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Developing theory-based asthma self-management interventions for South Asians and African Americans: A systematic review

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Purpose. Intervention development guidelines suggest that behavioural interventions benefit from being theory-based. Minority populations typically benefit less from asthma self-management interventions, and the extent to which appropriate theory has been used for culturally tailored interventions has not been addressed. We aimed to determine theory use and theoretical domains targeted in asthma self-management interventions for South Asian and Black populations.

Methods. We systematically searched electronic databases, research registers, manually searched relevant journals and reference lists of reviews for randomised controlled trials of asthma self-management for South Asian and Black populations, and extracted data using the Theory Coding Scheme to inform if/how theory was used and explore its associations with asthma outcomes, and the Theoretical Domains Framework was used to identify targeted theoretical domains and its relationship to effectiveness of asthma outcomes.

Results. 20 papers (19 trials) were identified; theory was not extensively used in interventions. It was unclear whether theory use or theoretical domains targeted in interventions improved asthma outcomes. South Asian interventions included 'behavioural regulation', while 'reinforcement' was mostly used in African American interventions. 'Knowledge' was central for all populations, though there were differences related to 'environmental context and resources' e.g., language adaptations for South Asians; asthma resources provided for African Americans. Author descriptions of interventions targeting providers were limited.

Conclusions. There was little evidence of theory-based approaches used in cultural interventions for asthma self-management. Demystifying theoretical concepts (and cultural interpretations of constructs) may provide clarity for 'non-experts', enabling mainstream use of theory-driven approaches in intervention development.

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Statements of contribution

What is already known on this subject?

- Compared to White populations, South Asians and African Americans benefit less from existing asthma self-management interventions. Use of culturally appropriate theoretical approaches may be important for developing effective interventions that aim to reduce asthma inequalities, which is highlighted in intervention development guidelines.

What does this study add?

- Theory used to tailor intervention techniques to the needs of South Asians and African Americans was limited and did not include culture-based theories
- Contextual influences on interventions were crucial, for example, resource provisions for African Americans and language appropriate knowledge for South Asians
- Supported self-management may be enhanced by training professionals with appropriate information and skills

Background

Asthma is a chronic respiratory illness caused by airway inflammation, which presents with variable symptoms including wheeze, chest tightness, and cough (GINA, 2016; NRAD, 2014; SIGN, 2016). South Asian and British/American Black ethnic minority communities typically have poorer asthma outcomes (e.g., risk of hospitalisation, or unscheduled care) compared to indigenous ethnic groups, for example, Scottish and American Whites (Hull et al., 2016; Moorman et al., 2011; Sheikh et al., 2016). Asthma guidelines suggest that self-management including education, personalised asthma action plans (PAAPs), and supportive discussions improve outcomes (GINA, 2016; Pinnock et al., 2017; SIGN, 2016). However, there are concerns that ethnic minority groups tend to benefit less from these strategies incorporated in interventions compared to White populations (Ahmed et al., 2018; Davidson, Liu, & Sheikh, 2010; Netuveli et al., 2005). Understanding what underlies this is therefore important to reduce health inequalities (Ahmed et al., 2018). Cultural tailoring of interventions for ethnic minority groups has been suggested to be beneficial (Ahmed et al., 2018; Barrera et al., 2013).

Amongst other factors (e.g., behaviour change techniques, intervention delivery mode, targeting participant characteristics such as asthma severity), explicitly basing interventions on theory may be important in predicting whether interventions will be effective (Cane, O'Connor, & Michie, 2012; Craig et al., 2008; Michie & Prestwich, 2010). However, the extent to which theory, particularly culturally appropriate theory, has been used for culturally tailored interventions has not been addressed (Burke, Bird, et al., 2009; Pasick et al., 2009). The use of theory (when described and explained clearly) can help tailor and improve the effectiveness of behavioural interventions (Cane, O'Connor, & Michie, 2012; Craig et al., 2008; Duncan et al., 2020; Michie & Prestwich, 2010). Theory promoting the identification of the 'active ingredients' of interventions (Michie & Prestwich, 2010; Nilsen, 2015), allow understanding of why, when, and how self-management behaviour does or does not occur, and informs future refinements (Duncan et al., 2020; Michie & Prestwich, 2010; Michie et al., 2014). For example, asthma medication beliefs (necessity and concerns) can be powerful predictors of adherence behaviour (Horne & Weinman, 1999). Hence, the use of theory is widely recommended in intervention development guidelines, for example, the Medical Research Council (Craig et al., 2008), and the National Institute of Clinical Excellence Behaviour Change Guidance (NICE, 2018).

Michie and Prestwich (2010) suggest that the application of theory should be explicitly defined; however how and the extent to which authors apply theory is often unclear (Birken et al., 2017; Michie & Prestwich, 2010). Reasons for this may include confusion about different types of theories, models, and frameworks. Without specialist behaviour change knowledge, theory may be applied without understanding the mechanisms that need to change and techniques that may endanger that change (Birken et al., 2017; Nilsen, 2015). Repeated use of familiar theories may hinder the progress of shared understanding or generalisation of findings (Birken et al., 2017). Inadequate descriptions may also lead to inaccurate conclusions regarding the effectiveness of theory (Michie & Prestwich, 2010), for example, when self-efficacy is used as a single construct of Bandura's Social Cognitive Theory (SCT), but positive change in this construct is extrapolated to endorse the full theory (Bandura, 1977). The development and application of systematic coding frameworks that address elements of theory such as the Theory Coding Scheme (TCS) and the Theoretical Domains Framework (TDF) can help to elucidate the role that theory plays in behavioural interventions (Cane, O'Connor, & Michie, 2012; Michie & Prestwich, 2010).

