Review

The effect of goal setting in asthma self-management education: A systematic review

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ABSTRACT

Background: Asthma self-management education combining with behavior therapy is considered to be more effective. Goal setting is a common behavior change technique used to help patients self-manage their symptoms. However, empirical evidence around its effectiveness on asthma management lacks clarity.
Aims: To systematically integrate and appraise the evidence for effectiveness of goal setting interventions on asthma outcomes.
Methods: Databases included CENTRAL, PubMed, EMBASE, CINAHL and Proquest Psychology Database were systematically searched for relevant intervention studies employing goal setting technique as a method in asthma education program for self-management. Characteristic of studies and outcomes in clinical, psychosocial and healthcare utilization outcome were extracted.
Results: From a total of 2641 citations, 45 full-text articles were assessed for eligibility and 9 studies met the inclusion criteria. Eight studies were randomized controlled trial and one was before-after study. None studies have a high methodological quality. Goal-setting based intervention appeared to improve symptom control, quality of life and self-efficacy in adult patients with asthma.
Conclusion: This systematic review highlighted the potential of a goal setting technique in the asthma self-management education. However, due to the limitations of the quality and quantity of the included literature, more rigorous studies are needed. In the future, better effective study protocol combining with goal setting approach and other behavior technique is needed to further investigate.

What is known?

- Goal setting has been implemented into interventions for behavior change in various areas for many years.
- Goal setting is believed to help patient develop good behavior by setting personal goals and designing specific action plan for goal achievement.
- A growing number of literature have explored the use of goal setting in asthma self-management, but results vary.

What is new?

- While studies present mixed results, there is more evidence to suggest positive effect of goal setting self-management support interventions on asthma control, quality of life and self-efficacy in adult patients than for negative effect.
- Evidence is insufficient for the effectiveness of goal setting self-management in improving healthcare utilization and emotional health. But its value on children participant is still unclear. Further studies which include economic and psychology analyses, specializing in children participants are required for definitive conclusions on the effects of goal setting self-management education programs.
- It is suggested to combine goal setting technique with other behavior change interventions, such as motive interviewing, empowering to improve the results of studies in further studies.

1. Introduction

Asthma, a common chronic respiratory disease, affects approximately 300 million people at all ages around the world [1]. Recurring symptoms and exacerbations of asthma potentially

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impair physical and psychological health of individuals and their family [2], resulting in direct or indirect financial costs [3] and even unnecessary deaths [4]. The goal of asthma treatment is for optimal asthma control, which could be achieved through combined efforts in pharmacologic therapy and asthma self-management. Educational program for self-management is considered to be an important part of routine care of asthma [5]. Although evidence indicated that self-management education has resulted in improved quality of life and reduced healthcare utilization, days absent from work or school, and nocturnal asthma [6], adherence to self-management in daily life remains poorly [7,8]. One reason for failing to prepare patients for chronic disease management is related to the failure to combine human behavioral processes and motivations in conducting educational programs [9]. Therefore, effective behavioral strategies are necessary to enhance the effectiveness of educational interventions for self-management.

Goal setting is an effective behavior change technique and considered to be a fundamental component of successful interventions [10]. It was underpinned by goal setting theory, one of the common motivational theories that developed by Edwin Locke in 1960s [11]. Locke believed goals are future valued outcomes to be viewed as incentives on task performance if they are specific and difficult to achieve [11], and the setting of goals is to bridge the gap between present condition and desirable outcome [12]. In the practice of goal setting, personal goals was identified and a specific action plan designed to motivate and guide toward goal achievement was developed, individuals modified their behaviors through moderators (importance, self-efficacy, task complexity, feedback, satisfaction) and finally achieve their goals [13]. Goal setting therefore be able to regulate individual's behavior and has been used in a wide variety of fields, such as education [14], sport [15], management [16]. In the area of medical health, interventions involving goal setting technique have been widely used for improving health related self-management behavior of patients with long-term conditions [17–19] and was believed to help enhance patient motivating variables, adherence, autonomy, satisfaction, task performance and team work [12,20].

