Application of behavioural theories, models, and frameworks in pharmacy practice research based on published evidence: a scoping review.

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REVIEW ARTICLE

Application of behavioural theories, models, and frameworks in pharmacy practice research based on published evidence: a scoping review

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Abstract

Background Pharmacy practice research often focuses on the design, implementation and evaluation of pharmacy services and interventions. The use of behavioural theory in intervention research allows understanding of interventions' mechanisms of action and are more likely to result in effective and sustained interventions.

Aim To collate, summarise and categorise the reported behavioural frameworks, models and theories used in pharmacy practice research.

Method PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science and EBSCO (CINAHL PLUS, British Education index, ERIC) were systematically searched to capture all pharmacy practice articles that had reported the use of behavioural frameworks, theories, or models since inception of the database. Results were filtered to include articles published in English in pharmacy practice journals. Full-text screening and data extraction were independently performed by two reviewers. A narrative synthesis of the data was adopted. Studies were reviewed for alignment to the UK Medical Research Council (MRC) framework to identify in which phase(s) of the research that the theory/model/framework had been employed.

Results Fifty articles met the inclusion criteria; a trend indicating an increasing frequency of behavioural theory/frameworks/models within pharmacy practice research was identified; the most frequently reported were Theory of Planned Behaviour and Theoretical Domains Framework. Few studies provided explicit and comprehensive justification for adopting a specific theory/model/framework and description of how it underpinned the research was lacking. The majority were investigations exploring determinants of behaviours, or facilitators and barriers to implementing or delivering a wide range of pharmacy services and initiatives within a variety of clinical settings (aligned to Phase 1 UK MRC framework).

Conclusion This review serves as a useful resource for future researchers to inform their investigations. Greater emphasis to adopt a systematic approach in the reporting of the use of behavioural theories/models/frameworks will benefit pharmacy practice research and will support researchers in utilizing behavioural theories/models/framework in aspects of pharmacy practice research beyond intervention development.

Keywords Behavioural theory · Pharmacy research · Pharmacy · Scoping review · Theoretical framework

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Impact statements

- There is trend indicating the increased adoption of behavioural theories/models/frameworks to underpin pharmacy practice research. However, identified articles are limited to predominantly investigations of intervention development. Therefore, we recommend that future research utilize behavioural theories/models/frameworks in phase 2–4 of the UK MRC framework.
- Pharmacy practice research will benefit from adopting a systematic approach in the reporting of the use of behavioural theories/models/frameworks.
- Inconsistent reporting of using theories/models/frameworks in pharmacy practice research has been noted among included studies, thus we suggest establishing a specific reporting checklist which could enhance the comprehensiveness of reporting and subsequently enable practitioners, policymakers, and other stakeholders to develop theory-informed interventions to promote patient safety and enhance the pharmacy practice.

Introduction

Pharmacy practice is described as a "scientific discipline that studies the different aspects of the practice of pharmacy, and its impact on health care systems, medicine use, and patient care" [1]. It focuses on improving health outcomes of individuals and populations as well as improving access, safety, and breadth of available services [2]. Pharmacy practice research therefore embraces both clinical pharmacy and social pharmacy elements [3]. While the terms 'clinical pharmacy' and 'pharmaceutical care' have been instrumental in initiating a shift towards more person-centered approach, its distinct research scope has expanded globally to encompass clinical, behavioural, economic, and humanistic implications of the practice of pharmacy [1, 4].

A discussion paper by Nørgaard et al. in 2000 argued the need for theory-based pharmacy practice research [5]. Pharmacy practice research often focuses on the design, implementation and evaluation of pharmacy services and interventions aimed at optimising patient safety [6]. These pharmacy services all contain an element of behavioural change for the pharmacist, the patient or the wider public, to produce the desired target outcome [7]. To assist researchers, the UK MRC Framework, first published in 2000, provides a structured approach to develop, evaluate, and implement such complex interventions using a range of qualitative, quantitative and mixed-method research approaches to help researchers make appropriate methodological and practical choices [8]. The UK MRC framework recognizes four phases of complex intervention research: 1. Development or identification of an intervention; 2. Assessment of feasibility of the intervention and evaluation design, 3. Evaluation of the intervention, 4. Impactful implementation [8]. They advocate underpinning theory at each phase.

Underpinning studies with behavioural theories/models/frameworks, has the potential to assist researchers to better understand the behaviour change process and guide the refinement of the intervention [9].

Many behavioural change theories/models/frameworks exist in the application of healthcare research. As a result, identifying the most suitable behavioural theory/model/framework to adequately address the desired research question is difficult and requires the appropriate expertise and a comprehensive understanding of available theories, models and frameworks. This starts with a correct understanding of the terminologies used.

Theories, models, and frameworks explained

Although there are many explanations of theories, models, and frameworks, there are many similarities and overlapping concepts. One common definition of 'theory' is "…an account of the world, which goes beyond what we can see and measure. It embraces a set of inter-related definitions and relationships that organises our concepts and understanding of the empirical world in a systematic way" [10]. A good theory provides a clear explanation of how and why specific relationships lead to specific events [11].

A model is often a simplified representation of a complex system, designed to focus on a specific question [12]. Models can be described as theories with a more narrowly defined scope of explanation; a model is descriptive, whereas a theory is explanatory as well as descriptive [13]. Models need not always be completely accurate representations of reality to be of value [14]. According to Creswell, a complex research theory may be presented as a simplified model so "that the reader can visualize the interconnections of variables" [15]. A conceptual framework on the other hand provides a set of "big" or "grand" concepts or theories [16]; frameworks do not provide explanations; they categorise empirical phenomena [13].

Supplementary Material 1 aims to provide a brief overview of some of the behavioural theories/models/frameworks commonly used in healthcare research. Bandura's Social Cognitive Theory proposes that people are driven by external factors rather than inner forces [17]; the Theory of Planned Behaviour is dependent on one's intention to perform the behavior [18], while the Transtheoretical Model proposes change as a process of six stages [19]. The COM-B model allows the mapping of the capability, opportunity and motivation of any person to determine the likelihood of a behaviour to occur

[20]. The Theoretical Domains Framework (TDF), an "integrative framework developed from a synthesis of psychological theories as a vehicle to help apply theoretical approach to intervention aimed at behavioural change", is useful to better understand implementation problems of health initiatives which are often heterogeneous and complex [21].

The recently articulated Granada statements published in a number of clinical and social pharmacy practice journals aspire to improve the quality of publications and advance the paradigms of related pharmacy practice research [3]. It is therefore timely to review the use of behavioural theories/models/frameworks in pharmacy practice research to date to inform future studies.

Aim

The aim of this scoping review was to collate, summarise and categorise the reported behavioural theories/models/frameworks used in pharmacy practice research.

Method

Protocol and registration

This scoping review was conducted and reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-analysis extension for scoping review (PRISMA-ScR) guidelines [22]. The protocol was registered in the Open Science Framework database (Registration number: qfw6d).

Eligibility criteria

The review included studies published in pharmacy practice journals. A list of the 33 peer-reviewed pharmacy practice journals indexed in PubMed, was compiled based on Mendes et al.'s study, which classified 285 pharmacy journals into six clusters including 'Pharmacy Practice' (67 journals, 33 indexed in PubMed) [23]. (Supplementary Material 2).

Databases were searched since inception to capture all pharmacy practice articles that had reported the use of any behavioural theories/models/frameworks. If it was not immediately clear whether the theory/model/framework was eligible for inclusion, consensus was sought between two research team members (ZN and LN) with reference made to the research that described the theory/model/framework development, if necessary. Consultation with the wider research group was made if consensus could not be reached.

Only studies published in English were included. All primary research study designs and reviews were considered. Letters, commentaries, perspectives, and editorials were excluded, as were studies that developed and/or validated theories.

Information sources and search strategy

The following electronic databases were independently searched by two authors (ZN, LN) on 30 May 2022; PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science and EBSCO (CINAHL PLUS, British Education index, ERIC). The following search string was used for PubMed and adapted for the other databases: (pharmacy(MeSH) [Title/Abstract]) AND ((theor*[Title/Abstract]) OR (framework [Title/Abstract])). Search strategies are provided in Supplementary Material 3.

Articles were exported to Rayyan QCRI® [24] and duplicates removed. Filters were applied to include articles published in the aforementioned 33 Pharmacy Practice Journals. Title/abstract screening and full-text screening were independently performed by two reviewers (ZN, LN). In cases of disagreements a third reviewer was consulted. Reference lists of included studies were manually checked.