However, commonly used theories may not be sufficient or even helpful for understanding common-sense, unconscious or automatic self-management behaviours, cued by environmental stimuli or unconscious belief systems typical to certain cultural groups influenced by habitus (Burke, Bird, et al., 2009; Daines et al., 2020; Marteau, Hollands, & Fletcher, 2012; Pasick et al., 2009). Habitus is a silent system that operates in the background consisting of internalised dispositions of second nature social rules and categorisations of perceptions, thoughts, and behaviours that are predicted by past experiences and cultural, social, and economic capital (Bourdieu, 1990). Bourdieu theorised that habitus produces and reproduces from external factors across time and space, for example, social structures of ethnic minority groups, conformity, and relationships. Therefore, habitus can shape self-management as a collective common-sense behaviour, for example, health beliefs about illness and its treatment, that are observable but unconsciously intended and acted upon without reflecting on its rationale (Bourdieu, 1990). For example, many populations (e.g., South Asians, South East Asian, Chinese, Puerto Ricans) share hot and cold beliefs about asthma and its treatment. This belief refers to the symbolic forces found in hot and cold elements (non-physical temperatures), for example, hot or cold food, herbs, weather, colour, medicine, or emotions. Good health is believed to be attained, and asthma eliminated or treated, through balancing hot and cold energies interacting with the body. Asthma is perceived as a cold illness triggered by exposure to cold elements/temperatures causing an imbalance in hot and cold energies in the body, implying that asthma should be treated with hot remedies, for example, hot food and applying heat to the body (Ahmed et al., 2017; Harver & Kotses, 2010). Cane, Pao, & McKenzie (2001) found that South Asian children with asthma and their parents avoided cold food (e.g., banana) when symptomatic. The lack of clarity on the cultural relevance of theories to South Asian and Black communities suggests that existing theory use in self-management interventions for these populations need to be explored.

Our previous systematic review (Ahmed et al., 2018) synthesised findings on the extent to which variance in asthma self-management may be due to ethnicity and/or various sociocultural contexts. We described features of culturally relevant interventions, synthesised evidence for intervention effectiveness, and identified barriers and facilitators of implementing asthma self-management (Ahmed et al., 2018). In this updated systematic review (2019), we report theoretical factors associated with effective asthma self-

management that may inform future theory-based self-management interventions for different ethnic groups. This review reports on the same studies included in the previous review (2015), and new studies from an updated search (2019). We aimed to: 1) establish the extent to which theory was used in interventions, 2) describe the theoretical domains that were reported in interventions (considering both patient/carer and provider elements of an intervention), 3) examine whether theory use and theoretical domains identified explained the impact on asthma outcomes.

Methods

The review protocol is registered with the PROSPERO database (CRD42015020174) and followed Cochrane methodology for systematic review of interventions (Higgins & Green, 2014). The search, screening, and data extraction strategy for this systematic review is described in our previous publication (Ahmed et al., 2018) and is summarised in Table 1. A PRISMA diagram (Figure 1) illustrates the initial (2015) and updated searches (2019). A full description of the Cochrane Effective Practice and Organisation of Care (EPOC) risk of bias checklist of the included studies has been reported previously (a summary assessment of bias is provided in Table 4) (Ahmed et al., 2018; Cochrane 2015). All extracted data were coded by one reviewer (SA) and independently verified by another coder (ES). Any discrepancies were resolved by discussion.

Coding theory use in interventions

We used the Theory Coding Scheme (TCS) (Michie & Prestwich, 2010), a validated system for assessing the degree to which behavioural interventions are based on theory. The 19 items are classed as 'yes', 'no', or 'don't know'. We applied the first 11 TCS items that have been adapted and applied as a quantitative checklist (Ayling, Brierley, Johnson, Heller, & Eiser, 2015; Prestwich et al., 2014; Taylor, Conner, & Lawton, 2012; Webb, Joseph, Yardley, & Michie, 2010). These items focus on identifying underpinning theory (items 1, 3), the use of theoretical constructs informing interventions (items 2, 5, 7 to 11), the use of theoretical predictors to identify intervention population (item 4), or deliver/tailor interventions (items 6) (Michie & Prestwich, 2010). Items 12 to 19 apply to methodological factors and theory refinement (Michie & Prestwich, 2010), which we addressed in our previous publication (Ahmed et al., 2018).

Coding the theoretical domains identified in interventions

To identify the theoretical domains targeted in interventions, we used the Theoretical Domains Framework (TDFs) (Cane, O'Connor, & Michie, 2012); a validated framework of 14 domains and 84 constructs developed from the synthesis of 33 psychological and organisational theories related to behaviour change. We applied the TDF to authors' descriptions of their interventions targeted at individuals with asthma and/or providers of asthma care. TDF domains were classified as either: 'included', 'not included', or 'unclear' (i.e., when interventions were suggestive of a domain but did not directly describe it). If studies referred to other articles/websites describing the intervention in greater depth, the full text of these information resources were retrieved and coded. These additional papers are underlined in Table 4. Decisions for coding TDFs are defined in the footnote of the table.

Table 1. Summary of methodology (see Ahmed et al. 2018 for more details)

Searches conducted in February 2015 and updated in October 2019

We searched for randomised controlled trials (RCTs) using key terms; 'asthma' 'AND' 'self-management' 'AND' the relevant population ('South Asian' and 'Black') with no date or language restrictions:

- Eight electronic databases (*Medline; EMBASE; Web of Science; PsycINFO; Scopus; Elsevier Science Direct; Cochrane Library; Google Scholar*)
- Three research registers for on-going studies (*PROSPERO; the University of York's Centre for Reviews and Dissemination; Clinical trials database*)
- Three journals were hand-searched (*Patient Education and Counselling; Health Psychology; Ethnicity and Health*)
- Reference lists of identified systematic reviewsThe detailed electronic search strategy has been previously published and can be found online (https://doi.org/10.6084/m9.figshare.5545348)

Study selection

The inclusion criteria were as follows:

- *Population* – South Asian communities (Indian, Pakistani, Bangladeshi, or Other), or Black populations (African, Caribbean, or Other), with asthma, or their parents/carers, health care/lay professionals
- *Intervention* – Asthma self-management interventions (defined as: 'The tasks that individuals must undertake to live with one or more chronic conditions. These tasks include having the confidence to deal with medical management, role management and emotional management of their conditions' (Adams, Greiner, & Corrigan&&, 2004)
- *Comparator* – Any people with asthma, parents/carers, or healthcare/lay professionals, who did not receive self-management intervention
- *Outcomes of interest* – i) clinical outcomes (asthma control, unscheduled healthcare use), defined according to the American Thoracic Society/European Respiratory Society Task Force (Reddel et al., 2009), ii) process outcomes (e.g., knowledge and self-efficacy), iii) behavioural outcomes (e.g., medicine adherence and inhaler technique)
- *Settings* – any healthcare, community, or remote settingsWe excluded interventions if studies did not explicitly specify the examined population (e.g., using terms such as 'West Indians' or 'Asians'), or did not provide separate outcome data for the population of interest.

Screening of articles

One trained reviewer (SA) undertook title/abstract and full-text screening, with 10% check by second reviewers (LS, HP). Disagreements were resolved by discussion and clarification of the inclusion/exclusion criteria, as necessary. See Figure 1 for study selection details.

