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REVIEW



# Physical activity for people with chronic conditions: a systematic review of toolkits to promote adherence

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## ABSTRACT

**Purpose:** The World Health Organisation (WHO) recommends that health professionals develop and implement “adherence counselling toolkits” to promote adherence to long-term therapies in people with chronic conditions. This prospectively registered review aimed to systematically identify and evaluate existing toolkits developed to promote adherence to physical activity in people with chronic conditions.

**Materials and methods:** Grey literature and six e-databases were searched for studies investigating the use of “toolkits” to promote adherence to physical activity or exercise recommendations in people with chronic conditions (Medline, PsycInfo, EmCare, Cochrane, CINAHL Plus, Pedro). A two-stage screening process was completed by two independent reviewers.

**Results:** Five studies describing five toolkits were included. Three toolkits displayed all WHO recommended features, including information on adherence, a clinically useful way of using this information, and behavioural tools for maintaining habits. The included toolkits featured “adherence” to the intervention; however, this was not their primary aim. There were trends towards improved physical activity with some of the included toolkits.

**Conclusions:** There are a lack of rigorously developed toolkits that focus on adherence to physical activity in people with chronic conditions. Toolkits should be developed, tested, and implemented to improve adherence and outcomes for people with chronic conditions.

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## KEYWORDS

Adherence; physical activity; toolkits; behaviour change; chronic conditions; health professionals; rehabilitation

## > IMPLICATIONS FOR REHABILITATION



- Health outcomes for people with chronic conditions may be enhanced with a focus on adherence, however there are currently no rigorously developed toolkits that meet this need.
- Adherence counselling toolkits should be co-designed with stakeholders for use with people with specific chronic conditions.
- Adherence-focused toolkits should be developed, implemented, and evaluated to ensure they are feasible to use and beneficial for health professionals working with people with chronic conditions.

## Introduction

Chronic health conditions are increasing globally, with more than 70% of all deaths caused by chronic disease [1]. Chronic conditions are illnesses that are not contagious, usually of long duration, slow to progress, and typically the result of genetics, environment, and/or lifestyle [2]. Of the chronic conditions, cardiovascular disease accounts for the highest mortality worldwide, followed by cancers, chronic respiratory diseases, and diabetes [3]. It is estimated that one in two people with a chronic condition have disability [4] and the increasing prevalence of chronic conditions has a significant socio-economic impact with implications for the health workforce [5], productivity, and healthcare expenditure [2].

Primary prevention of chronic conditions is required to reduce the risk of people developing the condition [6]. However, with the increasingly high prevalence of chronic conditions and multimorbidity [7] contributed to by longer life expectancy and the ageing population [8], secondary prevention is required to mitigate the negative health outcomes of those already suffering from the chronic condition [9]. Physical activity enhances the quality

of life and possibly life expectancy in people with chronic conditions and is considered a first-line treatment [10]. The WHO recently published the first population-based guidelines on physical activity for people with chronic conditions [11]. These recommendations specified that for people with chronic conditions, physical activity, defined as “any bodily movement produced by skeletal muscles that requires energy expenditure” (WHO, p. vii), can be undertaken as part of recreation and leisure, transportation, and in the context of daily occupational, educational, home or community settings. These guidelines provided a strong recommendation that “all adults and older adults with these chronic conditions should undertake regular physical activity” and included recommendations for adults with chronic conditions to engage in moderate to vigorous aerobic activity, muscle strengthening activities, and varied multicomponent physical activity that emphasises functional balance and strength training. Physical activity can come in many forms including incidental activity, sport and structured exercise programs, and can be performed at varying intensities from light to vigorous [12]. The World Health Organisation (WHO) recommend that physical activity is safe for

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people with chronic conditions, and the health benefits outweigh the potential risks, such as falls-related injury, provided it is appropriate to the individual's activity level, health status and physical function [11].

Reduced global levels of physical activity have been reported, and barriers to adherence, including lack of information and skills, reduced motivation and self-efficacy and a lack of support have been described [11]. For people with chronic conditions to benefit from physical activity programs, adherence is vital, and barriers can be even greater than in the general population with factors such as fatigue and pain contributing to low adherence rates [13]. For example, it has been reported that only 32% of people with cardiovascular disease meet physical activity guidelines and irrespective of cardiovascular disease status, those who met physical activity guidelines reported better health status [14]. Poor adherence to the treatment of chronic health conditions leads to poor health outcomes and increased healthcare costs [15]. In adults with chronic conditions, exercise adherence has been reported to be high in the initial stages of participation but tends to reduce over time (beyond three months) [16,17]. Adherence to treatment, including physical activity and exercise, is critical for an intervention to achieve a positive outcome [18,19]. Subsequently, extensive research has explored strategies to enhance adherence across a range of health domains, most notably medication adherence [20] and physiotherapy prescribed self-management strategies [21]. A recent umbrella review conducted by Collado-Mateo and colleagues [22] identified several key factors to improving adherence to physical activity in people with chronic conditions. Key factors related to people with chronic conditions included self-efficacy, education, expectations and knowledge, enjoyment and individuals having an active role [22].

In 2003, the WHO conducted the "Adherence to Long-Term Therapies Project", a global initiative aiming to improve global rates of adherence to therapies, including physical activity programs, in people with chronic conditions [23], in which they stated that "increasing the effectiveness of adherence interventions may have far greater impact on the health of the population than any improvement in specific medical treatments" [23, p.2]. Adherence was defined as "the extent to which a person's behaviour – taking medication, following a diet and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider" [23, p.3]. Poor adherence to treatment of chronic conditions was reported as a worldwide problem of striking magnitude, with the impact of poor adherence increasing as the burden of chronic health disease grows. The consequences of poor adherence to long-term therapies are poor health outcomes and increased health care costs. To enhance adherence and empower health professionals, it was recommended that an "adherence counselling toolkit" [23, p.33] should be developed and implemented for specific chronic conditions and should address three topics simultaneously; the toolkit should incorporate information on adherence, encompass tools and strategies and a clinically useful way of using this information, and include behavioural tools for maintaining habits. Adherence requires behaviour change, and it is recognised that health professionals should apply relevant behaviour change theory and techniques to enhance adherence to physical activity and exercise [24]. Toolkits should include resources for the health professionals and the people with chronic conditions who they are working with.

Toolkits, which have been widely used in health as a method of knowledge translation, aim to improve health behaviours for health professionals, consumers, health organisations, policy makers and the public [25]. Toolkits have not been consistently defined but have been described as "resource and tool collections designed to facilitate spread across settings and organisations and to ease

the uptake and implementation of interventions..." [26, p.2]. Examples of toolkit resources include templates, pocket cards, guidelines, algorithms, and summaries [25]. Any resource that aids implementation and increases uptake of an intervention could be used in a toolkit and these resources may be different depending on the chronic condition subgroup, the health professionals, the setting, and individual preferences.