In recent decades, there have been several studies that have explored the use of goal setting in asthma self-management, but results varied. One study indicated that a pharmacist-delivered asthma care program which incorporating goal setting can improve asthma control [21], the other study showed there was no short-term effect on self-management adherence [22]. To our knowledge, no previous review has systemically assessed this body of literature to allow practitioners to evaluate the evidence base of goal setting in asthma management. Consequently, this systematic review aims to investigate the effectiveness of goal setting technique incorporating with asthma self-management education on the outcomes in asthma morbidity, quality of life and healthcare use.

2. Method

2.1. Inclusion and exclusion criteria

Criteria for selecting the studies were as follows: (1) Population. Study subject was asthmatic patient/their caregiver (alone or in combination). As children with asthma may not have enough cognitive level to set a goal and their caregiver may participate in asthma management and play important role in it, therefore they would be enrolled in certain studies; (2) Intervention. Goal-setting techniques used alone or as a component of asthma management education intervention to help patient achieve self-management behaviors so as to promote their health outcome. The goals being set can be behavioral goals or outcome goals, but must be tailored to individual patient through assessment or under discussion; (3) Comparison. Control group used usual care or similar interventions that not contain goal-setting techniques; (4) Outcome. Primary outcome is clinical outcome such as asthma control, lung function and health care use, such as hospitalization, emergency department visit or unscheduled outpatient visit. Secondary outcome is to evaluate psychosocial outcome such as quality of life or self efficacy; (5) Study design. Randomized controlled trials, including parallel RCT and cluster RCT, and quasi experiment study with or without a compared group are included.

Exclusion criteria were as follows: (1) mixed disease samples and did not independently report results on persons with asthma; (2) the goal is not setting for personal patient (e.g. general goal suitable for all individuals); (3) medical treatment effect goals (i.e. goals being attained through medicine use), because its result is not related to asthma management education; (4) cross-sectional, non-intervention studies or conference abstract without sufficient full-text data.

2.2. Search strategy and study selection

We searched five electric databases: CENTRAL, PubMed, EMBASE, CINAHL and Proquest Psychology Database for relevant papers up to February 2019. The search string included the following terms: "asthma" and "goal" and ("education" or "management" or "intervention" or "behavior"). They were searched as MeSH or freeword according to different database. There were no time restrictions but language was restricted to English and Chinese as we don't have resource for translation. The detailed search strategy can be seen in Appendix A.

Citations of all searched studies were imported into reference management software NoteExpress to remove duplicates. Two researchers (YJ Liao and YQ Peng) independently screened studies through reviewing title, abstract and full-text, and excluded papers based on inclusion and exclusion criteria listed above. Disagreement was resolved by discussing with a third reviewer (GZ Gao). The detailed study selection process is summarized in Fig. 1.

2.3. Data extraction and quality assessment

Study data extraction was conducted by one reviewer (YJ Liao) using a structure collection form developed in Microsoft Excel and independently checked by another (YQ Peng). Extraction information include: author, year of publication, country, participants, sample size, interventions of each group, outcome measure and conclusion. Data discrepancies were resolved by consensus.