Risk of bias assessment and data extraction

Data extraction

Data were extracted by one reviewer (SA), and independently checked for accuracy by a second reviewer (ES). Discrepancies were resolved by discussions

Risk of bias assessment

We used the Cochrane EPOC Risk of Bias Assessment checklist (Cochrane, 2015)

Linking theory and theoretical domains identified in interventions to asthma outcomes

Effectiveness of interventions has previously been reported (Ahmed et al., 2018) and is illustrated in Table 3; here, we relate effectiveness to whether interventions used or did not use theory and theorectical domains.

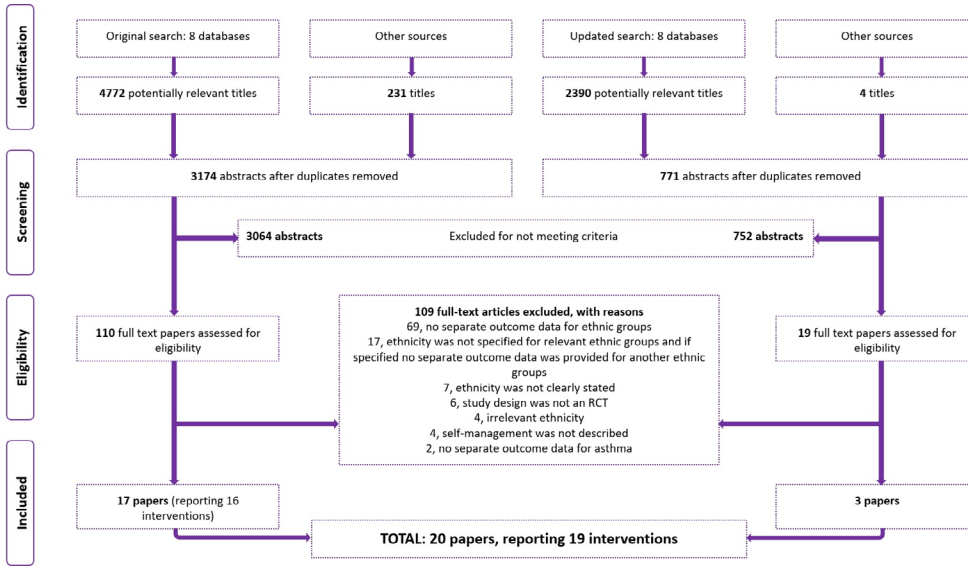

Figure 1. PRISMA flow diagram.

Results

Summary of intervention characteristics

From a total of 7162 titles and abstracts, we included 20 papers reporting 19 interventions (conducted between 1995 to 2017) in the review (see Figure 1). Of these, four interventions with South Asian participants were from India (Agrawal et al., 2005; Behera eta al., 2006; Ghosh et al., 1998; Shanmugam et al., 2012), three interventions with South Asian participants were from the UK and one was from Canada (Griffiths et al., 2004, 2016; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012), and twelve interventions with African American participants were from the USA (Bignall et al., 2015; Blixen et al., 2001; Fisher et al., 2009; Fisher et al., 2004; Ford et al., 1997; Kelso et al., ,1995, 1996; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2012; Velsor-Friedrich, Pigott, & Louloudes, 2004; Velsor-Friedrich, Pigott, & Srof, 2005).

Summary descriptions of included interventions are presented in Table 2 with full descriptions available in Ahmed et al. (2018). All interventions targeted asthma patients, some also targeted parents (Agrawal et al., 2005; Fisher et al., 2004; Ghosh et al., 1998), lay professionals (Fisher et al., 2009), and healthcare professionals (Griffiths et al., 2016; MacDonell et al., 2016). All interventions described providing education, but the content and mode of delivery varied, for example, written education (Behera et al., 2006; Bignall et al., 2015; Blixen et al., 2001; Ghosh et al., 1998; Griffiths et al., 2016; Kelso et al., 1996; Moudgil, Marshall, & Honeybourne, 2000; Patel et al., 2017; Shanmugam et al., 2012; Velsor-Friedrich et al., 2004, 2005), or technology-based education, for example, video (Bignall et al., 2015; Griffiths et al., 2004; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2012). Overall risk of bias within interventions were uncertain (Agrawal et al., 2005; Bignall et al., 2015; Fisher et al., 2004; Kelso et al., 1995; MacDonell et al., 2016; Patel et al., 2017; Poureslami et al., 2012; Shanmugam et al., 2012; Velsor-Friedrich et al., 2004, 2005), or high (Behera et al., 2006; Blixen et al., 2001; Ford et al., 1997; Ghosh et al., 1998; Kelso et al., 1996; Moudgil, Marshall, & Honeybourne, 2000; Velsor-Friedrich

Table 2. Summary of intervention characteristics

	Population				
Intervention	Ethnicity	Participant group (age)	Sample size (I/C)	Setting	Study description of intervention content
Agrawal 2005 India	Indian	Patients (2–12) Parents	60 (32/28)	University hospital clinic	Education (sessions/training) Action plans Asthma diary Asthma therapy
Behera 2006 India	Indian	Patients (18–60)	523 (260/263)	University hospital clinic	Education (written) Action plans
Blixen 2001 USA	African Americans	Patients (8–50)	28 (14/14)	Hospital	Education (sessions/written) Patient follow-up Referrals to asthma organizations Peak flow metres provided Medication provided
Bignall 2015 USA	African Americans	Patients (12–17)	30 (14/16)	Secondary school	Breathing retraining and education (sessions/written/CDs) Follow-up calls
Fisher 2004 USA	African Americans, White Caucasians, Others	Patients (5–14) Parents	249 (100/149)	Community School	Education (sessions/training) Promotional campaign
Fisher 2009 USA	African Americans	Patients (2–8) African American Coaches	191 (97/94)	Community Hospital	Education (sessions, social support) Action plans Provider education/training Lay support (parents/community)
Ford 1997 USA	African Americans	Patients (18–70)	241 (119/122)	Emergency department	Education (sessions/written) Patient follow-up Placebo inhaler

Continued

Table 2. (*Continued*)