Given the WHO recommendation for developing "adherence counselling toolkits" for people with chronic conditions, it is important to increase the awareness of current available toolkits and map the evidence for their effectiveness. An example of an existing toolkit is the "Physical Wellness Toolkit", which includes strategies for improving physical health [27]. However, we do not currently know how many toolkits exist, how they were developed or how effective they are in terms of improving adherence to physical activity and exercise. To date there are no systematic reviews about adherence toolkits, hence little is known about the effectiveness of toolkits and the components that may be well accepted and effective for inclusion. An understanding of existing toolkits and their use in healthcare will benefit health professionals and health consumers and is important to guide the development of further toolkits targeted at specific chronic condition groups and health professionals. Given the definition of toolkits is varied with use across a broad range of health care and health quality settings [25], the focus of our review was on toolkits that were developed to disseminate health information to people with chronic conditions, as well as change health professional behaviour. Therefore, the primary aim of this review was to systematically identify and describe existing toolkits developed to promote adherence to physical activity in adults with chronic health conditions. The secondary aim was to evaluate the identified toolkits in terms of use and effectiveness on physical activity adherence.

## Methods

The review was conducted in accordance with the PRISMA guidelines for reporting standards in systematic reviews and meta-analyses [28]. The protocol was prospectively registered with PROSPERO, International Prospective Register for Systematic Reviews (CRD42021290275).

### Search strategy

Six electronic databases were searched for studies investigating the use of "toolkits" to promote adherence to physical activity or exercise recommendations in people with chronic conditions: Medline, PsycInfo, EmCare, Cochrane CENTRAL, CINAHL Plus and Pedro. A search strategy was developed, and peer reviewed by an academic librarian. The search strategy for Medline is included as [Appendix 1](#). The search was restricted to studies published in English with no date limitation. The searches were initially conducted in November 2021 and updated in September 2022. In addition, a grey literature search (Google) was conducted in December 2022, using the terms "Exercise", "Adherence", and "Toolkit". The first 100 results were screened to identify any additional physical activity adherence toolkits.

### Inclusion and exclusion criteria

The following chronic health conditions were included; arthritis, asthma, back pain, cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes, chronic kidney disease, mental

health conditions and osteoporosis [29]. For inclusion, studies must have collected primary data from adults ( $\geq 18$  years) with at least one of these chronic conditions. As no single definition of the term “toolkit” has been described in the literature, for the purposes of this review, studies needed to include any tool/toolkit used to promote adherence; inclusive of pamphlets, manuals, diaries, accelerometers, mHealth, visual or audio resources. Studies must also have included a measure of adherence to exercise or physical activity recommendations. Case study designs, protocols and conference abstracts were excluded.

### Selection process

All studies were uploaded to Covidence [30] and duplicates removed. The screening process was initially piloted, with two reviewers screening the first 10 per cent of citations, and then meeting to discuss interpretation of the eligibility criteria and resolve any differences. This ensured a common understanding between reviewers. Title and abstracts were then independently screened by two reviewers (TL and SV). Following abstract screening, all remaining full texts were obtained and screened independently by the same reviewers. Any conflicts were resolved through discussion, in consultation with a third reviewer (LL).

### Access to included studies

To analyse details of the five included studies, the reviewers contacted (*via* email) those authors where toolkit details were not accessible through the publication.

### Data extraction and analysis

An Excel data extraction tool was developed by the research team, including study characteristics (type of study, participants, intervention, outcomes) and toolkit details (evidence underlying toolkit development, target audience, toolkit goals, toolkit content and method of delivery, WHO toolkit features, effectiveness on exercise adherence, and toolkit use).

At the commencement of data extraction, three reviewers (TL, KH and SV) independently extracted data from 10 randomly selected studies to ensure quality in the process.

Data from the five included studies was extracted by one reviewer (KH).

### Quality assessment

As there are currently no validated critical appraisal checklists for assessing toolkit quality, during data extraction, the reviewers captured information regarding toolkit development, including the conduct of a literature review, expert consensus, and the testing of the toolkits. This method of appraisal for toolkit rigor has been previously reported [31] (Appendix 2).

All included studies were evaluated against the three WHO key recommended criteria.

## Results

### Study selection

A total of 8513 citations were identified. Of these, 606 full text articles were screened for explicit inclusion of a “toolkit” with

intervention to promote exercise adherence (Figure 1). No further (studies of/publication of) exercise adherence toolkits were identified from the grey literature. Five studies describing five toolkits were included [32–36].

### Study characteristics

#### Type of study

Three of the included studies were randomised controlled trials, one was a quasi-experimental study and one was a pre-post single group design (Table 1). Included studies were conducted across the United States of America [32,34–36] and Canada [33], and published from 2007 to 2019.

#### Participants

Each study targeted a specific chronic condition in adults (Table 1). Sheppard et al. [36] and Nahm et al. [34] included breast cancer survivors and survivors of mixed cancer diagnoses, respectively. The remaining toolkits included people with cardiovascular disease [32], type 2 diabetes [33] and cardiovascular disease risk secondary to pre-eclampsia [35]. Sample sizes ranged from 22 to 198, with a median of 40. Follow up periods ranged from immediately post-intervention [32,34,36] to nine months [35]. Study participants were recruited *via* multiple methods including hospital and community healthcare centres relevant to the target health condition, websites, and social media, or *via* outreach materials such as flyers and study notices.

#### Intervention

Two studies investigated the toolkit in isolation as the intervention [33,34]. The remaining three studies supplemented toolkit intervention with follow-up phone calls or emails, supervised exercise and/or in-person education sessions [32,35,36]. Rich-Edwards et al. [35] used a toolkit as one component of a larger lifestyle program website intervention.

Within the toolkits, “adherence targeting” interventions included activity tracking, education about exercise (benefits, facilitators, overcoming barriers), personalised exercise plans, goal setting, phone or email coaching sessions and exercise counselling guides. Interventions specifically targeting exercise adherence are displayed in Table 2.

#### Outcomes

A wide range of outcomes were measured in the included studies (Table 1), encompassing assessment of cardiovascular fitness, self-efficacy, treatment adherence, symptom burden, quality of life, functional performance, and clinical/anthropometric variables.

The International Physical Activity Questionnaire – Short Form (IPAQ-SF) [37] was the only measure of exercise adherence included in multiple studies [33,34,36]. The IPAQ-SF utilises self-reported frequency and duration of different intensities (vigorous, moderate) of activity, walking and sitting over the preceding seven days. Other exercise adherence measures included were accelerometer and pedometer activity data [32], five-item Medical Outcomes Study General Adherence Scale [34], monitored online resource usage [34] and adapted Pregnancy Physical Activity Questionnaire [35] (Table 1).