Joanna Briggs Institute (JBI) critical appraisal checklist for Randomized Controlled Trials and Quasi-Experimental Studies were selected to evaluate the methodological quality of studies based on their study design. JBI Critical appraisal tools were developed by the JBI and collaborators and approved by the JBI Scientific Committee following extensive peer review [23]. RCT checklist included 13 items, evaluating the quality of study through aspects in randomization, blind, material collection, follow-up and so on [24]. Quasi-Experimental Studies checklist included 9 items, focusing on bias in causality of the study variables, baseline, control, measurement of outcome measures, and data analysis [25]. The detail items of these two tools can be seen in Appendix B, the bias of each item can be rated as "yes", "no", "unclear" or "not applicable". The final appraisal of studies would be include, exclude or seek further info if total bias are judged as low or high through reviewers discussion. Two reviewers (YJ Liao) and (YQ Peng) independently scored papers and compared results, and disagreement would be discussed by another researcher (GZ Gao).
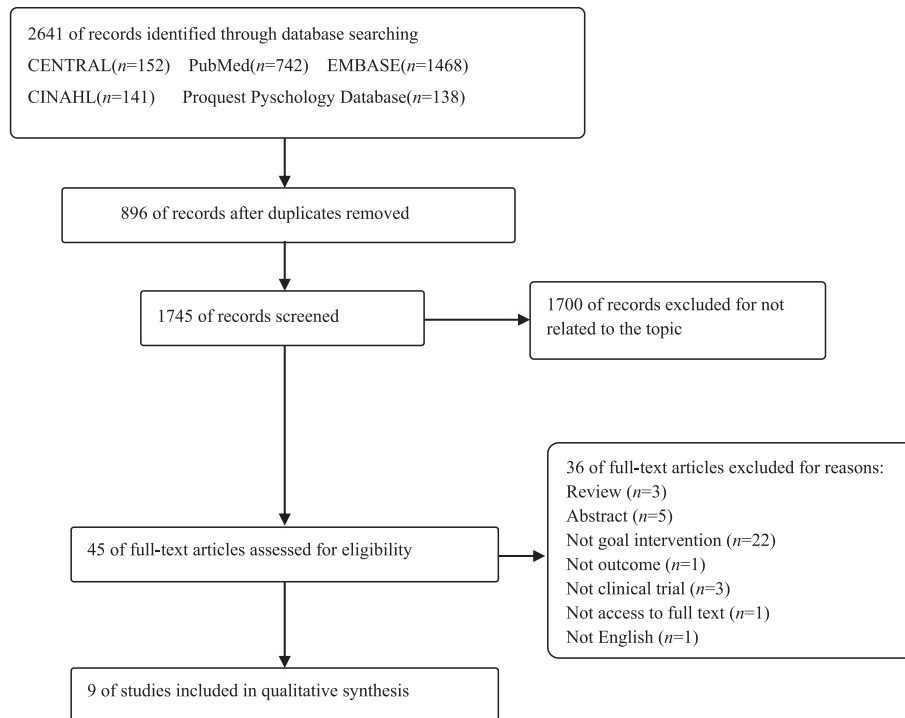
Fig. 1. Study selection flow.

3. Results

3.1. Results of the search

A total of 2641 articles were identified, of which 896 were excluded for duplication. After screening the titles and abstracts, a further 1700 articles were excluded for not relevance to the topic. The full manuscripts of 45 articles were reviewed in detail and 36 excluded for not related to our study population, intervention and outcome. Finally, 9 studies were eligible for systematic review [21,22,26–32]. The detailed selection process was shown in Fig. 1. In the process of screening, we also downloaded appendix and already published study protocol as supplement materials for further reviewing. Thus, 4 study protocol articles [33–36] and 2 appendix file were found as supplement materials.

3.2. Study characteristics

The study design of reviewed studies included 4 parallel RCT [22,29–31], 4 cluster RCT [21,26–28]and 1 before-after study [32]. Two of eight RCT studies were pilot study and one used mixed methods that have qualitative and quantitative results [27,30]. Country distribution of these studies is USA ($n=4$) [29–32], Australia ($n=2$) [21,26], UK ($n=1$) [27], Dutch ($n=1$) [28] and Switzerland ($n=1$) [22]. A total of 1325 patients were enrolled in all studies, of which 33 were the least [28] and 422 were the most [30]. Of the enrolling studies, 5 were conducted with adults aged 18 year and older[21, 22, 26, 27, 30], 1 with older adults aged 65 year and older [29], and 3 examined children with different age span (6-11Y, 8-13Y, grade 1–12) [28,31,32]. One study only examined African American women[30], the rest of the studies were of no restrictions for ethnics or gender, but one study [31] didn't provide any baseline data on age and gender. Details of the study characteristics about participants, intervention content, outcome measure and results would be listed in Table 1.

3.3. Goal identification and selection

Before setting goals, manners in which helping patients to identify and select their personalized goals vary in studies. Goals in two studies [31,32] were constructed previously that can be selected after initial assessment. One of these two studies established a case management protocol that concluded goals in 6 categories: safe school environment, symptom management, self-care, academic success, family/peer relationships and health care coordination [32]. Another study developed a Home Based Family Intervention (HBFI) manual that consists of 16 modules on asthma management and psychosocial issues, goals based on which could be chosen [31]. The rest of studies reported goal identification was based on assessment on patients' problem, challenge and barriers or self-observation during asthma management. Three studies [26–28]also provided tools for patients to identified their self-management goal. They are Participant Workbook, GOAL-elicitation tool and internet-based Pelican instrument, which could be used to write down the priority of goals or concerns patients wanted to achieved or solved. Six studies reported that patients or family selected goals through guide from educators [21,26–31], one study by discussed in small groups [22] and one was chosen by nurse, in which participants are school children [32]. However, one study didn't describe the process of goal selection [21].