	Population				
Intervention	Ethnicity	Participant group (age)	Sample size (I/C)	Setting	Study description of intervention content
Ghosh 1998 India	Indian	Patients (10–45) Parents	276 (140/136)	University hospital clinic	Education (sessions/training/written) Action plan Asthma diary Asthma therapy
Griffiths 2004 UK	South Asians, White Caucasians, Other	Patients (4–60)	164 (95/69)	Out of hours GP service, Hospital	Education (training) Action plans Patient follow-up Provider education/training Peak flow metres provided Medication provided Technology use
Griffiths 2016 UK	South Asians	Patients (under 3) GP and secondary care clinicians	375 (183/192)	GP surgery	Education (sessions/written) Action plans Patient follow-up Provider education/training
Keslo 1995 USA	African Americans	Patients (under 18)	52 (30/22)	Emergency department, University hospital clinic	Education (sessions/written) Patient follow-up Asthma therapy Peak flow metres provided Medication provided
Keslo 1996 USA	African Americans	Patients (under 18)	39 (21/18)	University hospital clinic	Education (sessions/written) Asthma diary Patient follow-up Asthma therapy Peak flow metres provided Medication provided

Continued

Table 2. (*Continued*)

	Population				
Intervention	Ethnicity	Participant group (age)	Sample size (I/C)	Setting	Study description of intervention content
MacDonell 2016 USA	African Americans	Patients (18–29)	48 (25/24)	University, University affiliated medical centre	Education (computer animated) Text reminders
Moudgil 2000 UK	South Asian, White European	Patients (11–59) GP	344 (171/173)	GP surgery	Education (sessions/written) Action plans Patient follow-up Provider education/training Asthma therapy Peak flow metres provided
Patel 2017 USA	African Americans	Patients (-)	422 (212/210)	University health system, University clinical trials database	Telephone counselling sessions and self-observation Education (written) Asthma diary Peak flow metre provided with video instructions Follow-up reminders (postcards; checklist, calls)
Poureslami 2012 Canada	South Asians, Chinese	Patients (under 21)	45 (33/12)	Home, University hospital clinic	Education (sessions) Action plans Peak flow metres provided
Shanmugam 2012 India	Indian	Patients (-)	66 (33/33)	University hospital	Education (sessions/written) Action plans Asthma diary Medication counselling
		Patients (8–13)			Education (sessions/written)

Continued

Table 2. (*Continued*)

	Population				
Intervention	Ethnicity	Participant group (age)	Sample size (I/C)	Setting	Study description of intervention content
Velsor-Friedrich 2004/2005 USA	African Americans		2004: 102 (40/62) 2005: 52 (28/24)	Public primary schools with nurse clinics	Action plans Patient follow-up
Velsor-Friedrich 2012 USA	African Americans	Patients (13–19)	137 (74/63)	Secondary schools	Education (sessions/training) Action plans Asthma diary Patient follow-up Medication provided Technology use Hydrofluoroalkane and static free chamber

Note. I = Intervention; C = Control.

et al., 2012), although two interventions were at low risk of bias (see Table 4) (Fisher et al., 2009; Griffiths et al., 2004, 2016).

Establishing the extent to which theory was used in interventions

Theory use in interventions coded according to the TCS is summarised in Table 3.

Identifying underpinning theory (items 1, 3)

10 (of 20) studies did not report the use of theory to any degree (Agrawal et al., 2005; Behera et al., 2006; Bignall et al., 2015; Blixen et al., 2001; Fisher et al., 2004; Ford et al., 1997; Kelso et al., 1995, 1996; Moudgil, Marshall, & Honeybourne, 2000; Shanmugam et al., 2012). Six interventions (seven papers) that reported theory use cited a single theory: the Transtheoretical Model (Fisher et al., 2009), Social Learning Theory (Ghosh et al., 1998), the Liaison Model of Specialist Nursing (Griffiths et al., 2004), the Information Motivation (MI) Behavioural Skills Model (MacDonell et al., 2016), Adult Learning Theory (Poureslami et al., 2012), and Orem's Self-Care Deficit Theory of Nursing (Velsor-Friedrich et al., 2004, 2005). Three other interventions used a combination of theories, for example, SCT and either the Self-Regulation Theory (Griffiths et al., 2016; Patel et al., 2017), or Orem's Self-Care Deficit Theory of Nursing (Velsor-Friedrich et al., 2012). None of the theories had an explicit focus on culture (see Table 3).

Use of theory/predictors to select recipients for the intervention (item 4) and tailor intervention techniques to recipients (item 6)

None of the interventions reported using theory to identify the population likely to benefit from the intervention, and only two interventions tailored techniques to the needs of the target participant (MacDonell et al., 2016; Patel et al., 2017). Patel et al. (2017) assessed the level of self-regulation ability (as per the SCT) at baseline using a scale developed by Zimmerman (e.g., actions such as peak flow monitoring) to tailor telephone counselling sessions to an individual's stage of self-regulation. At baseline, MacDonell et al. (2016) used real time Ecological Momentary Assessment via text messaging to assess medicine adherence and asthma symptom experiences to tailor technology-based motivational interviewing sessions for individuals, for example, providing participants the option to receive information on medication use.

Use of theory/constructs/predictors to inform the intervention (items 2, 5, 7–11)

Seven (of ten) interventions targeted a theoretical construct identified as a potential predictor of self-management (item 2) (Fisher et al., 2009; Ghosh et al., 1998; MacDonell et al., 2016; Patel et al., 2017; Poureslami et al., 2012; Velsor-Friedrich et al., 2004, 2005, 2012); for example, Patel et al. (2017) used the SCT and targeted self-regulation to enhance self-management through counselling sessions. Eight interventions used theory/predictors to select/develop intervention techniques (item 5) (Fisher et al., 2009; Ghosh et al., 1998; Griffiths et al., 2004, 2016; Patel et al., 2017; Poureslami et al., 2012; Velsor-Friedrich et al., 2004, 2005, 2012), for example, three interventions that used SCT targeted self-efficacy (Griffiths et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2012). Five interventions explicitly linked all intervention techniques to at least one theory-relevant construct/predictor (item 7) (Fisher et al., 2009; Ghosh et al., 1998; Griffiths et al., 2004,

Table 3. Theory use in asthma self-management interventions using the Theory Coding Scheme