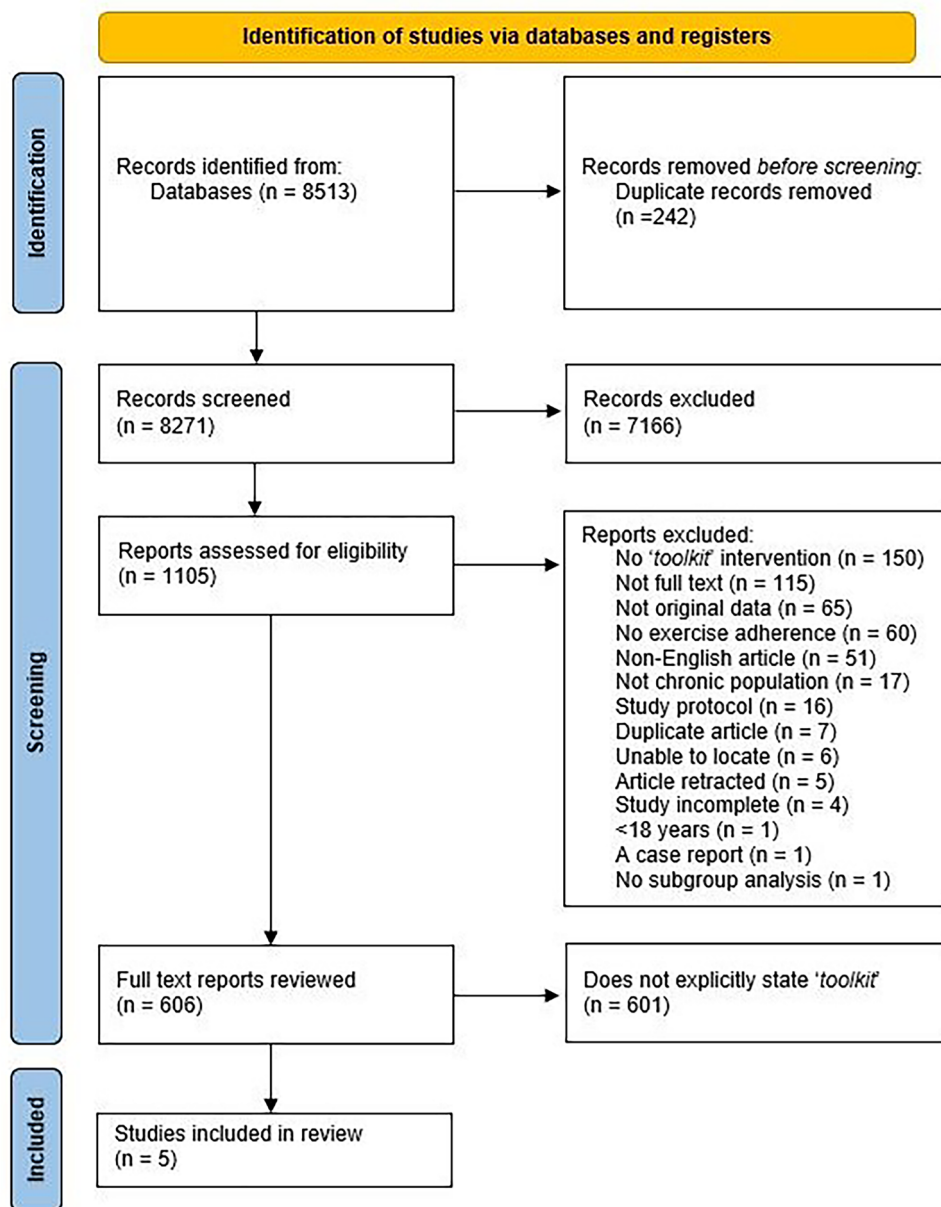


Figure 1. PRISMA flowchart.

### Toolkit details

#### Evidence underlying toolkit development

A summary of evidence for toolkit development in each study is included in Table 2. Toolkit developers were the study authors in two studies [34,36], a combination of study authors, health organisation and healthcare professionals in one study [33] and not specified in the remaining two studies. The process of toolkit development was not specified in any of the included studies. Supporting evidence for some components of toolkit intervention was presented in three of five studies, including systematic reviews, meta-analyses and clinical practice guidelines [32,33,36]. However, details of the literature reviews (search strategy, inclusion criteria, etc) were not specified.

Three toolkits were being tested and evaluated for the first time [32,34,36]. The toolkit presented by Fowles et al. [33] had previously been investigated for healthcare provider confidence in delivering physical activity counselling, but not for patient

outcomes [38]. The remaining study did not report on field testing or evaluation of the toolkit [35].

#### Target audience

Included toolkits were intended for use by healthcare consumers in three studies [32, 34, 35] healthcare professionals in one study [33] and both consumers and healthcare professionals in the remaining study [36].

#### Toolkit goals

Aims of each toolkit varied between a primary focus on increasing physical activity [32,33], to improvement of multiple health measures, inclusive of physical activity [34–36]. The toolkits intended for healthcare providers aimed to improve knowledge and understanding of physical activity and behaviour change to promote these outcomes in consumers [33,36].

Table 1. Study characteristics (n = 5).

	Study design	Location	Recruitment	Participants	Intervention	Outcome measures	Results
Adams, 2007[32] "A Walk in the PARK (Physical Activity Rehabilitation Kit)"	RCT	Indiana, USA	Hospital-based outpatient heart failure clinics.	N = 40 (control = 20, intervention = 20)	<b>Intervention:</b> Introduction class (orientation to program, exercise education, barriers, benefits of exercise, motivation), 8 week home-based self-directed toolkit with point accrual for physical activity, weekly phone calls to monitor progress. <b>Control:</b> Verbal instruction re: general guidelines for PA in HF (standard practice in HF clinic). No specified PA prescription. Weekly phone calls (answer questions, offer verbal encouragement to maintain compliance with intervention).	1. 6MWT 2. PFC 3. DASI 4. PHQ-8 5. SEE 6. MLHFQ 7. Physical activity: Actigraph (accelerometer), pedometer, self-reported exercise diary.	<b>6MWT:</b> Both groups improved walk distance (+21.8m [intervention], +21.5m [control]). No SS difference between groups. <b>PFC:</b> Intervention group PFC score increased from baseline to final (29.8 – 30.6), while control group did not (30.6-30.5). No SS difference between groups. <b>DASI:</b> Both groups improved score (IG mean score 11.3 [baseline] – 24 [final], CG mean score 9.9 [baseline] – 27.1 [final]). No SS difference between groups. <b>PHQ-8:</b> Both groups improved PHQ-8 scores (IG mean score 7.3 [baseline] – 5.9 [final], CG mean score 9 [baseline] – 7.3 [final]). No SS between groups. <b>SEE:</b> IG improved (49.6-55.5) while CG declined (51.9-42.8). No SS between groups. <b>MLHFQ:</b> No improvement in either group. <b>Actigraph:</b> improvement in both groups approaching significance (p=0.08). 7/40 participants failed to complete study participation. 6/7 who failed to complete were in the intervention group. 6MWT, DASI and PHQ all improved significantly in those who were adherent (regardless of group allocation).
Fowles et al., 2014 [33] Diabetes Physical Activity and Exercise Toolkit	Quasi-experimental study	New Brunswick & Nova Scotia, Canada	Diabetes centres	N = 198 (control = 51, intervention = 147)	<b>Intervention components:</b> Single counselling session between patient and Diabetes Educator to improve participation in regular PA. Patients to freely choose their engagement and physical activity. <b>Control components:</b> Single counselling session between patient and Diabetes Educator (educator not trained in toolkit use, no additional materials).	1. Clinical variables: Height, weight, waist circumference, blood pressure, fasting blood glucose and A1C, total cholesterol, high-density lipoprotein, low-density lipoprotein, triglycerides, medication +/- changes. 2. IPAQ-SF 3. Researcher-developed questionnaire (confidence and self-efficacy for PA). 1. HRQOL 12-Item SF-12 2. Memorial Symptom Assessment Scale 3. 47-item Impact of Cancer Scale (Version 2) 4. Six-item Assessment of Survivor Concerns scale 5. IPAQ – SF 6. Combined Fat/Fruit-Vegetable Screener 7. Components of Primary Care Index (interpersonal communication, provider's knowledge about the patient and care coordination) 8. Five-item Medical Outcomes Study General Adherence Scale 9. E-health Literacy Scale	<b>Clinical variables:</b> No difference in medication use or changes between groups. <b>IPAQ-SF:</b> No significant effect of intervention or control on self-reported MVPA or walking mins/week from baseline to 6 months. <b>Patient perceptions:</b> Overall perception of aerobic fitness improved over 6 months (p=0.003). No other SS difference between groups. Efficacy perceptions and attitudes maintained in intervention group over 6 months, approaching significance (p=0.07). <b>HRQOL 12-Item SF-12:</b> Significant improvement in physical component summary (p=0.049), but not mental component summary (p=0.722). <b>Memorial Symptom Assessment Scale:</b> Significant improvement in physical and overall symptom burden (p=0.018 and p=0.038, respectively). <b>47-item Impact of Cancer Scale:</b> Significant improvement in employment concern, but not other areas of impact. <b>IPAQ-SF:</b> Mean scores for walking, moderate and vigorous activity improved, but no SS between baseline and 3 months. Nil other significant change for remaining outcome measures.
Nahm et al., 2019 [34] CaS-PET – Cancer Survivorship Patient Engagement Toolkit	One group pre-post design	Maryland, USA	Cancer centre	N = 27	<b>Intervention components:</b> 12 week interactive online program including survivorship care plans, supportive resources and e-message follow up with healthcare team. <b>Control components:</b> No control group.	1. HRQOL 12-Item SF-12 2. Memorial Symptom Assessment Scale 3. 47-item Impact of Cancer Scale (Version 2) 4. Six-item Assessment of Survivor Concerns scale 5. IPAQ – SF 6. Combined Fat/Fruit-Vegetable Screener 7. Components of Primary Care Index (interpersonal communication, provider's knowledge about the patient and care coordination) 8. Five-item Medical Outcomes Study General Adherence Scale 9. E-health Literacy Scale	<b>HRQOL 12-Item SF-12:</b> Significant improvement in physical component summary (p=0.049), but not mental component summary (p=0.722). <b>Memorial Symptom Assessment Scale:</b> Significant improvement in physical and overall symptom burden (p=0.018 and p=0.038, respectively). <b>47-item Impact of Cancer Scale:</b> Significant improvement in employment concern, but not other areas of impact. <b>IPAQ-SF:</b> Mean scores for walking, moderate and vigorous activity improved, but no SS between baseline and 3 months. Nil other significant change for remaining outcome measures.