Data charting process and data items

The authors designed a data extraction tool based on the inclusion criteria and focused on key information required to comprehensively answer the research question and piloted it with 3 included articles. The following data were extracted: country, year of publication, study type and design, objective of study, outcomes measured, and the theory/model/framework reported in the study. Further details regarding how the theories/models/frameworks were used in study design including the research phase, context, and purpose of its use, were also extracted. Six reviewers were involved in the data extraction process and data extraction of each article was performed independently by two reviewers. In cases of disagreements a third reviewer was consulted.

Synthesis of results

Data were summarized quantitatively and qualitatively in relation to the research aim. Descriptive statistics were used to describe the number of studies by year published, country, and research design. Summary statistics were used to report the frequency of use, rationale for use, and how each theory/model/framework was used in the reported studies. A narrative approach was adopted to synthesise the findings. Narrative synthesis has been defined as "an approach to the systematic

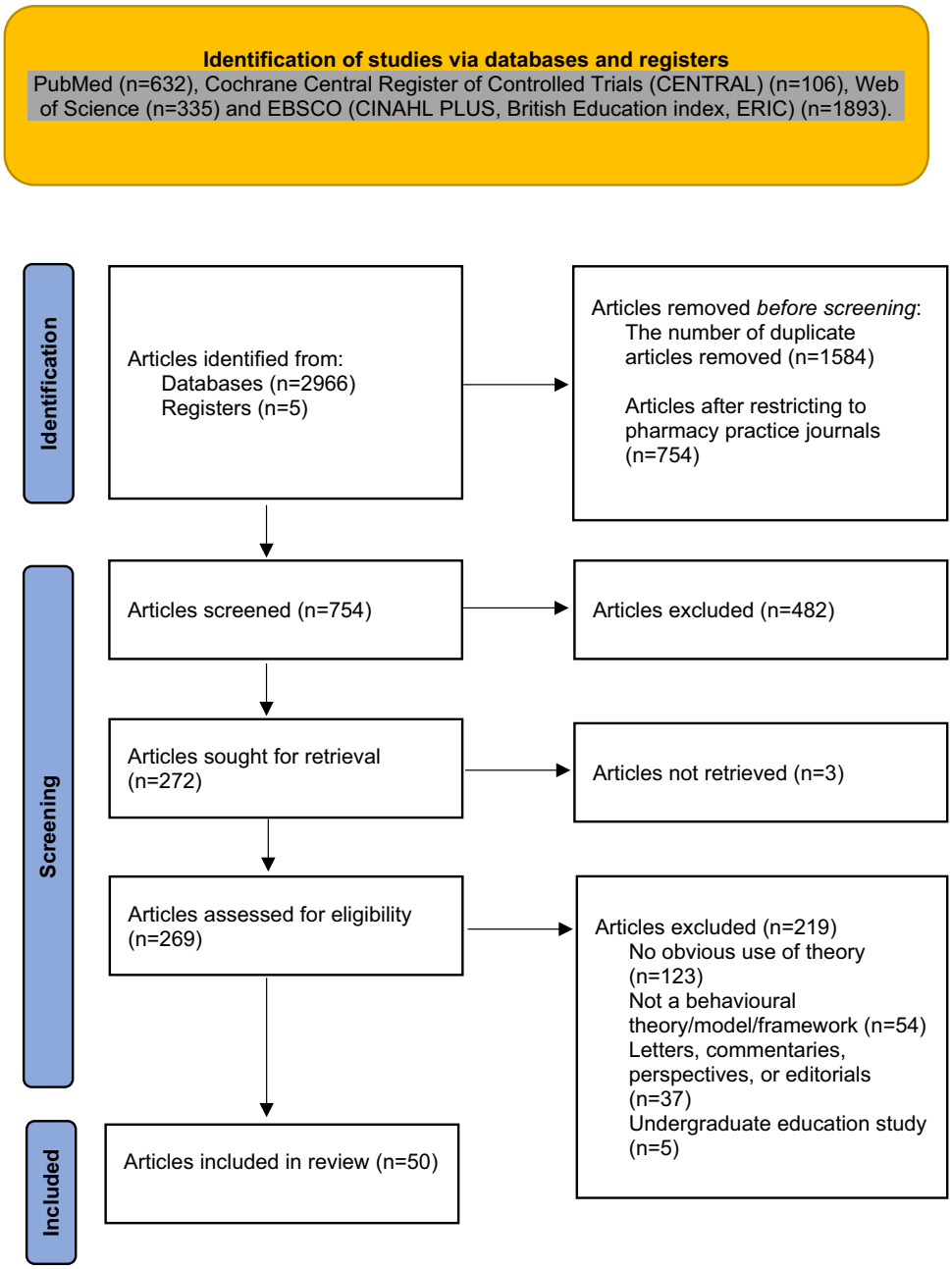

Fig. 1 PRISMA diagram of study selection and inclusion

review and synthesis of findings from multiple studies that relies primarily on the use of words and texts to summarize and explain the findings of the synthesis" [25].

Further, studies reporting a complex intervention as defined by the UK MRC, as those with several interacting components, or if they are dependent on the behaviour of those delivering and receiving the intervention [8], were reviewed to identify in which phase(s) of complex intervention research the theory/model/framework had been employed.

Results

Search results

Fifty articles met the inclusion criteria (Fig. 1 presents the PRISMA Flow Diagram). A summary of the characteristics of included studies is presented in Table 1 and Supplementary Material 4 provides full details of the included studies.

Table 1 Summary of the characteristics of included studies (n = 50)

Geographical dispersion of the studies. n = number of studies, (% of the included studies)			
North America	21 (42%)	Oceania/Australia	8 (16%)
Europe	9 (18%)	Africa	2 (4%)
Asia	8 (16%)	Not applicable/Not stated	2 (4%)
Setting in which the studies were conducted. n = number of studies, (% of the included studies)			
Community pharmacies	30 (60%)	Primary care	3 (6%)
Multiple settings	12 (24%)	Not stated	2 (4%)
Hospital (inpatient and outpatient)	3 (6%)		
Study population. n = number of studies, (% of the included studies)			
Pharmacy workforce	31 (62%)		
Patients	12 (24%)	Physicians	1 (2%)
Multiple stakeholders	5 (10%)	Not applicable	1 (2%)
Methods adopted in the included studies. n = number of studies, (% of the included studies)			
Quantitative (survey)	18 (36%)	Mixed methods	9 (18%)
Qualitative (interviews)	15 (30%)	Systematic review	1 (2%)
Qualitative (focus groups)	4 (8%)	Others (mapping, exploratory descriptive)	2 (4%)
Qualitative (focus groups and interviews)	1 (2%)		
Theory/model/framework adopted. n = number of studies, (% of the included studies)			
TPB	18 (36%)	Miscellaneous	7 (14%)
TDF	11 (22%)	COM-B	3 (6%)
Multiple theories	9 (18%)	HBM	2 (4%)

TBP: Theory of planned behaviour; TDF: theoretical domain framework; COM-B: capability, opportunity, and motivation behavioural model; HBM: health belief model

Study characteristics

Included studies were published between 2006 and 2022, with a marked rise after 2014 (Fig. 2). Most studies were conducted in North America (n = 21) and in community pharmacies (n = 30). Study subjects included pharmacy workforce (n = 31), patients (n = 12), multiple stakeholders (n = 5), and physicians (n = 1) (Table 1).

Twenty studies were qualitative (primarily individual interviews), eighteen cross-sectional surveys and nine mixed-methods. Only one systematic review related to pharmacy practice reported utilizing a theory for data synthesis [26]. Tables 2, 3, 4 present details describing the aim of the

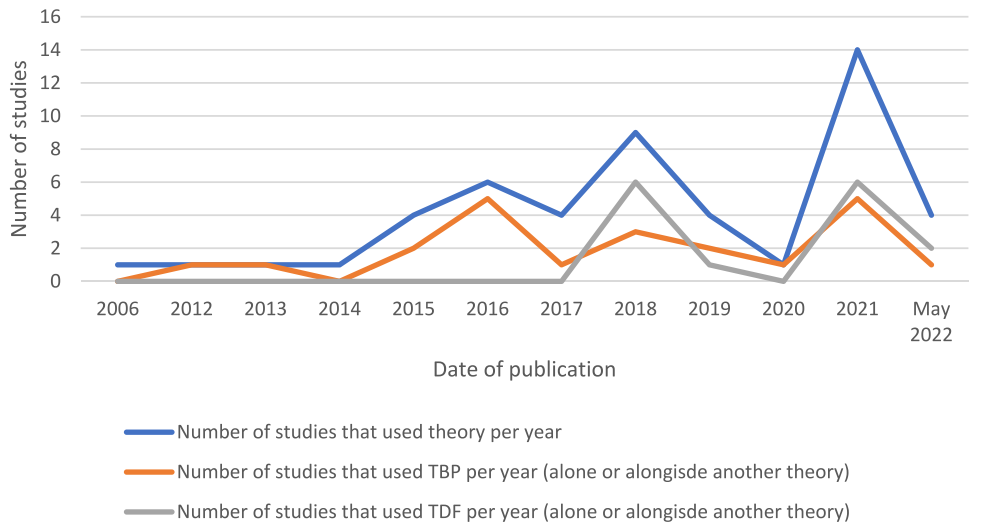

Fig. 2 The number of pharmacy practice studies adopting behavioural theory/model/framework since 2006