	Theory coding scheme (items 1–11)										
Intervention/ Overall intervention effectiveness	1. Theory/model of behaviour mentioned	2. Targeted construct mentioned as predictor of behaviour	3. Intervention based on single theory	4. Theory/ predictors used to select recipients for the intervention	5. Theory/ predictors used to select/ develop intervention techniques	6. Theory/ predictors used to tailor intervention techniques to recipients	7. All intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	8. At least one but not all, of the intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	9. Group of techniques are linked to a group of constructs/ predictors	10. All theory-relevant constructs/ predictors are explicitly linked to at least one intervention technique	11. At least one but not all, of the theory-!relevant constructs/ predictors are explicitly linked to at least one intervention technique
Agrawal 2005 *Positive*	X	-	-	-	-	-	-	-	-	-	-
Behera 2006 *Positive*	X	-	-	-	-	-	-	-	-	-	-
Bignall 2005 *No effect*	X	-	-	-	-	-	-	-	-	-	-
Blixen 2001 *No effect*	X	-	-	-	-	-	-	-	-	-	-
Fisher 2004 *No effect*	X	-	-	-	-	-	-	-	-	-	-
Fisher 2009 *Positive*	√ Transtheoretical Model	√	√	X	√	X	√	X	√	√	X
Ford 1997 *No effect*	X	-	-	-	-	-	-	-	-	-	-
Ghosh 1998 *Positive*	√ Social Learning Theory	√	√	X	√	X	√	X	√	√	X
Griffiths 2004 *No effect*	√ Liaison Model of Specialist Nursing	X	√	X	√	X	√	X	√	√	X
Griffith 2016	√	X	X	X	√	X	√	X	√	√	X

Continued

Table 3. (*Continued*)

	Theory coding scheme (items 1–11)										
Intervention/ Overall intervention effectiveness	1. Theory/model of behaviour mentioned	2. Targeted construct mentioned as predictor of behaviour	3. Intervention based on single theory	4. Theory/ predictors used to select recipients for the intervention	5. Theory/ predictors used to select/ develop intervention techniques	6. Theory/ predictors used to tailor intervention techniques to recipients	7. All intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	8. At least one but not all, of the intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	9. Group of techniques are linked to a group of constructs/ predictors	10. All theory-relevant constructs/ predictors are explicitly linked to at least one intervention technique	11. At least one but not all, of the theory-!relevant constructs/ predictors are explicitly linked to at least one intervention technique
No effect	Self-Regulation Theory Social Cognitive Theory										
Keslo 1995 *Positive*	X	-	-	-	-	-	-	-	-	-	-
Keslo 1996 *Positive*	X	-	-	-	-	-	-	-	-	-	-
MacDonell 2016 *No effect*	√ Information Motivation Behavioural Skills Model	√	√	X	X	√	X	√	√	X	√
Moudgil 2000 *Unclear*	X	-	-	-	-	-	-	-	-	-	-
Patel 2017 *Positive (pro protocol analysis)*	√ Social Cognitive Theory Self-Regulation Theory	√	X	X	√	√	X	√	√	X	√
Poureslami 2012 *Positive*	√ Adult Learning Theory	√	√	X	√	X	X	√	√	√	X

Continued

Table 3. (*Continued*)

	Theory coding scheme (items 1–11)										
Intervention/ Overall intervention effectiveness	1. Theory/model of behaviour mentioned	2. Targeted construct mentioned as predictor of behaviour	3. Intervention based on single theory	4. Theory/ predictors used to select recipients for the intervention	5. Theory/ predictors used to select/ develop intervention techniques	6. Theory/ predictors used to tailor intervention techniques to recipients	7. All intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	8. At least one but not all, of the intervention techniques are explicitly linked to at least one theory-relevant construct/ predictor	9. Group of techniques are linked to a group of constructs/ predictors	10. All theory-relevant constructs/ predictors are explicitly linked to at least one intervention technique	11. At least one but not all, of the theory-!relevant constructs/ predictors are explicitly linked to at least one intervention technique
Shanmugam 2012	X	-	-	-	-	-	-	-	-	-	-
Positive											
Velsor-Friedrich 2004/2005	√ Orem's Self-Care Deficit Theory of Nursing	√	√	X	√	X	√	X	√	√	X
Unclear											
Velsor-Friedrich 2012	√ Social Cognitive Theory Orem's Self-Care Deficit Theory of Nursing	√	X	X	√	X	X	√	√	X	√
No effect											

Note. When coding the interventions described by Griffiths et al. (2016) and Patel et al. (2017), the additional papers of which the interventions were based on were also coded (Clark et al., 1998, 2007; Lorig et al., 1999)

2016; Velsor-Friedrich et al., 2004, 2005), four interventions explicitly linked a minimum of one (not all) intervention technique to at least one theory-relevant construct/predictor (item 8) (MacDonell et al., 2016; Patel et al., 2017; Poureslami et al., 2012; Velsor-Friedrich et al., 2012), nine interventions linked a group of techniques to a group of constructs/predictors (item 9) (Fisher et al., 2009; Ghosh et al., 1998; Griffiths et al., 2004, 2016; MacDonell et al., 2016; Patel et al., 2017; Poureslami et al., 2012; Velsor-Friedrich et al., 2004, 2005, 2012), six interventions explicitly linked all theory-relevant constructs/predictors to at least one intervention technique (item 10) (Fisher et al., 2009; Ghosh et al., 1998; Griffiths et al., 2004, 2016; Poureslami et al., 2012; Velsor-Friedrich et al., 2004, 2005), and three interventions explicitly linked at least one (but not all) theory-relevant constructs/predictors to at least one intervention technique (item 11) (MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2012). For instance, a self-management training intervention based on the Social Learning Theory included the construct learning performance dichotomy, which predicted self-management (Ghosh et al., 1998). Learning from education (e.g., information on asthma triggers) and using learnt information with clinician support predicted self-management (e.g., using medication after exposure to triggers), as this improved comprehension and retrieval of information. Beneficial impact from learning and implementing self-management was therefore more likely to be repeated (Ghosh et al., 1998).

Describing the theoretical domains identified in interventions

Table 4 shows the theoretical domains identified in interventions coded using the TDF (Cane, O'Connor, & Michie, 2012).

Summary of theoretical domains identified in interventions directed towards participants with asthma (19 interventions, 20 papers)

All interventions addressed the domain 'knowledge' (an awareness of the existence of something), and the constructs 'scientific knowledge' and 'procedural knowledge', for example, asthma education/training, medication, and inhaler technique. 'Knowledge of task environment' (e.g., avoiding asthma triggers) was used in 14 out of 19 interventions (Behera et al., 2006; Blixen et al., 2001; Fisher et al., 2004, 2009; Ford et al., 1997; Ghosh et al., 1998; Griffiths et al., 2016; Kelso et al., 1995, 1996; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012; Velsor-Friedrich et al., 2004, 2005, 2012).