(Continued)

Table 1. Continued.

	Study design	Location	Recruitment	Participants	Intervention	Outcome measures	Results
Rich-Edwards et al., 2019 [35] <i>unnamed toolkit</i>	RCT	USA	Websites, social media	N = 151 (control = 75, intervention = 76)	<p><b>Intervention components:</b> 12 week Heart Health for Moms (HH4M) lifestyle program website (audio-visual modules including: healthy eating, Dietary Approaches to Stop Hypertension (DASH) diet recommendations, increasing physical activity, identifying promoters and barriers to adopting a healthy lifestyle), personalised lifestyle coaching with dietitian (phone call, email), online toolbox (see below).</p> <p><b>Control components:</b> Access to Heart Health 4 Moms (HH4M) "control" website (publicly available information re: cardiovascular risks associated with preeclampsia &amp; lifestyle recommendations to avoid CVD. Includes links to relevant health-related websites).</p>	<p>1. Adapted Sallis Eating Habits Confidence Survey &amp; Exercise Confidence Survey</p> <p>2. Adapted DASH Online Questionnaire (adherence to DASH diet)</p> <p>3. Adapted Pregnancy Physical Activity Questionnaire</p> <p>4. Researcher-developed questionnaire (knowledge of and control over CVD risk).</p>	<p><b>Adapted Sallis Eating Habits Confidence Survey &amp; Exercise Confidence Survey:</b> Significantly greater change in self-efficacy to eat a healthy diet in the intervention group (<math>p = 0.03</math>) at 9 months. No difference in change in physical activity self-efficacy between groups at 9 months.</p> <p><b>Adapted DASH Questionnaire:</b> No significant change in either group at 9 months.</p> <p><b>Adapted Pregnancy Physical Activity Questionnaire:</b> Change in physical activity levels displayed no difference between study arms. Physical inactivity decreased more in the intervention group than control (<math>p = 0.0006</math>).</p> <p><b>Knowledge and control over CVD risk:</b> Improved knowledge reported in both groups over 9 months with significantly greater improvement in intervention arm (<math>p = 0.01</math>). No significant difference between groups in sense of personal control over CVD risk (<math>p = 0.12</math>).</p> <p>93% retention in control group, 91% retention in intervention group at 9 months. Drop out mostly due to becoming pregnant or lost to follow up.</p>
Sheppard et al., 2016 [36] Stepping STONE (survivors taking on nutrition and exercise)	Two-arm feasibility RCT	Washington D.C., USA	Hospitals, flyers, newspaper study notices.	N = 22	<p><b>Intervention components:</b> 12 week program including fortnightly 30 min supervised exercise and 60 min education session, individual phone coaching sessions utilising motivational interviewing techniques.</p> <p><b>Control components:</b> NCI booklet "Facing Forward Life After Cancer Treatment" – general health information for cancer survivors.</p>	<p>1. Anthropometric measures: Weight, height, BMI (<math>\text{kg}/\text{m}^2</math>), waist and hip circumference.</p> <p>2. 4-day food intake records</p> <p>3. Multistage treadmill Bruce Protocol (<math>\text{VO}_2</math> max [<math>\text{kg}/\text{L}/\text{min}</math>])</p> <p>4. IPAQ-SF</p>	<p><b>Anthropometry:</b> Tendency for lower body weight, BMI, waist/hip ratio in intervention group vs control (mean change <math>-1.7</math>, <math>-0.3</math>, <math>-0.03</math>, respectively).</p> <p><b>Food intake:</b> Trend towards reduced energy intake and increased fibre intake in intervention group.</p> <p><b>Cardiovascular fitness:</b> <math>\text{VO}_2</math> max (<math>\text{kg}/\text{L}/\text{min}</math>) improved in intervention group and declined in control group.</p> <p><b>IPAQ:</b> Mean physical activity mins/week higher at final assessment for intervention vs control (366.7 vs 357.0 mins/week, respectively). Total physical activity (MET-min/week) increased 3.6-fold in intervention group compared to control (3501.1 vs 965.3, respectively).</p> <p>N.B. Sample size limits statistical power, thus significance not reported.</p>

RCT: Randomised controlled trial; PA: physical activity; HF: heart failure; 6MWT: 6-min walk test; PFC: Perceived Functional Capacity; DASI: Duke Activity Status Index; PHQ-8: Patient Health Questionnaire; SEE: Self Efficacy for Exercise; MLHFQ: Minnesota Living with Heart Failure Questionnaire; SS: statistically significant; IG: intervention group; CG: control group; IPAQ-SF: International Physical Activity Questionnaire – Short Form; MVPA: moderate to vigorous physical activity; HRQOL: Health Related Quality Of Life; CVD: cardiovascular disease; BMI: body mass index; MET: metabolic equivalent of task.