Table 2 Summary of how the theory of planned behaviour (TBP) was used in the included studies (n = 18)

Authors	Study design	Study population	Purpose of using theory/model/framework	Aspect of the research using theory/model/framework
Salgado et al. [56]	Qualitative, semi-structured interviews	Renal-specialized hospital pharmacists	To investigate intentions to implement pharmacy services in outpatient dialysis centers	Interview guide, data analysis & interpretation
DeMik et al. [70]	Quantitative, cross-sectional survey	Physicians & pharmacists	To investigate behavioural determinants to implement new pharmacy clinical service	Questionnaire design, data analysis & interpretation
Amin et al. [44]	Quantitative, cross-sectional survey	Community pharmacists	To investigate medication regimen adjustment behavioural for patients during Ramadan	Integrated into research question, study design, data collection, analysis & interpretation
Kennelty et al. [43]	Qualitative, semi-structured interviews	Community pharmacists	Explore the barriers & facilitators faced when reconciling medications	Interview guide, data analysis & interpretation
Amin et al. [62]	Quantitative; cross-sectional survey	Community pharmacists	To predict counseling on oral contraceptives (OCs)	Questionnaire design, data analysis & interpretation
Lee et al. [63]	Quantitative; cross-sectional survey	Asthma patients	To examine the influences, motivation, and self-efficacy to collect asthma controller medications from the pharmacy	Survey design, data analysis & interpretation
Puspitasari et al. [67]	Quantitative; cross-sectional survey	Community pharmacists	To investigate attitudes to delivering cardiovascular disease (CVD) support; and the environmental factors that influence the provision of CVD care	Questionnaire design, data analysis & interpretation
Tan et al. [45]	Mixed methods; semi-structured interviews, survey	Patients	To explore the key determinants and mediators of successful implementation of new public pharmaceutical services	Data analysis & interpretation
Amin et al. [57]	Qualitative; semi-structures interviews	Community pharmacy staff	To examine factors associated with the unwarranted dispensing of subtherapeutic doses of antibiotics	Interview guide, data analysis & interpretation
Adeoye et al. [39]	Quantitative; cross-sectional survey	Community pharmacy staff	To investigate association between attitudes and planned behaviourals toward participating in medication therapy management services	Questionnaire design
George et al. [59]	Qualitative; focus group	Community pharmacists	To explore factors associated beliefs to improve Star Ratings	Interview guide, data analysis & interpretation
Humphries et al. [58]	Qualitative; focus groups and individual interviews	Hospital & community pharmacists	To identify attitudinal, normative, and control beliefs regarding adjuvant endocrine therapy adherence	Interview guide
Fleming et al. [46]	Qualitative; focus groups	Community pharmacists	To investigate beliefs regarding willingness to engage patients with suspected controlled substance misuse	Interview guide
Hasan et al. [49]	Quantitative; survey	Community pharmacy patients	To understand factors influencing intention to seek pharmacist-provided medication therapy management services	Questionnaire design
Falope et al. [48]	Qualitative; interviews	Pharmacists	To explore the perceptions and knowledge of administering inactivated influenza vaccines (IIV) to pregnant women	Interview guide
Gülpinar et al. [47]	Qualitative; semi-structures interviews	Community pharmacy	To explore conscientious objection to provide pharmacy services that are contrary to personal beliefs	Interview guide, data analysis & interpretation
Nichols et al. [38]	Quantitative; cross-sectional survey	Community pharmacy preceptors	Investigate experiences, clinical and legislative knowledge, attitudes, and behaviourals regarding cannabidiol	Questionnaire design
Wash et al. [53]	Qualitative; focus groups	Pharmacists (& 1 pharmacy student)	To identify factors that influence intention to prescribe	Interview guide, data analysis & interpretation

included studies; the majority of the studies were investigations of pharmacy complex interventions, as defined by the UK MRC framework. These included investigations to explore pharmacists' involvement in various initiatives such as medicines optimization services [27], immunization clinics [28], pharmacist prescribing [29], falls prevention [30], medicines management services [31–35], and pharmacogenomics testing [36, 37].

Theories, models, frameworks used

Tables 2, 3, 4 present the data pertaining to how theories/models/frameworks were used in the included studies. The majority (n = 39) of studies used a single theory/model/framework, most commonly the Theory of Planned Behaviour (TPB) (n = 18), followed by the Theoretical Domains Framework (TDF) (n = 11). In studies using a combination of multiple theories/models/frameworks; the most frequent combination was TDF with the Capability, Opportunity, and Motivation Behaviour (COM-B) model.

Justification for theories/models/frameworks selected

Multiple justifications were reported for the use of theories/models/frameworks however, reporting was inconsistent, for example multiple studies simply mentioned that the theory/model/framework guided the development of the data collection tool [32, 37–42]. Beyond this, 14 studies provided a description of the theory/model/framework constructs and/or assumptions but without connecting it to the research question [28, 43–55]. Nine studies provided the justification that the theory/model/framework had been used previously in similar research or within the same field [27, 30, 33, 56–61]. Only seven studies connected the theory/model/framework with the research question of the study [26, 29, 31, 34, 62–64]. Other reasons provided included the potential/predicted benefits the theory/model/framework might have on the findings (n = 3) [65–67]; recommendation from leaders in the field (n = 2) [68, 69]; and the absence of theory-informed studies in the existing body of literature (n = 2) [70, 71].

Studies that combined multiple theories/models/frameworks cited their potential synergies as the chief driver for their combined use (n = 3) [35, 36, 72] however six studies did not provide a rationale for the combination [37, 41, 42, 73–75].

How theories/models/frameworks were used

The use of most theories/models/frameworks (n = 31) aligned to Phase 1 of the MRC framework; to explore determinants of behaviours, or facilitators and barriers to implementing or delivering new pharmacy services. Eighteen of these studies proceeded to identify theoretical domains that should be targeted in future interventions aimed at behavioural change. Three studies [35, 54, 55] aligned to Phase 2 of the MRC framework where the theory/model/framework was used in assessing intervention feasibility. However, there was a lack of detail to determine how the theory underpinned this assessment. Studies to evaluate an intervention and to assess the impact of an intervention (Phase 3 and 4 of the MRC framework) were not identified in this review. Most theories/models/frameworks were used to inform the item development of the data collection tool (n = 24) followed by guiding data analysis (n = 17). A large number of studies used theories (n = 20) in multiple aspects of the research, in most cases to inform the data collection tool then in the subsequent data analysis and interpretation. An example includes a study that used TPB in constructing interview questions to examine the barriers and facilitators reported by community pharmacists when reconciling medications for patients recently discharged from hospital. The subsequent analysis generated themes organized based on the TPB constucts [43].

The following sections provide descriptions specific to how each of the most common theories/models/frameworks were utilized in the included studies.

Theory of planned behaviour (TPB)

TPB was used in 21 studies (Table 2 provides a summary of how TPB was used in 18 of these studies, in the other three studies TPB was used alongside a second theory/model/framework, details of studies which combined multiple theories/models/frameworks can be found in Table 4). Of the 18 studies, 15 were conducted with pharmacy professionals, in the most part to investigate behavioural influences to either implement or deliver pharmacy service initiatives (examples include vaccination services, medication therapy management services, cardiovascular support) or specific aspects of pharmaceutical care (examples included medication counselling, clinical decision making, ethical dilemmas). Three studies were conducted with patients, their focus was to understand patient behaviours in seeking pharmacy services. Although not explicitly mentioned in the majority of reports, the intervention studies aligned to Phase 1 of the UK MRC framework. TPB was used to guide the design of the data collection tool in majority of studies and less frequently to guide the analysis and interpretation of the collected data.