3.4. Goal setting method in intervention

The proportion of goal setting as a component of the whole intervention varies in studies. Goal setting and review outcome goals were reported as a small part of a larger intervention in one study [21]. Other 8 studies using goal setting as a major component of their intervention, incorporating behavior theory and other problem solving skills, such as problem identification, personal resource activation, action planning, process evaluation and

Table 1
Extract data for studies.

First author Year of publication Country	Study design	Setting and provider	Participant	Experimental group intervention	Control group intervention	Outcome measures	Results
Smith et al., 2007 [26] Australia	Cluster RCT	21 community pharmacy settings Provider: pharmacists	109 adults with asthma Age (I/C): 51.42 ± 18.38/ 54.45 ± 20.13 Gender (I/C): 53.3% female/ 66.7% female No difference at baseline	$n = 46$ Provide support for problem identification, goal setting and strategy development, each visit provide ongoing assessment and feedback by reviewing set goals and strategies Session: 6 visits Dosage: first 45 min min s s, follow up 20 min Duration: 9 months	$n = 63$ Usual care with 3 visits (each about 10 min)	Measure time point: baseline, 4 and 9 months after baseline visit Measurement: Asthma Control Questionnaire (ACQ), The Medication Adherence Report Scale (MARS), The Asthma Self-Efficacy Questionnaire (KASE-AQ), Asthma Quality of Life Questionnaire (AQLQ), The Depression, Anxiety, Stress Scales (DASS)	Significant improvement in asthma quality of life and self-efficacy over time in intervention group Improvement of other indicators from baseline to final without significant difference between two groups
Hoskins et al., 2016 [27] Scotland	Pilot cluster RCT	10 primary care practices Provider: practice asthma nurses	48 adults with active asthma Age (I/C): 60.4 ± 18.01/ 54.0 ± 13.39 Gender (I/C): 50% female/60% female Baseline unclear	$n = 18$ GOAL-elicitation tool was provided to participants to write down their prioritized goals and difficulties, an individualized action plan based on selected goals was then negotiated and agreed on with the practice nurse during review meeting Session: not list Duation: not list	$n = 30$ Standard asthma review	Measure time point: baseline, 3 and 6 months after baseline Measurement: mini Asthma-related Quality-of-Life Questionnaire (mAQLQ), Asthma Control Questionnaire (ACQ), health services resource use data, patient self-efficacy (Patient Enablement Instrument), cost effectiveness (EQ-5D-3L)	No difference in quality of life between two groups
Armour et al., 2007 [21] Australia	Cluster RCT	50 community pharmacy settings Provider: pharmacists	396 adults with active asthma Age (I/C): 47.5 ± 17.1/ 50.4 ± 16.1 Gender (I/C): 67.5% female/ 60.5% female	$n = 191$ Provide ongoing cycle of assessment and management based on asthma care program including goal setting and review Section: 4 visits Duration: 6 months	$n = 205$ Usual care	Measure time point: baseline visit, final visit at 6 month later Measurement: Asthma severity/control (asthma severity assessment table), Lung function (FEV1%, FEV1/FVC%), Inhaler technique (Inhaler technique checklist), Adherence (Brief Medication Questionnaire), Asthma-related quality of life questionnaire (AQLQ), Perceived control of asthma questionnaire (PCAQ), Consumer asthma knowledge questionnaire (CQ)	Significant decrease of proportion of patients with severe asthma, increase of adherent to preventer medications and decrease in the mean daily dose of the reliever medication salbutamol in the intervention group Improved AQLQ, PCAQ, CQ scores in the intervention group No significant changes in spirometric parameters
van Bragt et al., 2014 [28] Dutch	Cluster RCT	9 general practices Provider: nurses	33 children with asthma Age (I/C): $8.4 \pm 1.7/8.7 \pm 1.7$ Gender (I/C): 33.3% female/ 42.9% female	$n = 15$ 6 steps individual self-management intervention: select problem; discuss problem details; formulate treatment goal; brainstorm on solutions; document solutions; repeated above	$n = 18$ Enhanced usual care	Measure time point: Baseline; 9 months later Measurement: Pediatric Asthma-related Quality of Life Questionnaire-standardized (PAQLQ-s), Child-Asthma Control Test	Score of PAQLQ-s, C-ACT, ACQ6, SDQ improved but no significant diference between two groups