### Toolkit content and method of delivery

Adams [32] presented toolkit components within the publication. Access to the remaining four toolkits was sought *via* email to study authors. Toolkit materials or an outline of toolkit components were provided by Fowles et al. [33] and Rich-Edwards et al. [35]. Due to ongoing research activities, the toolkit used by Nahm et al. [34] was not provided. Authors from the remaining study [36] were not contactable.

The contents of each toolkit were varied, however educational resources regarding exercise for the target chronic health condition were included in all toolkits. Details of toolkits and related interventions for each study are included in Table 2.

Nahm et al. [34] and Rich-Edwards et al. [35] used online toolkits. Nahm et al. [34] presented online educational modules (cancer survivorship, nutrition, exercise, relationships, mental health) that were viewed/completed over a 12-week period, supplemented with individualised support *via* e-messages and access to cancer survivorship resources. Rich-Edwards et al. [35] presented an online “toolbox” containing meal plans, recipes, and exercise videos alongside a twelve-week lifestyle program website incorporating audio visual modules (nutrition, increasing physical activity, promoters, and barriers to a healthy lifestyle) and personalised lifestyle coaching *via* phone/email.

Physical (paper-based) toolkits for healthcare consumers [32,36] included workbooks, educational resources (books, videos, recipes), personalised intervention plans and equipment (pedometer, stopwatch, resistance bands). Physical toolkits for health professionals [33,36] included foundational resources and manuals for implementation, resources for use with consumers (summary sheets, brochures, food, and fat models), counselling and/or assessment tools.

### WHO toolkit features

Table 3 displays the inclusion of the toolkit features recommended by the WHO [23], as outlined in the introduction. Three of the five toolkits included all suggested features [32,33,36]. Information on adherence included topics such as: benefits of physical activity, barriers and facilitators of exercise and managing motivation. Clinically useful ways of using information varied between activity recording (points, pedometer), goal setting, assessment of readiness for activity and individualisation of approach. Behavioural tools were presented *via* multiple methods of information delivery (videos, brochures, in-person education, activity monitoring, motivational interviewing, and individualised plans).

### Effectiveness on physical activity adherence

Included studies reported variable outcomes regarding physical activity and adherence to exercise with few parameters reaching significance between baseline and final assessment for the intervention group, or when comparing study groups. Adams [32] reported improvement in physical activity measured by accelerometer from baseline to eight weeks in both intervention and control groups approaching significance ( $p=0.08$ ), but no significant difference between groups. The intervention group also displayed significantly greater likelihood of incomplete study participation compared to the control group ( $p=0.04$ ). Authors noted potential for inaccuracy of results based on poor participant adherence to recording protocol and self-initiation of exercise in the control group.

Nahm et al. [34] reported improvement in average scores for self-reported walking, moderate and vigorous physical activity

(IPAQ-SF) from baseline to three months but this was not significant. Adherence to treatment (inclusive of regular exercise) was assessed by the Five-item Medical Outcomes Study General Adherence Scale, which displayed a non-significant decrease in overall adherence for the study period.

Fowles et al. [33] noted no significant effect of intervention or control on self-reported physical activity (IPAQ-SF) or a participant’s planned resistance or aerobic exercise from baseline to six months. When intervention participants were separated into sub-groups according to normal activity levels at baseline (inactive <150 min moderate to vigorous physical activity [MVPA] per week, vs active >150 min MVPA per week), a significant increase in physical activity was noted for the inactive group and a significant decrease in physical activity for the active group. However, both groups remained in the same activity cohort (inactive vs active) from baseline to six months.

Rich-Edwards et al. [35] reported no significant change in physical activity from baseline to nine months between intervention and control groups as assessed by the Adapted Pregnancy Physical Activity Questionnaire. Physical inactivity (time spent watching television, reading or on the computer) decreased significantly more in the intervention group than control group, reaching 7.8 hours less inactive time per week at nine months.

Sheppard et al. [36] reported a 3.6-fold increase in total physical activity (IPAQ-SF) for the intervention group compared to control.

**Toolkit use.** Study retention rates ranged from 52 to 92%. Fowles et al. [33] attributed low retention (52%) to miscommunication regarding confirmation of study participation and human error in use of unique identifiers. All randomised controlled trials reported lower retention in the intervention group compared to control; 70 vs 95% [32], 91 vs 93% [35] and 67 vs 75% [36], respectively. Adams [32] identified study group allocation (intervention or control) as the only significantly different baseline variable.

Toolkit usage was reported in two studies. Nahm et al. [34] reported 70% completion of all online modules in the intervention group, with the first two modules most frequently used. Fowles et al. [33] reported the toolkit continued to be utilised in all counselling sessions by one-third of diabetes educators at 12-month follow-up.

Three studies reported on participant satisfaction. The Cancer Survivorship Patient Engagement Toolkit (CaS-PET) was deemed helpful for survivorship care plans (70%), information (55%) and to stay healthy (30%) by intervention group participants [34]. The Stepping STONE (Survivors Taking on Nutrition and Exercise) toolkit received high overall satisfaction with an average rating of 9.3/10 [36]. Intervention participants expressed satisfaction with the toolkit’s multiple components, participant accountability and usefulness of materials. The Diabetes Physical Activity and Exercise Toolkit received an overall positive rating by diabetes educators of 5.8/7, with reported increases in confidence for physical activity counselling, prescription, efficacy, and knowledge [33].

Barriers to toolkit implementation were reported by Fowles et al. [33], who reported an increased prevalence of time as a barrier. However, ability and resources became less of a barrier to implementation over the intervention period.

Further details of toolkit use are presented in Table 2.



## Discussion

The WHO recommends “adherence counselling toolkits” addressing knowledge (information on adherence), thinking (clinical decision-making process) and action (behavioural tools) [23] for people with chronic conditions. Consistent with this, there is a lack of evidence surrounding evidence-based toolkits to promote adherence to physical activity in people with chronic conditions.

The purpose of this review was to identify and describe toolkits developed to promote adherence to physical activity in adults with chronic health conditions and to evaluate the identified toolkits in terms of their use and effectiveness on physical activity adherence. Regarding the primary aim of identifying adherence-focused toolkits, the screening process identified five studies meeting the criteria for inclusion, identifying five unique toolkits addressing cardiovascular disease, diabetes, and cancer.

Table 2. Toolkit details.