Theoretical domains framework (TDF)

TDF was used in 15 studies (Table 3 provides a summary of how TDF was used in 11 of these studies, in the other

Table 3 Summary of how the theoretical domains framework (TDF)) was used in the included studies (n = 11)

Authors	Study design	Study population	Purpose of using theory/model/framework	Aspect of the research using theory/ model/ framework
Cardwell et al. [32]	Qualitative; semi-structures interviews	Community pharmacists	To identify facilitators and barriers towards the utilization of a screening tool as a guide to conducting structured medicines use review (MURs)	Interview guide
Isenor [29]et al.	Quantitative; cross-sectional survey	Licensed pharmacists that are members of the Pharmacy Association of Nova Scotia	To identify barriers and facilitators to pharmacist prescribing	Questionnaire development
Rushworth et al. [50]	Quantitative; survey	Patients	To identify issues of access to general practitioners, community pharmacies and prescribed medicines in older people resident in the Scottish Highlands	Questionnaire development
Seubert et al. [55]	Mixed methods; systematic review, focus groups, intervention development, intervention feasibility study	Pharmacy staff and consumers	To identify barriers and facilitators for information exchange during OTC consultations in community pharmacies	Data analysis
Seubert et al. [54]	Mixed methods study; audio-recording, OTC consultations, consumer questionnaires and interviews, and pharmacy personnel interviews	Pharmacy staff and consumers	To explore intervention functions and the resulting behavioural change techniques that would most suitably address these barriers were identified	Data analysis and interpretation
Paudyal et al. [40]	Quantitative; survey	Community pharmacists	To determine community pharmacists' training, experiences and behavioural determinants in counselling and management of homeless population	Questionnaire development
Hussein et al. [65]	Mixed methods; survey, semi-structured interviews	Pharmacists	To identify barrier and facilitators influencing the adoption of full scope services among pharmacy professionals	Questionnaire and interview design, data, triangulation of findings
Mohammed et al. [66]	Qualitative; interviews	Pharmacists	To explore pharmacist's perceptions, current opportunities and key challenges towards the uptake of non-traditional roles	Data analysis
Patton et al. [31]	Mixed methods; semi-structured interviews, cross-sectional survey	Community pharmacists	To identify barriers and facilitators influencing community pharmacists' provision of medication adherence support (MAS) to older patients prescribed multiple medications	Interview guide, questionnaire development, data analysis and interpretation
Alenezi et al. [27]	Qualitative; semi-structures interviews	Community pharmacists	To explore pharmacists' roles, barriers and determinants related to pharmacists' involvement in optimizing prescribed opioids for patients with chronic pain	Interview guide
Lindner et al. [28]	Quantitative; cross-sectional survey	Community pharmacists	To identify relevant requirements and barriers to implementation of an immunization service and desired training specifications	Questionnaire development

4 studies TDF was used alongside a second theory/model/framework, details of these studies are presented in Table 4). Eight of the 11 studies were conducted with pharmacy professionals, in the most part to identify facilitators and barriers to either implement or deliver pharmacy service initiatives (examples include independent prescribing and immunization clinics) or specific aspects of pharmaceutical care (for example medication counselling). Thirteen studies aligned to Phase 1 of the UK MRC framework, the two other studies [54, 55] were research articles presenting data from the same project which aimed to assess the feasibility of delivering extended pharmaceutical care in community pharmacies in Australia.

Capability, opportunity, and motivation behaviour (COM-B) model

COM-B was used in 8 studies (Table 4 provides a summary of how COM-B was used in 3 of these studies, in the other 5 studies COM-B was used alongside another theory/model/framework, details of which are also presented in Table 4). All studies that used COM-B were conducted with community pharmacists to explore behavioural determinants to implement pharmacy services initiatives (these included a fall prevention service, extended pharmaceutical care services, and an asthma management service) and aligned to Phase 1 of the MRC framework. In all studies COM-B was used exclusively in the data analysis.

Health belief model (HBM)

HBM was used in 5 studies (Table 4 provides a summary of how HBM was used in 2 of these studies; in the other 3 studies HBM was used alongside another theory/model/framework, details of which are also presented in Table 4). All studies that used HBM were conducted with patients to explore behavioural determinants and predict behaviours. The studies aligned to Phase 1 of the UK MRC framework. In all studies, HBM was used for questionnaire development.

Studies that used multiple theories/models/frameworks

Other than studies utilizing TDF, which is a comprehensive framework derived from 33 psychological theories and 128 theoretical constructs [21], there were nine studies that combined multiple theories/models/frameworks. (Table 4). All studies that combined multiple theories were conducted with pharmacy professionals except for one with physicians investigating a substance misuse treatment service [72]. The primary purpose for conducting these studies was to explore behavioural determinants to implement pharmacy-based services. However, one study that described a service to treat non-prescription medication dependence used TDF and COM-B to establish the physicians' behaviours that should be targeted in an intervention [72]. These studies aligned to Phase 1 of the UK MRC framework.

Other theories/models/frameworks

Thirteen other behavioural theories/models/frameworks were adopted in the included studies, seven were used alone and six were combined with one of the aforementioned theories/models/frameworks. The justification and purpose for use of these theories/models/frameworks was inconsistently described. For instance, the Model of Communicative Proficiency (MCP) was used in a study to frame the findings but there was no consideration of its integration into the study methodology [60]. Exceptions to this were (n = 3) using the Andersen Behavioural Model [64], Explanatory Models of Illness (EMI) [41], and Alimo-Metcalfe and Alban-Metcalfe Model of Transformational Leadership [26]. The use of these theories/models/frameworks were thoroughly described and were incorporated in the design, analysis, and results synthesis and interpretation. In these studies theories were used to identify the determinants of behaviour to target in future interventions.

Reported benefits and challenges of using a theory/model/framework

Multiple studies described the benefits of using a theory/model/framework. Most frequently mentioned was the use of theory facilitating a more comprehensive understanding of the phenomenon under investigation compared to existing similar interventions; and secondly, the use of theory elucidated specific psychosocial factors influencing health-related behaviours and provided avenues for future research into targeted intervention development and relevant policy to improve practice or enhance patient safety. In contrast, the challenges authors faced in using theory/model/framework were rarely reported in the manuscript.

Discussion

Summary of key findings

This study identified the increasing trend to adopt the use of behavioural theories/models/frameworks within pharmacy practice research. The most utilized behavioural theories reported in pharmacy practice studies were the most established: Theory of Planned Behaviour (TPB); Theoretical Domains Framework (TDF): Capability, Opportunity, and Motivation Behaviour (COM-B) model; and the Health

Table 4 Summary of how other theories were used in the included studies

Authors	Theory/model/framework used	Study design	Study population	Purpose of using theory/model/framework	Aspect of the research using theory/ model/framework
Studies that used the COM-B model					
Hattingh et al. [51]	COM-B	Qualitative; semi-structures interviews	Community pharmacists	To explore the factors that contributed to the successful implementation and ongoing provision of enhanced and extended services in Western Australian community pharmacies	Data analysis
Bertilsson et al. [33]	COM-B	Qualitative; semi-structures interviews	Community pharmacists	To identify factors affecting recruitment of patients in community pharmacies participating in a multicenter trial of a pharmacy asthma service in Australia	Data analysis
Gemmeke et al. [30]	COM-B	Mixed methods; survey, interviews	Community pharmacists	To identify barriers and facilitators in offering fall prevention services including deprescribing of fall risk-increasing drugs (FRIDs)	Data analysis and interpretation of the qualitative part
Studies that used the HBM					
Pinto et al. [68]	HBM	Quantitative, cross-sectional survey	Patients	To determine factors affecting patient retention in pharmaceutical care services	Questionnaire development
Alatawi et al. [34]	HBM	Quantitative; cross-sectional survey	Patients	(1) assess self-report of medication-taking in a Saudi T2D convenience sample, (2) investigate self-reported HBM constructs for T2D, its complications, and medication-taking in this sample, and (3) test the ability for self-reported health beliefs to predict specific medication-taking behaviourals among the sample	Questionnaire development, data interpretation and discussion
Studies that used other theories/models/frameworks					
Odukoya et al. [71]	Three-step error recovery model	Mixed methods; observations, interviews, focus groups	Community pharmacists	To describe the process used by community pharmacy staff to detect, explain, and correct e-prescription errors	Interview guide and data analysis
Desai et al. [64]	Andersen Behavioural Model	Quantitative; cross-sectional survey	Consumers	To identify factors associated with accessing medications/vitamins online and to identify factors associated with discussions of online information	Data analysis
Ziaei et al. [60]	Model of Communicative Proficiency (MCP)	Qualitative, focus groups	Pharmacists (community and hospital)	To investigate Internationally Trained Pharmacists (ITPs') perceptions of their communication proficiency and the resultant impact on patient safety	To understand the findings
Chevalier B et al. [61]	Communication Accommodation Theory (CAT)	Qualitative; semi-structures interviews	Pharmacists and patients (inpatient and outpatient)	To explore hospital pharmacists' and patients' views about what constitutes effective communication exchanges between pharmacists and patients	Data analysis
Murad et al. [52]	Face-work theory	Exploratory descriptive design	Community pharmacists and customers	To determine face needs, threats and the strategic communication strategies used to address these within community pharmacist-patient interactions	Data analysis