Table 1 (*continued*)

First author Year of publication Country	Study design	Setting and provider	Participant	Experimental group intervention	Control group intervention	Outcome measures	Results
				steps if treatment goal not achieved Section: 4 visits Duration: 9 months		(C-ACT), Asthma Control Questionnaire 6 (ACQ6), Strengths and Difficulties Questionnaire (SDQ)	
Baptist et al., 2013 [29] USA	RCT	Outpatient Provider: health educators	70 adults with asthma Age (I/C): 72.8 ± 5.6/73.8 ± 6.9 Gender (I/C): 67.6% female/ 86.1% female	n = 34 Session 1:Problem selection and routine research Session 2: Identification of self-management goal and discussion of rewards Session 3–5: Tailored problem solving and self-regulation, asthma action plan generation, additional asthma education Session 6: Tying it all together and plans for the future Session: 6 Duration: 6 weeks	n = 36 Standard asthma education; allergist address inquires	Measure time point: baseline visit, 1, 6, 12 month after first visit Measurement: mini Asthma-related Quality-of-Life Questionnaire (mAQLQ), Asthma Control Questionnaire (ACQ), Healthcare utilization (ED visit, hospitalizations, unscheduled visit, healthcare utilization), Lung function (FENO, FEV1%)	A significant improvement of asthma control, quality of life, andhealthcare utilization, particularly unscheduled office visits for asthma in intervention group No difference in lung function.
Steurer-Stey et al., 2015 [22] Switzerland	RCT	Outpatient clinic and emergency room Provider: asthma trainers	61 adults with partially controlled asthma Age (I/C): 43.2 ± 14.9/ 33.7 ± 10.0 Gender (I/C): 55% female/63% female	n = 30 Patient education + ZRM ZRM including 5 phases training to develop action-oriented personal goals and activate resources to achieve and practice them in daily life in main and refresher session Session: 3 Duration: 3 months	n = 31 Patient education	Measure time point: baseline visit, 3 months after baseline visit. Measurement: adherence to self-monitoring (registered their symptoms and/or peak-flow at least once per day on 51 of the 90 days), adherence to the individualized action plan (80% of actions taken by patients to adjust their medication were correct according to the action plan), self-efficacy (General Perceived Self-Efficacy Scale), self-regulation (Volitional Components Inventory)	Better Self-efficacy in the intervention group No difference in self-regulation, self-monitoring and adherence to action plan between two groups
Patel et al., 2017 [30] USA	Pilot RCT	Telephone Provider: health educators	422 woman with asthma Age (I/C): 42.01 ± 14.76/ 43.35 ± 15.23	n = 212 Problem identification, self-observation, goal setting, evaluation of progress, and establishing rewards for positive behavioral change Session: 6 telephone counseling sessions (30 −45 min, 2 weeks apart) Duration: 6 months	n = 210 Usual care	Measure time point: baseline, 12 and 24 months after baseline Measurement: Asthma Control Test (ACT), mini Asthma-related Quality-of-Life Questionnaire (mAQLQ), Health care use (ED visits, hospitalizations, scheduled office visits, urgent office visits, follow-up visits after an asthma attack), self-regulation (Zimmerman scale)	Significant improved daytime symptoms, asthma control quality of life, health care use including unscheduled physician visits, scheduled physician visits, self-regulation in the intervention group No difference in night time symptoms, health care use including ED visit, hospitalization, self-confidence between two groups