	Toolkit intervention	Adherence interventions	Evidence underlying toolkit development	Toolkit use & satisfaction
Adams, 2007 [32] “A Walk in the PARK (Physical Activity Rehabilitation Kit)”	<p><b>Chronic condition:</b> Cardiovascular disease (left heart failure).</p> <p><b>Toolkit target:</b> Healthcare consumers</p> <p><b>Toolkit contents:</b> Workbook (PA prescription and point accrual guideline, Borg scale, chart to document PA points earned), poker chips to track PA point accrual, pedometer, stopwatch, National Institute on Aging Exercise Guidebook and video tape, resistance band and diagram guide, Tai Chi video tape, Pilates video tape.</p> <p><b>Duration:</b> 8 weeks</p>	<p><b>Toolkit adherence resources:</b> point accrual for activity (poker chip tracking, chart), pedometer</p> <p><b>Additional adherence intervention:</b> Introduction class (orientation to program, education re: importance of exercise, barriers, benefits, motivation)</p> <p>Weekly phone calls (check progress, encourage compliance and advancement of goals)</p>	<p><b>Process:</b> Nil specified.</p> <p><b>Literature review:</b> Review of empirical evidence for exercise in heart failure. Process of review not documented. Results of 26 studies were presented. Referenced clinical practice guideline documents in generating toolkit exercise protocol (ACSM, 2000; AHCP, 1995; Hunt et al., 2005).</p> <p><b>Conceptual framework:</b> Wilson and Cleary’s conceptual model of health-related quality of life (1995).</p> <p><b>Expert consensus:</b> Nil specified.</p> <p><b>Field testing:</b> First implementation of toolkit.</p> <p><b>Evaluation:</b> No evidence of toolkit evaluation prior to current study.</p>	<p><b>Intervention (toolkit) engagement:</b> Significantly greater likelihood of incomplete study participation in intervention (toolkit) group compared to control (<math>p = 0.04</math>).</p> <p>8/14 who completed study intervention reported attempting to earn prescribed physical activity points.</p>
Fowles et al., 2014 [33] Diabetes Physical Activity and Exercise Toolkit	<p><b>Chronic condition:</b> Type 2 diabetes (T2DM).</p> <p><b>Toolkit target:</b> Healthcare professionals (diabetes educators) counselling patients with T2DM.</p> <p><b>Toolkit contents:</b> Foundational resources (understanding PA and diabetes, how to create a PA and exercise plan), quick reference resource guide to aid implementation of strategies, resources (tools, handouts) for use with patients to support initiation and maintenance of a PA plan (identifying barriers, goal setting, stages of change, exercise readiness, exercise recording).</p> <p><b>Duration:</b> single individualised counselling session</p>	<p><b>Adherence resources:</b> manual to assist healthcare professionals in counselling to establish regular physical activity and exercise (materials to educate health professionals, aid counselling and assessment, resources to provide to consumers)</p> <p><b>Additional adherence intervention:</b> Nil</p>	<p><b>Process:</b> Nil specified.</p> <p><b>Literature review:</b> Nil process specified. Extensive references to literature presented in “Foundational Resources” section of toolkit. Recommendations for diabetes management in toolkit reference Canadian Diabetes Association (CDA) Guidelines (peer-reviewed, evidence-based &amp; expert consensus).</p> <p><b>Conceptual framework:</b> Self-Efficacy Theory (Bandura, 1997) &amp; Transtheoretical Model (Prochaska et al., 1994)</p> <p><b>Expert consensus:</b> (see “Literature review” re: CDA Guidelines)</p> <p><b>Field testing:</b> Previously investigated toolkit re: diabetes educator confidence in providing physical activity counselling and perceived patient knowledge (Shields et al., 2013).</p> <p><b>Evaluation:</b> Demonstrated improved diabetes educator confidence in physical activity counselling and increased perceived patient knowledge and confidence in patients (Shields et al., 2013). Toolkit effect on exercise adherence not yet investigated.</p>	<p><b>Diabetes educators:</b> Overall positive rating of the toolkit and its use (5.8/7). 20% greater confidence in physical activity counselling and prescription. 18% greater confidence in clients. Reduction in barriers of ability and resources in providing activity counselling, but increased prevalence of time as a barrier. Improved self-reported counselling efficacy and knowledge 12 months after resource and training provision. 1/3 of diabetes educators used resource in all of their sessions 12 months after resource and training provision.</p>

(Continued)

Table 2. Continued.

	Toolkit intervention	Adherence interventions	Evidence underlying toolkit development	Toolkit use & satisfaction
Nahm et al. 2019 [34] CaS-PET – Cancer Survivorship Patient Engagement Toolkit	<p><b>Chronic condition:</b> Cancer.</p> <p><b>Toolkit target:</b> Healthcare consumers.</p> <p><b>Toolkit contents:</b> Survivorship Care Plan (SCP), bi-weekly healthcare team follow up <i>via</i> patient portal e-messages, Well Beyond Cancer (WBC) online learning modules (introduction to survivorship, nutrition, exercise, cancer and relationships, fear and mental health, stress management using mindfulness) including videos, discussion forums, virtual libraries.</p> <p><b>Duration:</b> 12 weeks</p>	<p><b>Adherence resources:</b> Education module re: exercise</p> <p><b>Additional adherence intervention:</b> Nil</p>	<p><b>Process:</b> Nil specified.</p> <p><b>Literature review:</b> Nil specified.</p> <p><b>Conceptual framework:</b> Conceptual quality-of-life model for cancer survivors (Mayer &amp; Earp, 2017).</p> <p><b>Expert consensus:</b> Nil specified.</p> <p><b>Field testing:</b> Current study is pilot RCT of toolkit.</p> <p><b>Evaluation:</b> No evidence of toolkit evaluation prior to current study.</p>	<p><b>Module and discussion board use:</b> 19/27 participants completed all modules. 7/27 completed less than 50%. Usage of each module ranged from 60-80%. Most frequently used modules were “transition to survivorship” (80%) and “nutrition” (70%)</p> <p>Site Usability Questionnaire showed that program was user-friendly.</p> <p><b>Perceived usefulness of SCPs and WBC:</b> 22/31 participants found the SCP helpful. 11/20 respondents commented that the SCP provided helpful information on treatment and future plans. 6/20 respondents commented that SCPs helped them to stay healthy. 17/20 respondents had no further suggestions. Overall, participants reported WBC helped them to better manage their health with focus on helpful information, videos, online access, learning from others.</p>
Rich-Edwards et al. 2019[35] <i>unnamed toolkit</i>	<p><b>Chronic condition:</b> Cardiovascular disease risk (secondary to preeclampsia).</p> <p><b>Toolkit target:</b> Healthcare consumers.</p> <p><b>Toolkit contents:</b> Meal plans, recipes, exercise videos.</p> <p><b>Duration:</b> 9 months</p>	<p><b>Adherence resources:</b> Nil in toolkit</p> <p><b>Additional adherence intervention:</b> Lifestyle program website access including education module re: increasing physical activity &amp; identifying promoters and barriers to adopting a healthy lifestyle. Personalised lifestyle coaching (phone calls, email)</p>	<p><b>Process:</b> Nil specified.</p> <p><b>Literature review:</b> Nil specified.</p> <p><b>Conceptual framework:</b> Nil specified.</p> <p><b>Expert consensus:</b> Nil specified.</p> <p><b>Field testing:</b> Nil specified.</p> <p><b>Evaluation:</b> Nil specified.</p>	<p><b>Online resource uptake:</b> 99% of intervention participants accessed website (significantly different to control arm, 67%).</p>
Sheppard et al. 2016 [36] Stepping STONE (survivors taking on nutrition and exercise)	<p><b>Chronic condition:</b> Breast cancer.</p> <p><b>Toolkit target:</b> Healthcare consumers, healthcare professionals (nutritionist, exercise physiologist, survivor coach).</p> <p><b>Toolkit contents:</b> Survivor toolkit: personalised implementation plan (goals, targets), pedometer, session notebook, recipes, resources. Interventionist toolkit: implementation manual, baseline parameters, contact forms, food and fat models, study protocol.</p> <p><b>Duration:</b> 12 weeks</p>	<p><b>Adherence resources:</b> Consumers: personalised exercise plan with goals/targets, pedometer</p> <p>Healthcare professionals: implementation manual</p> <p><b>Additional adherence intervention:</b> Once fortnightly (6x) 30 min supervised exercise and 60 mins education session. 6x Individualised telephone coaching sessions (including motivation for PA, progression, overcoming barriers to PA)</p>	<p><b>Process:</b> Nil specified.</p> <p><b>Literature review:</b> No process of review documented. Referenced systematic review of behavioural interventions using cultural adaptation strategies to improve diet and weight loss in African American women (Kong et al. 2014).</p> <p><b>Conceptual framework:</b> Theory of Planned Behaviour &amp; Social Cognitive Theory.</p> <p><b>Expert consensus:</b> Nil specified.</p> <p><b>Field testing:</b> Pilot RCT of toolkit.</p> <p><b>Evaluation:</b> No evidence of toolkit evaluation prior to current study.</p>	<p><b>Intervention (toolkit) satisfaction:</b> Participants reported high satisfaction with intervention. Positive review of interventionist performance and skills.</p>