Table 4 (continued)

Authors	Theory/model/framework used	Study design	Study population	Purpose of using theory/model/framework	Aspect of the research using theory/ model/framework
Waddell et al. [69]	Alimo-Metcalfe and Alban-Metcalfe model of transformational leadership	Mapping	Not applicable	To map the leadership and management domain of the Australian Advanced Pharmacy Practice Framework (APPF) against the model of transformational leadership and make comment on the potential utility of the APPF to develop advanced practitioners in the area of leadership and management	To map the Australian framework
Qudah et al. [26]	Street's Linguistic Model of Patient Participation in Care (LM)	Systematic review	Community pharmacists	To identify barriers and facilitators of patients' engagement in pharmacy consultations	Data synthesis (mapping)
Studies that used multiple theories/models/frameworks					
Luder et al. [73]	HBM, TPB, and Theory of Reasoned Action (TRA)	Quantitative; cross-sectional survey	Community pharmacists	To describe the characteristics, health beliefs, and cues to action of newly enrolled participants	Questionnaire development
Fingleton et al. [72]	TDF and COM-B model	Mixed methods; survey, semi-structured interviews	Doctors	To establish how non-prescription medicine (NPM) dependence is treated by doctors in specialist substance misuse treatment services and to identify perceived barriers to providing treatment	Questionnaire development and interview topic guide
Jonkman et al. [41]	HBM, TPB, and the Explanatory Models of Illness (EMI)	Qualitative; semi-structures interviews	Public hospitals, private hospitals, and community pharmacies	To identify patient-reported barriers and facilitators to managing chronic non-communicable diseases (NCDs) and characterize medication and health related needs with chronic NCDs	Interview guide design and data analysis
Abdu-Aguye et al. [75]	TDF and COM-B model	Qualitative; semi-structures interviews	Outpatient pharmacies located within hospitals	To understand barriers/facilitators to optimal medication counselling by conducting a behavioral analysis using the COM-B model, TDF, and BCW	Interview guide design and data analysis
Bright et al. [37]	Rubin and Rubin framework and TPB	Qualitative; semi-structures interviews	Community pharmacists	To identify patient perceptions related to pharmacogenomic testing in the community pharmacy setting	Interview development
Faisal et al. [35]	The Technology Acceptance Model (TAM), TPB, and COM-B model	Mixed methods; semi-structured interview, survey	Community pharmacists	To explore factors affecting implementation of a real-time adherence-monitoring, multidose-dispensing system in community pharmacies	Interview development; analysis (mapping) of themes
Luke et al. [36]	TDF and COM-B model	Qualitative; semi-structures interviews	Pharmacists who completed the PRIME training program irrespective of setting	To elucidate the factors influencing the integration of pharmacogenomics testing by pharmacists in their practices	Data analysis
Viegas et al. [74]	TDF and COM-B model	Quantitative; cross-sectional survey	Community pharmacists	To characterize the major facilitators and barriers faced by pharmacists in their daily practice	Questionnaire development
Okuyan et al. [42]	Transtheoretical model of behavior change and HBM	Quantitative; cross-sectional survey	Community pharmacists	To determine the intention to receive COVID-19 vaccine and to identify the factors related to it based on the HBM framework among Turkish pharmacists	Questionnaire development

COM-B: capability, opportunity, and motivation behavioural; HBM: health belief model; TPB: theory of planned behaviour; BCW: behavioural change wheel

Belief Model (HBM). These findings are consistent with reviews conducted in other health domains [76–78]. Few studies provided explicit and comprehensive justification for adopting a specific theory/model/framework.

The majority of the included studies were investigations exploring determinants of behaviours, or facilitators and barriers to implementing or delivering a wide range of pharmacy services and initiatives within a variety of clinical settings. In reviewing the use of behavioural theories/models/frameworks against the four phases of complex intervention research proposed in the UK MRC framework, it was determined that most studies were focused on developing an intervention within a pharmacy setting (Phase 1), very few studies aligned to Phases 2–4 of the UK MRC framework.

Strengths and limitations

This scoping review was conducted through the application of rigorous and transparent processes [22, 79] and to the best knowledge of the authors, is the first review that reports the use of behavioural theories/models/frameworks in pharmacy practice research. One limitation is that the review was restricted to articles published in the English language only, and articles published in 33 'Pharmacy Practice' journals hence relevant publications in other languages, and in other pharmacy and non-pharmacy journals were not included. Also, investigating the gaps in the theories/models/frameworks that have been applied to pharmacy practice research fell outside the scope of this review, but the authors agree that this would be a worthwhile follow-up study.

Interpretation of findings

The majority of the included studies reported on interventions within pharmacy practice. Whilst there were many studies investigating determinants of behaviours, or facilitators and barriers to implementing new services (phase 1 of the MRC framework); there were substantially fewer studies reporting on the subsequent phases of the MRC framework. There is evidence to suggest that studies of intervention feasibility, evaluation and implementation are frequently published in journals other than pharmacy practice journals. For example a 2020 systematic review of interventions using health behaviour theories to improve medication adherence among patients with hypertension, included 11 studies, none of which were published in pharmacy practice journals [80]. The same finding was found from a 2022 systematic review to determine the utilization of the transtheoretical model of change, to predict or improve medication adherence in patients with chronic conditions [81]. Although, it is possible that publishing in non-pharmacy practice journals may enhance the visibility of the research, it means that pharmacy practice journals do not benefit from the potential impact of this research. Furthermore, the Granada statements encourage researchers to prioritise pharmacy practice and social pharmacy journals for some of their "best" work with the aim to strengthen the discipline of pharmacy practice research [3].

The use of a behavioural theory/model/framework to underpin data collection tools and data analysis in the included studies, was reported to elicit greater insight of behavioural determinants compared to existing literature that had not adopted this approach. This broader assessment was often claimed to have helped in identifying potentially unknown behavioural influences which can be targeted in the design of interventions. However, beyond describing how theory was used to inform questionnaire-design, studies lacked explicit detail of how the theory was used to underpin data analysis and interpret study findings. It is plausible, as suggested elsewhere in the literature, that word limits imposed by journals may restrict the provision of information on theoretical underpinning [82]. However, the lack of detail included meant that it was often difficult to determine what theoretical components and strategies were associated with the success or challenges of the intervention. Thus, we recommend the inclusion of further detail relating to theoretical underpinnings and expected causal mechanisms of behavioural change prospectively, and evaluation of these mechanisms to better understand what strategies are effective. This would facilitate evidence synthesis, prevent research duplication and enhance transferability of study findings [83, 84].

Moreover, since it is well-established that the use of theory in intervention research allows understanding of interventions' mechanisms of action and are more likely to result in effective and sustained interventions [83, 85], greater consistency in describing the rationale for theory selection is warranted, with recognition that different theories are more applicable to different study settings. Selecting the most appropriate theory from amongst the wide range of options, is likely to be perplexing for researchers [86, 87], thus, guidelines to direct researchers in this regard may also serve as a useful resource. The use of checklists such as the Template for Intervention Description and Replication (TIDieR), which includes an item to describe any theory used in studies when describing an intervention, has been developed to improve the completeness of reporting, and ultimately the replicability, of interventions [88]. Also authors may consider the use of a tool recently developed by Michie and Prestwich, the Theory Coding Scheme(TCS), which assesses the degree to which an intervention uses theory to guide intervention design, implementation and evaluation [89]. This tool includes 10 specific coding criteria, which range from noting whether a theory was mentioned in the introduction of a journal article to whether the findings of the study were discussed in a theoretical context. This

tool may serve as a useful framework for authors to improve the use of theory and act as a blueprint for the design and reporting of intervention studies.

Further work

With the growing use of behavioural theory in pharmacy practice research, studies to ascertain whether theories/models/frameworks are being used correctly are warranted. For example, constructs may be misinterpreted or poorly measured which may result in inappropriate analysis. Such studies will help to provide further guidance for researchers.

Furthermore, this review has highlighted the inconsistent reporting of using theories/models/frameworks in pharmacy practice research, thus suggesting potential advantage to establish a specific reporting checklist.

Finally, this review did not elicit the challenges researchers face in using behavioural theory to underpin their studies, further investigations are necessary to explore these issues.