Author	Design	Setting/Provider	Participants	Intervention (I/C)	Measurement	Outcomes
Celano et al., 2012 [31] USA	RCT	Home Provider: asthma counselors, a postdoctoral fellow in psychology, and a respiratory therapist	43 family with a child resident in urban countries with poorly controlled asthma Age and gender not provided	n = 23 16 modules of asthma management were developed First visit to discuss the specific asthma management challenges, choose 3 to 4 goals; subsequent visit to implement the prepared modules matching the family's goals Session: 4–6 visits Duration: 4 months / n = 20 The Enhanced Treatment as Usual (ETAU): one home visit from an Asthma Counselor, provided trigger control resources, provided feedback on the child's lung functioning and inhaler technique, and implemented the Developing a Written Asthma Action Plan module.	Measure time point: baseline visit, 4 months after baseline, after 6-month follow up Measurement: the Family Asthma Management System Scale (FAMSS), metered dose inhaler checklist (MIDC), asthma morbidity (the number of school days missed, asthma symptom days, and urgent health care visits)	No difference in asthma management, health care use and caregiver stress between two groups.
Engelke et al., 2014 [32] USA	Before-after study	24 schools Provider: school nurses	143 students in Grades 1–12 with new diagnosis or unstable asthma Age: 70.6% in grade 1–5, 21.0% in grade 6–8, 8.4% in grade 9-12 Gender: 49.7% female	School nurse chose individual goals for each student after the initial assessment and provided interventions to the student to meet the goals during school year Session: not list Duration: not list	NA / Measure time point: baseline, at the end of case management Measurement: quality of life (PedsQL 3.0 SF22 Asthma Module Instrument), academic performance (grade point average, GPA)	Significant lower proportion of children reporting symptom and treatment problems at the end of the program compared to baseline. There is a correlation between goal achievement and GPA improvement.

Note: RCT, randomized control trial; I/C, intervention group/control group; FEV 1, forced expiratory volume in 1 s; FVC, forced vital capacity; NAC, National Asthma Council; FENO, fractional exhaled nitric oxide; ED, emergency department.

reward. Seven studies reported tailored strategies would be developed for goal achievement [22,26–30,32] and two studies reported the set goals and strategies would be repeated assessed [26,28]. No study used goal setting as solely intervention. Interventions were delivered in varying formats, including in person visit [21,26–28,31,32], group-based training [22], telephone-based [30], and group counseling combined with telephone follow-up [29]. The duration of study intervention range from 6 weeks to 9 month, in which the number of sessions range 3–6 among seven studies. Only two studies [26,30] stated the length of time in each session, one lasted 45 min at the first session and 20 min at the follow up session, the other lasted 30–45 min and apart 2 weeks for each telephone counseling session. Two studies [27,32] didn't provide any information on the length of time for their intervention.

3.5. Outcomes

3.5.1. Process outcome of goal setting

Only three studies reported process results of goal setting. One study [26] showed that each participant had an average of four new goals and a further six repeated goals. Most commonly used goal is related to asthma triggers, the second is asthma control, and the third is medications. The other study [21] reported every participant set a mean 3 ± 2 goals during the study, and fifty of 165 patients reported that they had achieved all of their goals. Most commonly used goals in this study is related to medications, second is exercise tolerance, third is asthma control. The third study [32] founded that knows asthma triggers, demonstrates age appropriate knowledge of medications, self-administers/receives inhaled medication, tries to avoid asthma triggers are commonly used goals for setting.

3.5.2. Clinical outcome

Asthma control results were measured in 5 studies, but reported in 4 studies, in which Asthma Control Questionnaire ($n = 4$) and Asthma Control Test ($n = 2$) was as measurements. As for the results of ACQ and ACT, one study reported improvement from baseline to end point in both groups [26], one study cannot make a conclusion as underpowered analysis [28], and 2 studies reported a significant difference between intervention group and control group [29,30]. Of this two study, one showed that the improvement of ACQ score in intervention group was seen at 1 and 6 months, but lost at 12 months [29], and another reported the significance of ACT score maintained at 24-month follow-up [30].