All interventions with South Asian participants (from indigenous and minority countries) used the domains 'environmental context and resources' (using a variety of 'resources/material resources'). For instance, the TDF construct 'barriers and facilitators' (e.g., addressing language) was reported in all interventions with South Asian participants from developed industralised countries (Griffiths et al., 2004, 2016; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012), and some in South Asian countries (Behera et al., 2006; Shanmugam et al., 2012). All interventions with South Asian participants also used 'behavioural regulation' in the form of peak flow monitoring and/or using PAAPs (using constructs 'self-monitoring' and 'action planning') (Agrawal et al., 2005; Behera et al., 2006; Ghosh et al., 1998; Griffiths et al., 2004, 2016; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012; Shanmugam et al., 2012). In interventions delivered to indigenous South Asians, 'goals' were used in two interventions (Behera et al., 2006; Shanmugam et al., 2012), but this was unclear in two other interventions (Agrawal et al., 2005; Ghosh et al., 1998). Similarly, 'goals' incorporated in PAAPs were used in three

Table 4. Theoretical domains identified in interventions using the Theoretical Domains Framework

	Theoretical Domains Framework													
Intervention Risk of bias/ Intervention effectiveness Theory use	Knowledge	Skills	Social/ professional role and identity	Beliefs about capabilities	Optimism	Beliefs about consequences	Reinforcement	Intentions	Goals	Memory, attention and decision processes	Environmental context and resources	Social influences	Emotion	Behavioural regulation
Interventions targeting participants with asthma (South Asians)														
Agrawal 2005 Unclear/Positive	√	√							√	√	√	√		√
Behera 2006 High/Positive	√	√							?	√	√		?	√
Ghosh 1998 High/Positive Social Learning Theory	√	√		√					√	√	√	√		√
Griffiths 2004 Low/No effect Liaison Model of Specialist Nursing	√	?					√		√	√	√			√
Griffith 2016 Low/No effect Self-Regulation Theory Social Cognitive Theory	√	√		√					√	√	√	√		√
Moudgil 2000 High/Unclear	√						√		√	√	√			√
Poureslami 2012 Unclear/Positive Adult Learning Theory	√			√		√			?		√	√	√	√
Shanmugam 2012 Unclear/Positive	√	?							?		√			√

Continued

Table 4. (*Continued*)

	Theoretical Domains Framework													
Intervention Risk of bias/ Intervention effectiveness Theory use	Knowledge	Skills	Social/ professional role and identity	Beliefs about capabilities	Optimism	Beliefs about consequences	Reinfor-cement	Intentions	Goals	Memory, attention and decision processes	Environmental context and resources	Social influences	Emotion	Behavioural regulation
Interventions targeting participants with asthma (African Americans)														
Bignall 2015 Unclear/No effect	√	√					√				√		√	
Blixen 2001 High/No effect	√	√					√				√	√	√	√
Fisher 2004 Unclear/No effect	√			√					?	√		√	√	
Fisher 2009 Low/Positive	√	√	√	√			√	√	√	√	√	√		√
Transtheoretical Model Ford 1997 High/No effect	√	√		√		√	√			√	√		√	
Keslo 1995 Unclear/Positive	√	√		√		√	√			√	√			√
Keslo 1996 High/Positive	√	√					√			√	√	√		√
MacDonell 2016 Unclear/No effect	√	√		√			√		√	√	√	√		√
Information Motivation Behavioural Skills Model Patel 2017 Unclear/Positive pro protocol analysis	√	√	√	√		?	√		√	√	√	√		√
Social Cognitive Theory														

Continued

Table 4. (*Continued*)

Intervention Risk of bias/ Intervention effectiveness Theory use	Theoretical Domains Framework													
	Knowledge	Skills	Social/ professional role and identity	Beliefs about capabilities	Optimism	Beliefs about consequences	Reinforcement	Intentions	Goals	Memory, attention and decision processes	Environmental context and resources	Social influences	Emotion	Behavioural regulation
Self-Regulation Theory Velsor-Friedrich 2004 Unclear/Unclear	√	?	√	√			√			√	√			√
Orem's Self-Care Deficit Theory of Nursing Velsor-Friedrich 2005 Unclear/Unclear	√	√	√				√		√		√			√
Orem's Self-Care Deficit Theory of Nursing Velsor-Friedrich 2012 High/No effect	√	√		√		√	√		√	√	√	√	√	√
Social Cognitive Theory Orem's Self-Care Deficit Theory of Nursing Interventions targeting providers (South Asian and African American)														
Griffiths 2004 Low/No effect	√	√	√				√			√	√			
Liaison Model of Specialist Nursing Griffith 2016 Low/No effect	√	√	√				√			√	√	√		

Continued

Table 4. (*Continued*)

	Theoretical Domains Framework														
Intervention Risk of bias/ Intervention effectiveness Theory use	Knowledge	Skills	Social/ professional role and identity	Beliefs about capabilities	Optimism	Beliefs about consequences	Reinfor-cement	Intentions	Goals	Memory, attention and decision processes	Environmental context and resources	Social influences	Emotion	Behavioural regulation
Self-Regulation Theory														
Social Cognitive Theory														
Fisher 2004	√	√	√	√				√			√	√	√	
Unclear/No effect														
Fisher 2009	√	√	√							√	√	√		
Low/Positive														
Transtheoretical Model														
Moudgil 2000		?	√								√			
High//Unclear														
Poureslami 2012			√								√			
Unclear/Positive														
Adult Learning Theory														

Underlined ticks = coded from additional articles/websites describing the interventions (American Lung Association, 2002; Bailey et al., 1990; Boltonv et al., 1991; Clark et al., 1998, 2007; Creer, Kotses, & Reynolds, 1989; Fisher et al., 1994; Kaur et al., 2002; Lorig et al., 1999; O'Brien et al., 2007; Poureslami et al., 2011)

Decisions made for coding theoretical domains included the following:

(i) If parents/carers were targeted in an intervention this was classified as 'social influences' ('social support'), (ii) Provision/education of personalised asthma action plans was coded as 'behavioural regulation' ('self-monitoring'; 'action planning'), and 'goals' ('implementation intentions'). 'Goals' ('goal/target setting') was not coded unless explicitly described. Traffic light systems on action plans or peak flow metres, were classed as a decision process or a decision-making tool ('memory, attention, and decision processes') and 'behavioural regulation' ('self-monitoring'), (iii) 'Skills' were only coded if there was explicit reference to behavioural practice, (iv) 'Memory, attention and decision processes' was coded where there was action taken to support this, for example, provision of prompts or cues, (v) Any coding of decisions that were unclear were marked with a question mark in the table.