Conclusion

Behavioural theory/models/frameworks are increasingly being adopted to underpin pharmacy practice research across a variety of research designs and frequently in studies of initial investigations of complex interventions within various settings. The findings from this review indicate the need for more thorough reporting in regards to the rationale for the selection of a specific behavioural theory/model/framework; details of its application in underpinning the research; and the challenges and limitations encountered. Clearer reporting will aid in determining how best to use behavioural theory/models/frameworks in pharmacy practice research. Furthermore, studies adopting behavioural theories/models/frameworks in the latter stages of interventional research (feasibility testing, evaluation and implementation) published in pharmacy practice journals will help to further strengthen the field.

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Supplementary Material 1: A brief overview of some of the behaviour change theories, models and frameworks commonly used in pharmacy practice research

Name	Description
Theory of Planned Behaviour (TPB)/ Theory of Reasoned Action (TRA) (1)	The Theory of Planned Behavior (TPB) started as the Theory of Reasoned Action in 1980 to predict an individual's intention to engage in a behavior at a specific time and place. The theory was intended to explain all behaviors over which people have the ability to exert self-control.
Theoretic Domains Framework (TDF) (2)	The Theoretical Domains Framework (TDF) is an integrative framework developed from a synthesis of psychological theories as a vehicle to help apply theoretical approaches to interventions aimed at behavior change.
Transtheoretical Model of Behaviour change (3)	The transtheoretical model posits that health behavior change involves progress through six stages of change: precontemplation, contemplation, preparation, action, maintenance, and termination.
The Capability Opportunity Motivation-Behaviour model (COM-B) (4)	According to the COM-B model, for a given behaviour to occur, at a given moment, one must have the capability and opportunity to engage in the behaviour, and the strength of motivation to engage in the behaviour must be greater than for any other competing behaviour.
Health belief Model (5)	Suggests that a person's belief in a personal threat of an illness or disease together with a person's belief in the effectiveness of the recommended health behavior or action will predict the likelihood the person will adopt the behavior.
Andersen Behaviour Model (6)	The Andersen Model was originally proposed to present a theoretical framework to understand and explain how and why people use certain types of health services or general types of health services.

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Supplementary Material 2: The Pharmacy Practice Journals, indexed in PubMed, systematically search in conducting this review

Clinical pharmacy practice journals
American Journal of Health-System Pharmacy: AJHP
Canadian Pharmacists Journal: CPJ
Currents in pharmacy teaching & learning
European Journal of Hospital Pharmacy
European Heart Journal — Cardiovascular Pharmacotherapy
Exploratory Research in Clinical and Social Pharmacy
Expert opinion on pharmacotherapy
Hospital Pharmacy
Innovations in Pharmacy
Integrated Pharmacy Research & Practice
International journal of clinical pharmacy
Journal of Basic and Clinical Pharmacy
Journal of clinical pharmacy and therapeutics
Journal of managed care & specialty pharmacy
Journal of managed care pharmacy: JMCP
Journal of oncology pharmacy practice
Journal of pain & palliative care pharmacotherapy
Journal of Pharmacy & Bioallied Sciences
Journal of pharmacy practice
Journal of pharmacy practice and research
Journal of Young Pharmacists: JYP
Journal of Research in Pharmacy Practice
Journal of the American Pharmacists Association
Journal of the American College of Clinical Pharmacy
Medicine and Pharmacy Reports
Pharmacotherapy
Pharmacy and Therapeutics
Pharmacy Practice
Pharmacy: Journal of Pharmacy Education and Practice
Research in social & administrative pharmacy
The Annals of pharmacotherapy
The American journal of pharmacy benefits
The American journal of geriatric pharmacotherapy
The Canadian Journal of Hospital Pharmacy
The consultant pharmacist
The senior care pharmacist
The International journal of pharmacy practice

Supplementary Material 3: Search strategies applied to the electronic databases included in this review.

Database	Search Strategy	Filters applied
PubMed	(pharmacy [Title/Abstract]) AND ((theor*[Title/Abstract]) OR (framework [Title/Abstract]))	Clinical study, clinical trial, clinical trial phase I, clinical trial phase II, clinical trial phase III, clinical trial phase IV, comparative study, controlled clinical trial, evaluation study, Meta-analysis, observational study, pragmatic clinical trial, randomized controlled trial, review, systematic review validation study, English
CENTRAL	Pharmacy AND (framework OR theories)	**None**
Web of Science	(TS=(pharmacy)) AND (TS=(framework) OR TS=(theor*))	English + open access
EBSCO (CINAHL Plus, Britsih libarary index, ERIC)	AB Pharmacy AND AB (framework OR theory)	Available for free + English + Academic journals

Supplementary Material 3: Full details of included studies.

Author, date of publication	Country of the study	Aim of study	Duration of study	Outcome measure(s)	Study setting	Population	Study design	Theory/framework/model used	Purpose of the theory/ framework/model used	Authors rational for the use of theory/ framework/model	Key research findings	Conclusion
Kennelty et al, 2015	USA	(1) examine the barriers and facilitators community pharmacists face when reconciling medications for recently discharged patients; (2) identify pharmacists' preferred content and modes of information transfer regarding updated medication information for recently discharged patients	December 2012-December 2013	Barriers and facilitators community pharmacists face when reconciling medications, and pharmacists' preferred content and modes of information transfer regarding updated medication information for discharged patients	Community pharmacies	10 community pharmacists	Qualitative, semi-structured interviews	TPB	TPB was used as the guiding theory for constructing initial interview questions, the directed content analysis results are organized based on the TPB constructs	TPB posits that an individual's attitude toward the behavior, subjective norms, and perceived and actual control of a behavior shape their intent to perform a behavior and the execution of the behavior itself	In the context of the TPB, more barriers than facilitators of reconciling medications were revealed. Themes were categorized as organizational and individual-level themes. Major organizational-level factors affecting the medication reconciliation process included: pharmacy resources, discharge communication, and hospital resources. Major individual-level factors affecting the medication reconciliation process included: pharmacists' perceived responsibility, relationships, patient perception of pharmacist, and patient characteristics. Interviewed pharmacists consistently responded that several pieces of information items would be helpful when reconciling medications for recently discharged patients, including the hospital medication discharge list and stop orders for discontinued medications	The TPB was useful for identifying barriers and facilitators of medication reconciliation for recently discharged patients from community pharmacists' perspectives. The elucidation of these specific facilitators and barriers suggest promising avenues for future research interventions to improve exchange of medication information between the community pharmacy, hospitals, and patients
Amin et al, 2015	Egypt	To explore the utility of TPB model in predicting community pharmacists' Medication Regimen Adjustment (MRA) behavior for patients during Ramadan	November-December 2012	Community pharmacists' MRA behavior for patients during Ramadan	Community pharmacies	363 community pharmacists. 92.9% of the approached pharmacists participated	Quantitative, cross-sectional survey	TPB	Integrated into research question, study design, data collection, analysis & interpretation. This study employed constructs derived from TPB and adapted to the research question following pretesting	TPB implies that individuals carefully consider the available information before acting. According to TPB, attitudes, subjective norms and perceived behavioral control determine the individual's behavioral intention and consequently determine the likelihood of the individual carrying out that specific behavior	While 94.2% reported performing one or more kinds of MRA around Ramadan for at least one patient, the majority of these were for a small percentage of patients. The most common MRA was changing the frequency of taking the medication followed by the dose of the medication, the dosage form of the medication and the medication itself. Statistically significant predictors of MRA in the final model included patient social pressure (PSP), pharmacist perceived behavioral capability (PBC), pharmacist perceived patient benefit (PPB), initiating communication and the number of working hours	TPB appears to have utility in predicting pharmacists' behavior. Pharmacists may be open to a larger MRA role than they are currently performing. There is a need to prepare pharmacists to make sure they provide a safe transition for fasting patients into and out of Ramadan
DeMik et al, 2013	USA	To determine whether a correlation exists between existing clinical pharmacy services within a practice-based research network (PBRN) and provider attitudes and beliefs regarding implementing a new pharmacy intervention based on TPB	Not stated	Determinants of behavior theorized to be associated with the implementation of the intervention based on TPB	32 primary care offices throughout the USA	Physicians returned 321 (35.9%) surveys, while pharmacists returned 40 (75.5%)	Quantitative, cross-sectional survey	TPB	The survey was developed using an operation manual for validated instruments for the TPB obtained from experts in the field. TPB was integrated into the analysis and discussion	TPB has been used to explain physician intentions to perform an activity such as implementation of guidelines. TPB has been used primarily to evaluate implementation of guidelines for chronic conditions; however it has not been used to evaluate prospective clinical pharmacy interventions. Quality improvement strategies for management of chronic diseases (e.g. hypertension, asthma) may benefit from implementation research driven by theory	The Cronbach's alpha coefficients generally ranged from 0.65 to 0.98. TPB subscale scores were lower in offices rated with lower pharmacy service scores, but these differences were not statistically significant. There was no correlation between clinical pharmacy service score and providers' TPB subscale scores. In both the hypertension and asthma groups, pharmacists scores were significantly higher than physicians' scores on the attitudes subscale in the multivariate analysis	Pharmacists consistently scored higher than physicians on the TPB, indicating that they felt the hypertension or asthma intervention would be more straightforward for them to implement than did physicians. There was no significant correlation between clinical pharmacy service scores and attitudes toward implementing a future physician/pharmacist collaborative intervention using the TPB
Salgado et al, 2012	Australia	To explore renal-specialized hospital pharmacists' intentions to implement pharmacy	October-December 2010	Measures pharmacists' views on their potential involvement and perceived ease or	Society of Hospital Pharmacists of Australia	13 Australian renal-specialized hospital pharmacists	Qualitative, semi-structured interviews	TPB	The interview guide was developed based on the TBP. The analysis was also guided by TBP, the coding	TBP has been applied to healthcare research to predict health care professional and patients' behavioral change	Pharmacists demonstrated positive attitudes towards the implementation of the services. Outcomes expected included benefits to patients, the renal team, and the pharmacy profession, as well as economic savings due to dose optimization and improvement of	Pharmacists showed positive attitudes, favorable subjective norm and strong perceived behavioral control, which originated a clear behavioral intention to