PA: physical activity; RCT: randomised controlled trial.

Table 3. WHO features of included toolkits.

Study authors	Information on adherence	Clinically useful way of using information	Behavioural tools for creating/maintaining habits. Strategies to enhance behaviour change.
<b>Adams, 2007</b> [32]	<ul style="list-style-type: none"> <li>Evidence for benefits of exercise, barriers to exercise and motivation for self-efficacy.</li> <li>Prioritised adherence to evidence-based guidelines for care.</li> </ul>	<ul style="list-style-type: none"> <li>Earning activity “points” and recording in diary.</li> <li>Goal setting.</li> <li>Flexibility in physical activity based on personal preferences and abilities.</li> <li>Pedometer.</li> </ul>	<ul style="list-style-type: none"> <li>Principles of Social Cognitive Theory as related to self-efficacy. Key factors included: vicarious experience (video-tape), verbal persuasion (education), physiologic feedback (RPE monitoring) and performance attainment (tolerance of increasing activity, pedometer).</li> </ul>
<b>Fowles et al., 2014</b> [33]	<ul style="list-style-type: none"> <li>Definitions of activity and exercise.</li> <li>Relevance in diabetes care.</li> <li>Benefits of activity, barriers to activity.</li> <li>Role of diabetes educator.</li> </ul>	<ul style="list-style-type: none"> <li>Screening tools for activity.</li> <li>Assessing readiness for activity.</li> <li>Guidelines for physical activity.</li> <li>Collaborative counselling approach.</li> </ul>	<ul style="list-style-type: none"> <li>Long term strategies for maintenance.</li> <li>Worksheets (goal setting, stages of change, exercise recording sheet, etc).</li> <li>Educational brochures</li> </ul>
<b>Nahm et al., 2019</b> [34]	<ul style="list-style-type: none"> <li>Not specified (information on exercise, benefits and guidelines to follow).</li> </ul>	<ul style="list-style-type: none"> <li>Use of IPAQ-SF to monitor change in levels of physical activity</li> </ul>	<ul style="list-style-type: none"> <li>Not specified.</li> </ul>
<b>Rich-Edwards et al., 2019</b> [35]	<ul style="list-style-type: none"> <li>Not specified for “toolbox”</li> </ul>	<ul style="list-style-type: none"> <li>No assessment tools or strategies included in “toolbox”</li> </ul>	<ul style="list-style-type: none"> <li>Not specified</li> </ul>
<b>Sheppard et al., 2016</b> [36]	<ul style="list-style-type: none"> <li>Content guided by Theory of Planned Behaviour (TPB) and Social Cognitive Theory (SCT).</li> <li>Perceived control to make lifestyle changes, improving self-efficacy, goal setting, attitudes to exercise, role-modelling behaviours, addressing ambivalence, addressing environmental influences on behaviour)</li> </ul>	<ul style="list-style-type: none"> <li>Targeted toward black survivors using culturally appropriate adaptation strategies (relevant themes and content)</li> <li>Materials included specified difference in risk for black survivors.</li> <li>Tailored sessions related to intentions, attitudes and participant norms.</li> </ul>	<ul style="list-style-type: none"> <li>Development of actionable steps.</li> <li>Strategies for maintaining behaviours (creating a support system), coaching with MI.</li> </ul>

RPE: Rating of Perceived Exertion; IPAQ-SF: International Physical Activity Questionnaire – Short Form; MI: motivational interviewing.

Of the five toolkits identified in this review, three included all three features recommended by the WHO [32,33,36]; however, adherence was not the primary focus of each toolkit. Information on adherence included benefits of physical activity, barriers, and facilitators to exercise and managing motivation. Clinically useful ways of using information included activity recording, goal setting, assessment of readiness for activity and an individualised approach, and behavioural tools included multiple methods of information.

Regarding the secondary study aim of toolkit effectiveness, three toolkits showed a trend towards toolkit intervention improving physical activity [32,34,36] and one study demonstrated a significant decrease in physical inactivity [35]. Small sample sizes and low participant retention limited reporting of significance. Based on the findings of this review, a superior toolkit design could not be identified.

The WHO recommendations for toolkit content are further supported by an international multidisciplinary survey investigating key toolkit features to aid exercise delivery for people with osteoarthritis, with recommendations including different ways of delivering information, resources on how to perform and progress exercises, tools to support motivation and track progress, resources to guide individuals with accessing professional and peer support and to enable tailoring of the program [39]. Multiple studies have highlighted that toolkits should be tailored to the individual [39–41]. As no “ideal” adherence-focused toolkit was identified in this review, health professionals should consider these recommended features and components when developing physical activity programs for people with chronic conditions.

Toolkits in healthcare have previously been investigated for content, uptake, and effectiveness. Barac et al. [25] and Hempel et al. [26] systematically reviewed toolkits for knowledge translation in health and quality improvement in healthcare, respectively. Toolkits across both reviews were aimed predominantly at healthcare professionals and included a range of resources. Most toolkits included written or downloadable material (information sheets, guidelines) with some utilising physical tools (pedometers, peak flow meters). Both reviews highlighted positive outcomes

regarding satisfaction and perceived usefulness, but a lack of evidence to support toolkit content and overall effectiveness.

In order to make recommendations based on this systematic review, and in the absence of a validated critical appraisal checklist for assessing toolkit quality, we chose to explore the methods of development of the included toolkits, as a measure of the rigor or quality of the toolkits. This information will also aid in future work developing toolkits for physical activity adherence in people with chronic conditions. Information regarding the toolkit development process was limited in all included studies. Some studies included reference to existing literature [32,33,36] or expert consensus [33] and use of conceptual frameworks to guide development [32–34,36]. However, a detailed process of literature review, stakeholder engagement or resource development was not reported. Additionally, most toolkits had not been pilot tested prior to these studies. One toolkit had previously been investigated for outcomes, but this was not inclusive of exercise adherence [33].