South Asian interventions from developed countries (Griffiths et al., 2004, 2016; Moudgil et al., 2000), though this was unclear in another intervention (Poureslami et al., 2012).

Most of the interventions involving African Americans (11 interventions, reported in 12 papers) used the domain and construct 'reinforcement' (Bignall et al., 2015; Blixen et al., 2001; Fisher et al., 2009; Ford et al., 1997; Kelso et al., 1995, 1996; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2004, 2005, 2012). For instance, follow-ups were used as opportunities to reinforce self-management behaviours (Bignall et al., 2015; Blixen et al., 2001; Fisher et al., 2009; Ford et al., 1997; Kelso et al., 1995, 1996; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2004, 2005, 2012). In addition, one intervention used the construct 'incentives' alongside 'reinforcement' (Blixen et al., 2001). Eleven interventions used 'environmental context and resources', primarily using 'resources/material resources' (e.g., audio-visual and written materials and/or supplying inhalers and peak flow meters), alongside various other constructs (Bignall et al., 2015; Blixen et al., 2001; Fisher et al., 2009; Ford et al., 1997; Kelso et al., 1995, 1996; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2004, 2005, 2012). This was unclear in another intervention (Velsor-Friedrich et al., 2004).

Summary of theoretical domains identified in interventions directed towards providers of asthma care (six interventions)

Interventions which targeted the role of providers, all included 'social/professional role and identity' ('professional role'), and 'environmental context and resources' ('organisational culture/climate' with a mixture of other constructs). For instance, 'professional role' was targeted by training providers (Fisher et al., 2004, 2009; Griffiths et al., 2004, 2016; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012). Additionally, most interventions included 'knowledge' ('scientific knowledge' and a mixture of other constructs) and 'skills' (with a mixture of constructs) (Fisher et al., 2004, 2009; Griffiths et al., 2004, 2016).

Relationship between theory use and theoretical domains identified in interventions to asthma outcomes

Four (of nine) theoretically informed interventions (using the Transtheoretical Model; Social Learning Theory; Social Cognitive Theory/Self-Regulation Theory; Adult Learning Theory) improved asthma outcomes, for example, knowledge, unscheduled healthcare use, asthma-related quality of life, asthma symptoms, peak flow rate, lost productivity days, and inhaler technique (Fisher et al., 2009; Ghosh et al., 1998; Patel et al., 2017; Poureslami et al., 2012). Three theoretically informed interventions were ineffective (Griffiths et al., 2004, 2016; MacDonell et al., 2016), and the impact of two other interventions were unclear (Velsor-Friedrich et al., 2004, 2005, 2012). There was no clear association between theory use and the impact on asthma outcome effectiveness, even when content addressed specific theoretical domains (Griffiths et al., 2004, 2016; MacDonell et al., 2016; Patel et al., 2017; Velsor-Friedrich et al., 2004, 2005, 2012). The theoretical domain 'knowledge' had a positive impact on knowledge in three (of six) interventions (Agrawal et al., 2005; Poureslami et al., 2012; Velsor-Friedrich et al., 2005). An intervention designed to address 'self-efficacy' (within the theoretical domain of 'belief about capabilities') non-significantly improved self-efficacy scores (measured by the validated Asthma Belief scale) (Velsor-Friedrich et al., 2012). Targeting 'beliefs about capabilities' in three interventions showed no evidence of a positive impact on

measurements of self-efficacy or self-esteem (Ford et al., 1997; Griffiths et al., 2016; Velsor-Friedrich et al., 2012). Although Velsor-Friedrich et al. (2005) measured 'self-efficacy', it was not described in the intervention, and therefore, it was not coded as a theoretical construct for that intervention.

Discussion

This review included 20 papers (19 RCTs) evaluating asthma self-management interventions targeted at South Asians and African Americans. It remains unclear whether the use of theory or interventions targeting theoretical domains improved asthma outcomes. Only half the interventions reported theoretical underpinning, of which only a minority used theory to tailor intervention techniques to the needs of South Asians and African Americans. No interventions used a culturally specific theory. There was no evidence to suggest which theory should inform future interventions for South Asians and African Americans. 'Knowledge' was central to all interventions and was provided in appropriate languages. Interventions directed at South Asians typically included the following: 'environmental context and resources' (e.g., language appropriate education), and 'behavioural regulation', for example, goal-setting in asthma action plans. Most interventions targeting African Americans used the domains 'reinforcement' (e.g., provided in follow-ups), and 'environmental context and resources', for example, providing inhalers. The perception that different cultural groups may have different needs, however, did not appear to be underpinned by theory or evidence. The domains 'social/professional role and identity' and 'environmental context and resources' were included in all interventions that targeted professionals (Fisher et al., 2004, 2009; Griffiths et al., 2004, 2016; Moudgil, Marshall, & Honeybourne, 2000; Poureslami et al., 2012). Otherwise, descriptions of intervention for providers were limited. Provision of supported self-management may be enhanced by targeting 'social/professional role and identity' and 'reinforcement'.

Interpretation of findings

Intervention effectiveness can be influenced by multiple factors such as behaviour change techniques, intervention delivery mode, and use of theory in interventions (Cane, O'Connor, & Michie, 2012; Michie & Prestwich, 2010). Some behaviour change may be subject to common-sense or unconscious processes (Burke, Bird, et al., 2009; Marteau et al., 2012; Pasick et al., 2009), though, in contrast to previous literature (Cane, O'Connor, & Michie, 2012; Michie & Prestwich, 2010), we could not determine whether the use of theory in self-management interventions improved asthma outcomes. Our findings suggest that simply identifying or labelling theory does not determine intervention effectiveness. In part, this may be related to the lack of explicit reporting of intervention content and theory, for example, one intervention targeted self-efficacy using the SCT but did not describe targeting this as part of the intervention and therefore it was not coded as a domain (Velsor-Friedrich et al., 2012). It may be that guidance on meaningful theory use during intervention development is not clear, and there is often no consideration of cultural constructs or theory at play. Standardising the reporting of intervention content may be helpful (Duncan et al., 2020). Further, differences between interventions directed at South Asians and African Americans may relate to cultural differences in the implementation of interventions; for instance, US African American interventions may not need to consider language appropriate resources, though the socio-

economic context may be crucial (e.g., provision of inhalers and peak flow meters), suggesting that it would be helpful to describe theoretical domains along with the context in which interventions were delivered in (Aromatario et al., 2019; Carey et al., 2019; Duncan et al., 2020; Moore & Evans, 2017).