		services in outpatient dialysis centers		difficulty in implementing pharmacy services in outpatient dialysis centers	Renal Special Interest Group				process began with the identification of discourse passages which fitted each component of the theory, yielding to the main themes of the analysis		patients' adherence. Subjective norm was favorable meaning that nephrologists, nurses and patients were expected to be receptive towards future pharmacy services. Barriers comprised: funding, hospital administrators' approval, time and staff shortage, academic training, relationship with physicians, and attitudes of pharmacists, renal team, and patients. Facilitators included: having an interview room with access to information sources, consent from the team, access to patients' profiles, and a full-time pharmacist with a clearly defined role	develop pharmacy services in outpatient dialysis centers
Puspitasari et al, 2016	Australia	(1) pharmacists' attitudes to delivering cardiovascular disease (CVD) support; (2) environmental factors, influence the provision of CVD care in the community pharmacy setting	Cross-sectional, data from 2014	The primary dependent variable was the provision of CVD support. There were two secondary dependent variables: the frequency of working with GPs and the level of pharmacies' involvement in providing enhanced services	Community pharmacies	N = 1350 community pharmacists; response rate 15.8%	Quantitative; cross-sectional survey	TPB	Used in development of data collection tool and then data analysis. A theoretical model was developed from the TPB with additional variables addressing environmental factors, and used as a framework for a survey instrument	The use of a theoretical framework in pharmacy practice studies serves to enrich the value and interpretability of research findings	The model for CVD support provision by demonstrated good fit. Factors found to predict CVD support included: two attitudinal latent factors ("subjective norms of pharmacists' role in CVD support" and "pharmacists' perceived responsibilities in CVD support") and environmental factors i.e. pharmacy infrastructure (documentation and a private area), workload, location; government funded pharmacy practice programs; and pharmacists' involvement with Continuing Professional Development and attendance at CVD courses	Pharmacists' attitudes appeared to be the strongest predictor of CVD support provision. TPB was useful in identifying "subjective norms" and "pharmacists' beliefs" as key constructs of community pharmacists' attitudes. Community pharmacies would be able to provide such an advanced clinical service if they strongly believed that this was an acknowledged part of their scope of practice, had adequate infrastructure and employed sufficient numbers of pharmacists with appropriate and relevant knowledge
Amin et al, 2016	Egypt	To predict Egyptian community pharmacists' counseling on oral contraceptives (OCs) while utilizing TPB	Not stated	(1) importance of taking OCs at the same time every day. (2) the appropriate day to start taking OCs. (3) how to act if one or more pills are missed. (4) OCs side effects. The TPB constructs were used as the independent variables	Community pharmacies	Of the 181 pharmacists invited to complete the survey, response rate 93%	Quantitative; cross-sectional survey	TPB	Largely for questionnaire development (extensive, detailed mapping of TPB constructs to questionnaire items) which then followed into the analysis and discussion (although less on the actual theory). Used constructs derived from TPB and adapted to the research question following pretesting	Provide extensive, detailed text in the introduction on the relevant of TPB to pharmacist counselling in general. Has a figure mapping the TPB constructs with the behavior	Pharmacists indicated they talked to a slightly higher proportion of women about the importance of taking OCs at the same time daily than about topics such as which day to start taking OCs, side effects and what to do when a dose of OCs was missed. Pharmacists' reported counseling on OCs was positively associated with their perception that women welcomed pharmacist-initiated OC counseling, perceived adequacy of time available to counsel women on OCs and the perceived number of women who asked for their help in selecting an OC without providing a pre- scription in the past week. Pharmacists reported that women's welcoming pharmacists initiating OC counseling was associated with the pharmacists' reported percent who asked pharmacists for OC advice out of the last 5 women seeking OC. Male pharmacists were less likely than female pharmacists to report that women welcomed pharmacist-initiated OC counseling	The TPB appears to help predict pharmacists' OC counseling. There is a need to prepare pharmacists who are frequently requested to assist women with the selection of an oral contraceptive. Interventions that would facilitate women's requests for information may be valuable to increase pharmacists' counseling on OCs
Lee et al, 2016	USA	To examine the behavioral influences, motivation, and self-efficacy that may guide a patient's decision to pick up asthma controller	April- August 2014	Behavioral beliefs, attitude toward the behavior, normative beliefs and subjective norms	Academic family medicine practice	Patients with asthma treated at one academic family medicine practice.	Quantitative; cross-sectional survey	TPB	The survey was based upon TPB. It also served as a tool to explore behaviors and attitudes toward asthma in order to begin to	TBP includes key variables that serve as the foundation for an individual's intention, ultimately resulting in a behavior. As adherence to medications is dependent upon picking up prescribed medications from	Eighteen individuals (67%) were prescribed a controller inhaler in the past year, fourteen of whom picked up their prescription from the pharmacy. Individuals who did not pick up their prescription reported more strongly than those who did that using their inhaler is important. No other statistically significant differences were identified.	Use of an inhaler is important to the patient based upon survey results; however, this belief did not correlate with adherence. Future studies that investigate patient-specific motivators would allow