Other clinical outcomes including: pulmonary function test ($n = 2$) and asthma severity assessment ($n = 1$). One study demonstrated there were no significant changes in lung function parameters over the 6-month course of the study in either percentage predicted $FEV_1\%$ or $FEV_1/FVC\%$ [21]. The other study also found there was no difference in FENO and $FEV_1\%$ at 6 and 12 month follow-up [29]. Asthma severity assessment was a self-developed tool to classify patients as "mild", "moderate", "severe" based on the self-reported frequency of parameters such as asthma-related symptoms. The study showed that patients change from the "severe" category to the "not severe" category ("moderate" or "mild") in the intervention group were almost three times more likely to than patients in the control group [21].

3.5.3. Psychosocial outcome

Seven studies reported psychosocial outcomes. Most commonly assessed were asthma quality of life ($n = 7$) and self-efficacy (n = 2). Two of seven studies assessed quality of life using Asthma Quality of Life Questionnaire (AQLQ), three used mini AQLQ, and two studies with children used Pediatric Asthma Quality of Life

Questionnaire (PAQLQ) and PedsQL 3.0 SF22 Asthma Module Instrument. 7 studies measured asthma related quality of life, of which 5 studies [21,26,27,29,30] (Smith 2007, Hoskins2016, Armour 2007, Patel 2017, Baptist 2013) showed the overall quality of life score, only two studies [28,32] (van Bragt2014, Engelke2014) displayed overall and sub-scales scores for QoL. According to total scores of QoL, 5 in 7 studies reported a significant effect of the intervention on quality of life [21,26,29,30,32], and the effect even continued at 24-month follow-up assessment in one study [26], while 2 studies reported no difference between two groups [27,28]. As for subscales of QoL, domains in symptoms and treatment problems were significant in experiment group compared to control group in Engelke 2014 [32]. Sub domains of symptoms in QoL was also positive even though there was not significant in overall scores between two groups in van Bragt 2014 [28]. Participants' self-efficacy was significantly improved in intervention group at each follow-up time point in two studies [22,26], which was considered to help with self-management. A study also assessed the effect of intervention on depression and anxiety, but found no difference [26].

3.5.4. Healthcare utilization outcome

Healthcare utilization such as emergency department (ED) visit, hospitalization, unscheduled visit was assessed in 3 studies. One study found that the number of subjects who require ED visit didn't significantly reduced in intervention group, however, the healthcare utilization (combining the number of hospitalization, ED visit and unscheduled visit) was significantly lower in intervention group at 6-month and 12-month follow-up [29]. The second study demonstrated that ED visits, hospitalization and unscheduled physician visit is not significant between intervention group and control group at 24-month follow-up assessment, but the number of scheduled physician visit is significant higher in intervention group[30]. The third study revealed that there was no significant differences for number of ED visits, but there was a significant group difference for number of hospitalizations at one year after post intervention [31].

4. Methodological quality of included studies

Seven studies were randomized controlled trials, thus JBI critical appraisal checklist for RCT was used, but 4 of them were cluster RCT, which not applicable to the item allocation concealment. One studies was assessed by JBI critical appraisal checklist for Quasi-Experimental Studies, cause it's a before-after study. Appendix B details the methodological quality of all studies. Four studies [22,27,28,30] used minimization and randomization list generated by statistical software to reduce selection bias, which is low in bias, two studies [26,29] stated using randomization number generator and one study [31] using block randomization but not in details, so their selection bias is unclear. A cluster RCT Study [26] set intervention and control community according to their location in north or south, which would be in high degree of bias. Except one study [22] stated using central telephone service to achieved adequate concealment, other three were unclear about their allocation method. Only one study [21] blinded to participants, intervention delivers and outcome assessors, all other studies cannot reached treatment blinding, because delivers have to know the intervention content. Four studies [21,29–31] were blinded to collect measures. All studies have reported the amount of participants being lost, and six studies [21,22,27,28,30,31] described the reason, but three studies [21,27,30] used intention-to-treat (ITT) to handle attrition in the analysis.

5. Discussion

We may draw a conclusion that goal-setting based intervention appeared to improve symptom control, quality of life and self-efficacy in adult patients, but the effectiveness on lung function and healthcare utilization is unclear.

