 studies, Recovery self-efficacy was assessed in 9 studies, Behavior was assessed in 17 studies, and Action control was only used in one study.

DISCUSSION

This study aimed to systematically review HAPA-based studies of non-communicable diseases regarding targeted health behaviours (interventions), target groups and the social cognitive constructs of the HAPA model that are targeted in interventions or measured as outcomes. Most studies use physical activity/exercise, healthy diet, and adherence as targeted interventions. In all 18 included studies, the targeted population was adults, a total of 5,375. All HAPA constructs were used, but only one study used all constructs.

HAPA Applied in non-communicable diseases care

The HAPA model is an open- architecture framework that allows the use of only a part of the model's constructs [41]. The HAPA intervention can be delivered in a stage-matched format, meaning that participants can receive the intervention that fits their degree of self-efficacy, planning and action control [41]. This study shows that the 12 studies are real HAPA studies [25,26,28,29,31,32,35–40] as stated by Schwarzer and Hamilton that one type of self-efficacy and one type of planning to mediate between intention and behavioural outcomes is needed to consider a study of a real HAPA study [42]. However, one included study found that action self-efficacy is not significant to be a predictor of intention connected to physical activity [27]. It can be interpreted that being aware of a health risk alone is not sufficient to develop an intention to change. For this reason, other variables are needed in the motivational phase in order to mediate an intention. Furthermore, Schwarzer and Luszczynska [43] pointed out that risk perception is likely to play a more significant role in certain preventive behaviours (e.g., participation in screening examinations).

Three studies show a significant relationship between only one variable (Outcome Expectancies) in the motivational phase with intention [23,27,34]. Only one study found no relationship between Outcome Expectancies and behavioural intention [29]. In a study on dental health, it was stated that the significance of the relationship between outcome expectancies and behavioural intention was due to strong encouragement from medical staff during the provision of health education to patients so that patients' confidence increased to make changes in their health behaviour [44]. Schwarzer and Renner [45] emphasize that the relevant motivational factors can vary significantly across different health behaviours and groups studied [42]. Furthermore, Schwarzer's suggestions about expectancies [46] that the positive consequences linked to healthy behaviours are often sufficient to explain the intention to adopt those behaviours. However, in many of the studies included in this review, Action Self-efficacy is the main predictor of behavioural intention, where 14 studies confirm the significance of the relationship between this variable and intention [24–27,29,31,33–36,38,39]. In many studies, self-efficacy is an essential component of social–cognitive models, and self-efficacy proved to be especially important concerning physical activity [7,37]. In addition, in the current study, we found that action self-efficacy and outcome expectancies were most often together as variables of the motivational phase significantly related to behavioural intention.

In the volitional phase, planning (action and coping) together in 8 included studies [23,25,26,31,32,36,38,39] plays an essential role in connecting intention with behaviour. At this stage, it is also important to become the intervention target. Focusing on maintenance and recovery self-efficacy is necessary because these variables are significant predictors of planning [47]. Building multiple types of self-efficacy can help individuals maintain their behaviour [36]. Individuals would only adopt, initiate, and maintain a planned action if they believed in their capability [43]. Self-efficacy is needed all over the entire behaviour change process. Because different challenges occur as people progress from one phase to the next, so specific self-efficacy is required [19], such as task and coping. Individuals with high coping self-efficacy recover more quickly and commit to their goals [48],. The purpose of the interventions should be coping planning and coping self-efficacy for patients in the volitional phase. Concerning medication adherence, especially in chronic diseases, feeling hassled about the treatment plan and forgetfulness were the most comm, on reasons for non-medication adherence. It highlights the importance of self-efficacy beliefs [49].

Intervention for Behavioral Changes

The HAPA interventions can be designed using BCTs, which were developed to specify, evaluate and implement behavioural change interventions and to facilitate the comparison of the interventions [18]. Interventions for behavioural changes are usually selected on the basis of the theoretical constructs they are intended to target. Only five studies were in experimental design, two RCTs and three quasi experimental. In these studies, the use of BCTs eases comparison of the designs of the interventions between the treatment groups. Probably as a result of using BCTs, the HAPA constructs were more explicitly designed in the included experimental studies than in the observational studies. Behavior changes intervention may not have been reported in the observational studies because these studies have targeted fewer HAPA constructs in the intervention [46].

Overall, all experimental studies target interventions in the motivational phase to promote self-efficacy, outcome expectancies, risk perceptions, and behavioural intentions. Studies in Canada state that education in Cardiac Rehabilitation effectively improves knowledge, which is the most important part related to increasing intention [25]. Juwita, in his study, concluded that whether the respondent already has good motivation and goodwill, then this HAPA will strengthen the motivation and will that the respondent already has [30]. An experimental study in Australia found no signs of the workbook intervention on the healthy eating behaviour of people with diabetes, which occurred because the intervention given was low-intensity [35]. Previous research has found brief, non-face-to-face interventions to be effective in improving dietary behaviour and cholesterol in individuals with diabetes up to 12 months later, suggesting that change can be effectively brought about within this population following brief interventions [50].

LIMITATIONS

We were unable to access some credible databases that might have provided more extensive results. Studies may have missed if they used HAPA constructs but had not labeled them as such in the original papers.

CONCLUSION

Based on 18 studies, the HAPA model was evaluated to assess patients' behavioural changes of non-communicable diseases. With moderate certainty, HAPA-based interventions are evaluated mainly by physical activity, healthy diet behaviour, medication adherence, knowledge, and participation in the program. All constructs of the HAPA model were evaluated, but only one study used all constructs as a complete set to define the intervention. There is an urgent need to align the target population, the targeted intervention, the targeted outcome and the HAPA constructs to be used. The follow-up time of interventions

could be extended to 10 weeks at least to create a behavioural change and often longer to assess its effects on the outcomes and brief. Lastly, a brief intervention should be set up to be effective in these chronic conditions.

AUTHOR CONTRIBUTION

SA designed the study and developed the search strategy. SA and AZA provided feedback on search strategy and study design. MS conducted the systematic literature search. IS reached out to partners for grey literature. SA and AZA conducted the review of literature, abstracts and full texts. SA and AZA conducted data extraction. MS wrote the manuscript and prepared all tables and figures. SA, AZA, MS, and IS reviewed and approved the final.

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