As previously reported, 'knowledge' was a central domain of all interventions, only some of which were effective at improving the measured outcome knowledge, suggesting that solely relying on this domain may not be enough (Taylor et al., 2014). This resonates with a systematic review which found that improving asthma knowledge was essential to supported asthma self-management, but in isolation, was not sufficient to create change (Pinnock et al., 2017). Previous studies (Miles et al., 2017; Moudgil & Honeybourne, 1998) suggest that South Asians may find it difficult to understand information on asthma treatment/medication and preventative care. A study of African Americans reached similar conclusions about the recall of information on medication, asthma triggers, and medical advice (Biksey, 2011). It may be that beliefs (important for, say, medication adherence) may need to be framed by how information is learnt in a cultural group, for example, information geared towards beliefs may be easier to understand if it aligns with cultural values or norms (Castro, Barrera, & Holleran, 2010; Resnicow et al., 1999; Triandis, 2018). This infers that generic education may not always facilitate understanding in some communities (Ahmed et al., 2018).

The need to account for cultural beliefs in asthma self-management has been reported previously (Hussein & Partridge, 2002; Poureslami et al., 2007). Both 'beliefs about capabilities' and 'beliefs about consequences' were targeted in two interventions in this review with little benefit, suggesting that something was missing and warrants further exploration (Ford et al., 1997; Poureslami et al., 2012). For example, an intervention directed at African Americans (which did not use any theory) showed little improvement on knowledge and self-efficacy measures (Ford et al., 1997). Addressing 'beliefs about capabilities' was linked to validated self-efficacy outcomes in three interventions, but did not show benefit in this context (Ford et al., 1997; Griffiths et al., 2016; Velsor-Friedrich et al., 2012). The theoretical construct self-efficacy may be contextual and have culture-specific meanings. Understanding self-efficacy on an individual basis marginalises cultures that may have a collective focus on self-efficacy (Burke, Joseph, et al., 2009; Klassen, 2004, 2008; Triandis, 2018); for example, Klassen (2008) found that compared to White individuals, Asians gained self-efficacy from the perception of other people and from making social comparisons on who has better self-management abilities. Modesty (not focusing on oneself) was a cultural value that needs to be considered. Although Bandura (2002) refined the SCT for cultural contexts and considered collective self-efficacy based on a group's beliefs about capabilities in their contextual environment, the theory tends to use its constructs homogenously by not considering how 'culture' should be defined, how individuals apply collective self-efficacy to themselves, or cross-cultural variations of self-efficacy in different groups (Burke, Joseph, et al., 2009).

Theories may need to acknowledge how collective beliefs can be targeted if individuals themselves are not fully aware of the rationale behind such beliefs (Bourdieu, 1990; Burke, Bird, et al., 2009). Bourdieu argues that the idea of deliberate, effortful and conscious intentions, choices, or actions are not enough to explain the daily health behaviours around habitus (Bourdieu, 1990), unless people receive education to raise consciousness or awareness of what underpins their behaviours (Burke, Bird, et al., 2009; Kellerman, 2016). Hence, there may be challenges in enhancing awareness or discussion on some collective beliefs in the conscious realm (Bourdieu, 1990; Burke, Bird, et al., 2009; Triandis, 2018). Interventions raising consciousness or reflections on unconscious

behaviours may be helpful. However, how to achieve such reflections is unclear because unconscious behaviours remain largely undefined and difficult to identify. The shift between conscious and unconscious self-management behaviours overlap, complementing or conflicting with each other, shaped by contextual factors (e.g., stress), and it is unknown if unconscious behaviours can be targeted to sustain behaviour change (Marteau et al., 2012). For example, there remains uncertainty around widely implemented unconscious bias training in diversity interventions, since knowledge of bias does not necessitate behaviour change through self-reflection, assumptions of which overlook embedded structural reinforcements for racism in organisations (Atewologun et al., 2018; Noon, 2018). It might be that culturally relevant theories are required for maximum effectiveness (Burke, Bird, et al., 2009; Pasick et al., 2009).

Strengths and limitations of the review

To our knowledge, this review is one of the first studies synthesising the use of theory and theoretical intervention domains in the context of interventions that promote asthma self-management in South Asian or African American populations. To synthesise findings on theory use and intervention domains, the issue of variable reporting was minimised by examining original articles on which interventions were based on and requesting additional data, though this did not always overcome limitations of author descriptions. We relied on author descriptions to code theoretical domains, however authors did not explicitly use TDF terminology to describe intervention strategies, introducing subjectivity of researchers interpretions, although we minimised this subjectivity by duplicate independent coding of data. Reporting typically described intended interventions, and fidelity to these intentions were rarely described. Future research needs to develop standards on how researchers should use TDF terminology in describing the content of interventions (Duncan et al., 2020).

Conclusions

Theory-based approaches were missing in many cultural interventions. Self-management interventions in these communities could be improved by targeting various domains and considering the context in which it will be delivered. 'Knowledge' formed a central domain for both South Asians and African Americans, and 'environmental context and resources', for example, delivery of interventions in South Asian languages; provision and access to asthma resources for African Americans restricted by socio-economic factors. Provision of education may be enhanced by targeting beliefs, which should focus on how information is learnt in a cultural group, however whether collective conscious and unconscious beliefs can be targeted remains elusive. Although these domains all seem relevant, further research is needed to ascertain what theory in which cultural group is optimal.

To mainstream theoretical approaches in intervention development, there may need to be a recognition that it is a sophisticated task that requires expert support to ensure adequate completion, which can also empower lay researchers. National/international guidance on standardising reporting of theory use in intervention content may help improve inadequate reporting, encourage authors to use TDF terminology as a standard, and bolster considerations of cultural meanings applied to theoretical constructs (e.g., collective self-efficacy) and contextual factors.

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Conflict of interest

All authors declare no conflict of interest.

Author contribution

Salina Ahmed (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing – original draft; Writing – review & editing) Hilary Pinnock (Conceptualization; Data curation; Formal analysis; Funding acquisition; Methodology; Supervision; Writing – review & editing) Elizabeth Steed (Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Supervision; Writing – review & editing).

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All included papers are published; no further data are available. Requests for further information should be addressed to the corresponding author.

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