Although only two studies indicated goal setting interventions can help patients acquire asthma control, they have a large sample size, a low selection bias and blind in outcome assessors, and another study also showed that the extent of symptom severity was reduced significantly, their results therefore was considered to be trusted. This finding is consistent with systematic reviews of Fredrix [37] that systematically review articles about goal-setting focused interventions in diabetes self-management and found it appeared to result in reduced HbA1C levels. However, these two studies did not target children, so it is not clear whether goal setting intervention is beneficial to childhood asthma control. In regards to pulmonary function, we were unable to make a strong conclusions about the direction of effect could be drawn from these finding due to only two studies reporting pulmonary function parameters.

Given the less number of studies showing subscales of QoL, we cannot tell goal-setting can especially improve which subscale, but the improvement of total QoL still can be drawn. 5 studies (4 adults and 1 child) found significant increases in quality of life vs. Two studies (1 adults and 1 children) that did not. Because only one before-after study indicated the intervention effect on school students, thus it's difficult to tell goal setting intervention has a positive effect on children. We tend to believe goal setting intervention more effective in adult patients than in children. Quality of life questionnaire of asthma was to measure functional impairments that are most troublesome to patients in daily life [38]. Goal setting techniques typically encourage patients to identify the issues of greatest concern and help patients resolve problems while achieving their goals. Consequently, once the goal is attained, the impairment of daily activities will be reduced. In our review, we can see education programs in eight of nine studies included sessions for problem, challenge or difficulties detection before goal setting. Therefore, problem identification and goal setting technique should be combined in future studies. Asthma self-efficacy has been identified reflects degrees of confidence patients have in their ability to carry out the necessary self-management behaviors (e.g. adhering to medication) required to control asthma symptoms and prevent exacerbations [39,40]. In our review, two studies showed self-efficacy was increased significantly in intervention group of which one found that patients with high self-efficacy achieve better asthma control and quality of life post intervention. The relationship between goal setting and self efficacy is interacted and co-existed. Self-efficacy is a moderator to enhance goal commitment [41], so that goals can be transformed into performance. At the same time, individual's self confidence would be increased once goal attainment. Therefore, we recommend implementing goal setting technique while strengthening confidence for self-management.

We also were unable to draw conclusions around the importance of healthcare utilization, as three studies found no significant difference in ED visit, but two studies found significantly reduce hospitalization.

6. Limitation

Firstly, the limitation of this research is that the number of studies for reviewing is small, all studies have more or less bias in its design, conduct and analysis and various degrees of goal setting component may lead to the outcome difference. Therefore, the

results of this review must be interpreted with caution. Because of the detailed information, such as session duration, session number and session dose of the intervention was not provided in some of the studies, we are unable to ensure how to implement goal setting module is the most effective. Secondly, although a systematic review have found that goal setting is particularly effective in school children and younger people [10], the number of studies target on this kind of population is small and some of the outcome parameters not provided, leading to the uncertainty of evidence accuracy of these studies. Finally, goal setting theory stated that goal-performance relationship can be influenced by four moderators included goal commitment, feedback, task complexity and satisfaction [13]. Except some studies in our review can see the utilization of feedback, other moderators seemed to be unclear in the course of intervention, therefore the effect of goal setting intervention may be weekend.

7. Conclusion

The aim of this review was to explore the use of goal setting technique within the asthma self-management education program for improving the outcome in physical, psychosocial and healthcare utilization. There appears to be an evidence base to support the effectiveness of goal setting interventions in improving asthma control, quality of life and self-efficacy in adult asthma patients. Therefore, goal setting technique is a promising approach that could be considered into future asthma care nursing. However, considering the modest method quality of the studies and the small number of studies in pediatric patients, more well-designed randomized controlled trials are needed in adults and children with asthma. Goal setting technique in this study was used as primary or secondary intervention to built self-management behaviors, the dosage of goal setting is not clear recorded in all studies, which makes it difficult to determine why some interventions were more successful than others. Future research should design intervention based on goal setting theoretical model that combining moderators in goal commitment, feedback, task complexity and satisfaction. In addition, due to the lack of studies on anxiety, depression, healthcare utilization and other aspects, it is unclear what role goal setting is in psychology or economics. We suggest future studies can add more measurements to these areas when using goal setting.

Conflicts of interest

None.

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Appendices. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2019.04.003.

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