While this systematic review identified trends towards improving physical activity, reducing physical inactivity and participant satisfaction with toolkit use, a lack of detail regarding the toolkit development process, absence of the use of implementation outcomes and limited participant retention in the studies limit confidence of health professionals in using these toolkits. Robust development of future toolkits is required, involving stakeholder engagement at all stages of development (co-design, content, format) and rigorous testing of key implementation outcomes such as feasibility, acceptability, and sustainability.

### Limitations of this review

Some limitations to this review must be acknowledged. While every effort was made to conduct a thorough search strategy, including both e-databases and the grey literature, it is possible that some relevant studies may have been missed. Ten “chronic conditions” were included, based on the Australian Institute of Health and Welfare [29], therefore, conditions considered “chronic” in other countries may not have been captured and may be an

important avenue for future research. As articles not published in English were excluded, the review may have missed some relevant studies. This review followed PRISMA guidelines, with two reviewers independently screening both titles and abstracts, and then full texts. For the data extraction phase, data extraction was completed by a single reviewer and cross-checked thereafter. It is possible that this method may have introduced bias in the data extraction, however, the cross-checking mitigated this risk.

## Conclusions

There is a lack of current, rigorously developed toolkits that focus on promoting adherence to physical activity in people with chronic conditions. Five toolkits were identified in this systematic review, three of which incorporated all of the features recommended by the WHO. Whilst no adherence-focused toolkit currently exists in the literature, health professionals should consider resources that incorporate the features recommended by the WHO when developing physical activity programs for people with chronic conditions. There is, however, a clear need for the robust development and testing of toolkits for health professionals to promote physical activity adherence for people with chronic conditions. As adherence has been identified as a key factor influencing health outcomes, and physical activity is considered a first line treatment in people with chronic conditions, further research is needed to develop toolkits that target adherence to physical activity recommendations.

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## Appendix 1. Search strategy

Ovid Medline <https://salus.idm.oclc.org/login?url=http://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=N&PAGE=main&SHAREDSEARCHID=2mJjXXkqKIUY2YvSaX8GXC88KcPA3ilvVPkFjFC4v2noTrr7YXbmJKDKx17lrq9KI>

Database(s): **Ovid MEDLINE® and Epub Ahead of Print, In-Process, In-Data-Review & Other Non- Indexed Citations and Daily**  
1946 to September 02, 2022

Search Strategy:

#	Searches	Results
1	Patient Compliance/ and (exp exercise/ or Exercise Therapy/ or Exercise Movement Techniques/)	3621
2	((exercis* or physical activit* or physiother* or physical therap*) adj5 (adher* or nonadher* or complian* or noncomplian* or concordan* or cooperat* or "co- operat*" or uncooperat* or "unco-operat*" or engag* or disengag* or attend* or uptake or participat* or maintenance or motivat* or sustain*)).ti,ab,kf.	34593
3	or/1-2	36740
4	resource*.ti,ab,kf.	435446
5	tool*.ti,ab,kf.	904948
6	instrument*.ti,ab,kf.	334354
7	teaching materials/	6541
8	teach*.ti,ab,kf.	221829
9	Patient Education Handout.pt.	5556
10	pamphlets/	4084
11	pamphlet*.ti,ab,kf.	2297
12	booklet*.ti,ab,kf.	4155
13	"Patient Education as Topic"/	88124
14	education*.ti,ab,kf.	683768
15	exp *technology/	224792
16	technolog*.ti,kf.	119326
17	digital*.ti,kf.	68501
18	mHealth.ti,kf.	6514
19	eHealth.ti,kf.	4816
20	smartphone/	8170
21	smartphone*.ti,ab,kf.	19865
22	mobile phone*.ti,ab,kf.	12592
23	mobile application/	10490
24	mobile app*.ti,ab,kf.	8592
25	or/4-24	2714318
26	exp chronic disease/	598978
27	chronic disease*.ti,ab,kf.	81264
28	(chronic* adj2 (condition* or ill*)).ti,ab,kf.	69930
29	cardiovascular diseases/	169770
30	heart diseases/	73361
31	exp Coronary Disease/	231928
32	((coronary or heart or cardiac) adj3 (disease* or fail*)).ti,ab,kf.	523926
33	exp Pulmonary Disease, Chronic Obstructive/	64312
34	(chronic obstructive adj2 (pulmonary or lung*)).ti,ab,kf.	62261
35	COPD.ti,ab,kf.	55287
36	exp Diabetes Mellitus/	486968
37	diabet*.ti,ab,kf.	738555
38	exp stroke/	163013
39	(stroke or poststroke).ti,ab,kf.	291694
40	cerebrovascula*.ti,ab,kf.	67333
41	cerebral vascula*.ti,ab,kf.	8372
42	exp Neoplasms/	3730241
43	neoplasm*.ti,ab,kf.	301604
44	cancer*.ti,ab,kf.	2127918
45	malignan*.ti,ab,kf.	655096
46	exp Arthritis/	287036
47	arthriti*.ti,ab,kf.	206827
48	Osteoarthritis*.ti,ab,kf.	83206
49	exp osteoporosis/	61074
50	osteoporosis.ti,ab,kf.	79541
51	exp Back Pain/	43554
52	back pain.ti,ab,kf.	55885
53	exp Renal Insufficiency, Chronic/	129860
54	((renal or kidney) adj2 (disease* or insufficien*)).ti,ab,kf.	192856
55	exp Mental Disorders/	1389286
56	((mental* or psychiatric) adj3 (disorder* or ill* or health)).ti,ab,kf.	332209
57	((anxiety or depressive or mood or dissociative or affective or personality or neurotic or substance or stress or trauma* or obsessive or compulsive or panic or dysthym*) adj3 (disorder* or illness or disease*)).ti,ab,kf.	237291
58	bipolar.ti,ab,kf.	71163
59	schizophren*.ti,ab,kf.	139054
60	exp Musculoskeletal Diseases/	1179805
61	(musculoskeletal adj2 (disease* or disorder* or condition*)).ti,ab,kf.	16261
62	or/26-61	9270454
63	and/3,25,62	3928
64	limit 63 to ed = 20211101-20220906	295

**Appendix 2. Example from Godinho et al 2021**

Data extraction form fields and description	
Toolkit	What is the toolkit called?
Year	In which year was the toolkit published?
Organisation(s)	Which organisation developed the toolkit?
Summary (rationale and scope)	A brief summary of the toolkit's rationale, purpose, aim/scope and tools/components, if described
Purpose: Implementation	Is the toolkit intended for use in implementation?
Purpose: Evaluation	Is the toolkit intended for use in evaluation?
Target user group	Who are the target user group, as specified by the toolkit itself?
Toolkit development overview	Description of the stages and processes involved in toolkit development
Reported process	Did the toolkit report its development process?
Literature review	Did the development process include a literature review or evidence synthesis?
Conceptual framework	Did the development process include a conceptual framework?
Expert consensus	Did the development process include expert consensus?
Field testing	Did the development process include field testing?
Evaluation	Was the toolkit evaluated?
Organisational level	Which organisational level does the toolkit address? (ie, national health system level, health facility level, or operational/staff/user level?)