		medications from the pharmacy for the treatment of persistent asthma				N=240 patients; 27 individuals consented and completed a survey			understand how they impact the decision to pick up, or acquire a prescribed controller medication	the pharmacy, factors that affect filling prescriptions are of particular importance. Utilizing TPB in the context of asthma management, the psychosocial factors that may influence whether an individual picks up a prescription for asthma were explored in this study	Regarding control beliefs and perceived behavioral control, participants' belief that they do not have asthma, not knowing how to use their inhaler(s), use of illicit substance(s) and/or alcohol, and transportation to the pharmacy were not identified as barriers to picking up prescriptions from the pharmacy	practitioners to better target clinical interventions to improve medication adherence in patients with asthma
Amin et al, 2017	Egypt	To examine factors associated with the unwarranted dispensing of subtherapeutic doses of antibiotics in community pharmacies as part of a cold group or upon direct request from patients among community pharmacy staff	April - December 2016	Community pharmacy staff's views on factors associated with the unwarranted dispensing of subtherapeutic doses of antibiotics	Community pharmacies	N= 15, Nine pharmacists and six pharmacy assistants	Qualitative; semi-structures interviews	TPB	TPB constructs framed the different items of the interview question guide. Directed content analysis was performed based on the coding frame. The coding process began with the identification of passages from the transcribed interviews which fitted the theory constructs, yielding to the main themes of the analysis	TPB implies that individuals carefully consider the available information before acting. According to TPB, attitudes, subjective norms and perceived behavioral control determine the behavioral intention and consequently determine the likelihood of the individual carrying out that specific behavior. This construct has been shown to add predictive power to models predicting pharmacists' intentions to carry out behaviors. The TPB has been useful for qualitative research aiming to explore pharmacists' behavior	Factors contributing to dispensing antibiotics injudiciously included incorrect beliefs about potential benefit of antibiotics, profit, client pressure, ease of obtaining antibiotics from other pharmacies, inadequate enforcement of the law, pharmacist absenteeism, and assuming that the 'non malfeasance' principle is not violated. Reasons for lying to clients about the actual content of CGs included protecting the patient from harm resulting from antibiotic resistance and avoiding a possible argument	Examining attitude, subjective norm, perceived behavioral control and perceived moral obligation provided insight into community pharmacy staff's behavior related to dispensing subtherapeutic doses of antibiotics injudiciously. Multi-tiered interventions are urgently needed to tackle different factors contributing to this dangerous practice
Tan et al, 2016	Malaysia	To explore the key determinants and mediators of successful implementation of new public pharmaceutical services by investigating the cognitive perspectives of patients' intentions to adopt with the TPB as the theoretical framework	Not stated	Not stated	Not stated	Patients No further details provided	Mixed methods; semi-structured interviews, survey	TPB	For the qualitative phase, TPB model serves as the framework for thematic analysis. Emerging themes from the interview were used to generate a series of hypotheses which was tested using the questionnaire	Intentions to perform behaviors can be predicted from attitudes, subjective norms, and perceived behavioral control. We posit that patient knowledge and expectations about pharmacy value added services (PVAS) may also be significant predictors of intention and may also indirectly influence TPB constructs in affecting intentions	Subjective norms, perceived behavioral control, knowledge and expectations are found to be significant predictors of intentions to adopt PVAS. Knowledge and expectations are found to exert significant indirect effects on intentions	Patient knowledge could be enhanced through appropriate channels and expectations of service quality could be met to increase intentions
Nichols et al, 2021	USA	To characterize community pharmacist preceptors' experience, clinical and legislative knowledge, attitudes, and behaviors regarding cannabidiol (CBD). The secondary study objective was to identify which of these factors influenced intent to recommend CBD products	January-April 2020	Not stated	Community pharmacies	Pharmacists, 18 years or older, with active license, practicing in a community pharmacy, and precepted for an accredited school of pharmacy. N = 2242; responses rate 13.2%	Quantitative; cross-sectional survey	TPB	Survey development	Not stated	For experience items, most respondents (70.7%) reported receiving previous education on CBD. Almost half (48.4%) reported CBD sales in their pharmacies, whereas 89.1% reported answering clinical questions about CBD. For knowledge items, respondents performed poorly on CBD adverse effect and drug interaction items. Many respondents were not comfortable counseling on (49.0%) or recommending (56.1%) CBD products for patient use. Most (74.5%) believed more research was needed before they would feel comfortable recommending CBD products. Most (57.8%) reported not having reliable CBD resources available in their pharmacies. Subjective norms and previous CBD education or personal research were the only	Opportunities exist to fill knowledge gaps, enhance confidence, and provide desired educational resources for community pharmacist preceptors on CBD products

											factors found to have direct influences on respondents' intent to recommend CBD products	
Fleming et al, 2019	USA	To elicit modal salient beliefs of community pharmacists regarding their willingness to engage patients with suspected controlled substance misuse	Not stated	Beliefs of community pharmacists regarding their willingness to engage patients	Community pharmacies	Community pharmacists	Qualitative; focus groups	TPB	Questionnaire tool developed based on TPB	TPB allows for the assumption that behavioral beliefs, normative beliefs and control beliefs are predictors of that same individual's perceived attitude, subjective norm, and control toward any behavior	The most prevalent behavioral belief was the disadvantage associated with patient confrontations. Pharmacists also believed that engaging patients may cause loss of customers/business but may help patients receive appropriate counseling	Addressing key barriers such as perceptions around loss of customers/business, regulatory barriers and resources- to patient engagement is critical to increasing pharmacists' willingness to engage patients with potential OUD.
Gülpinar et al, 2021	Turkey	To provide an in-depth understanding of the factors related to the beliefs of community pharmacists on conscientious objection to provide pharmacy services contrary to their personal beliefs based on the TPB	January-May 2019	Not stated	Community pharmacies	N=25 community pharmacist in Turkey	Qualitative; semi-structures interviews	TPB	Development of interview guide; analysis of interview themes (generation of codes and sub-themes from the same central meaning units)	According to TPB, attitudes, subjective norms, and perceived behavioral control are predictors of individual's behavioral intention and consequently determine the likelihood of the individual carrying out that specific behavior	Factors affecting pharmacists' decision to provide pharmacy services when their personal beliefs included moral integrity, consequences on healthcare, profit, patient pressure, precedence of professional values, and care for religious sources. Most pharmacists were against conscientiously objecting to provide services because of possible negative consequences on healthcare. Pharmacists who were willing to act based on their personal beliefs were expecting from various third parties to fulfill certain responsibilities to facilitate to adopt the behavior	This novel study highlights the urgent need for more research and training for community pharmacists serving patients in different socioeconomic contexts in both developed and developing countries
Falope et al, 2021	USA	To explore the perceptions and knowledge of Florida pharmacists in administering inactivated influenza vaccines (IIV) to pregnant women	February - August 2019	Not stated	Community pharmacies	Licensed pharmacists in the state of Florida	Qualitative; interviews	TPB	Interview guide design	TPB is an intrapersonal level theory with three constructs (behavioral attitudes, social norms, and perceived behavioral control), which all determine why an individual may or may not engage in behavior. For this study, the theory was modified to include knowledge as a construct	The majority of pharmacists (94%) were knowledgeable about the IIV in pregnant women. Participants expressed mixed attitudes, identified barriers and facilitators, and subjective norms influencing vaccine administration in pregnant women. Participants expressed the importance of trust and how that influenced vaccine uptake. Participants also expressed their position not to only provide immunization services but also to counsel and educate patients	There is a need to strengthen immunization services, provided by pharmacists to more individuals, including high-risk groups such as pregnant women
Humphries et al, 2018	Canada	To identify women's attitudinal, normative, and control beliefs regarding adjuvant endocrine therapy (AET) adherence that could be targeted by an intervention offered in the community pharmacy setting	November 2013 - February 2014	To elicit general experience with AET and personal beliefs (attitudinal, normative, and control beliefs) regarding AET	Hospital and community pharmacies	Phase 1 (focus groups): N=34, women diagnosed with breast cancer and had their first AET prescription within the last two years. Phase 2 (interviews): N=9, women with self-report difficulties adhering to AET	Qualitative; focus groups and individual interviews	TPB	To develop a topic guide for the focus groups and interviews	TPB has been widely used to identify the main psychosocial factors influencing health-related behaviors in quantitative and qualitative studies. It is considered as one of the most effective psychosocial theories to predict a behavior, such as medication adherence	Most women had a positive attitude towards AET regardless of their medication-taking behavior. The principal perceived advantage was protection against a recurrence while the principal inconvenience was side effects. Almost everyone approved of the woman taking her medication. The women mentioned facilitating factors to encourage medication-taking behaviors and cope with side effects. For adherent women, having trouble establishing a routine was their main barrier to taking medication. For non-adherent women, it was side effects affecting their quality of life	The use of TPB contributed to the understanding of beliefs that should be targeted in a community pharmacy-based intervention to enhance AET adherence. The identification of priority targets is especially important when designing brief interventions. Focus groups allowed for a general portrait of the experience of women with AET while interviews offered a deeper understanding of non-adherence
Adeoye et al, 2018	USA	To model the association between pharmacy technicians' attitudes and planned behaviors toward participating in MTM and store level MTM completion rates.	February - May 2017	Not stated	Community pharmacies	N=77 pharmacy technicians (66.4%) and 99 pharmacists (86.8%) Pharmacy technicians and pharmacists who represented 116 supermarket pharmacy	Quantitative; cross-sectional survey	TPB	Survey development	Not stated	Pharmacy technicians held significantly more positive perceptions about MTM delivery, particularly regarding adequate time and support. However, pharmacy technicians reported having the necessary knowledge and skills significantly less frequently compared with pharmacists. TPB variables for pharmacy technicians were not significant predictors of MTM completion rates. However, pharmacist attitudes, pharmacy technician education, and number of technician	Pharmacists' attitudes, pharmacy technician level of education, and number of technician hours worked per week were associated with MTM completion rates

		Secondary objectives included 1) to compare pharmacy technician and pharmacist attitudes and planned behaviors toward participating in MTM and 2) to identify respondent and pharmacy demographic factors associated with MTM completion rates.				chain locations in a Midwestern division					hours worked per week were positively associated with MTM completion rates	
Hasan et al, 2019	USA	To use the TPB to understand factors influencing South Asian consumers' intention to seek pharmacist-provided medication therapy management services	Not stated	Effects of attitude, subjective norm (SN), perceived behavioral control (PBC), and socio-demographics on South Asian consumers' intention to seek medication therapy management services	Community pharmacies	Participants who were ≥18 years of age, of South Asian origin, with a previous visit to a pharmacy in the US for a health-related reason, and with ability to read and comprehend English were recruited from independent pharmacies in New York City	Quantitative; survey	TPB	Items from a previous TPB study on pharmacist intention to provide MTMS were modified to develop items assessing subjective norm in this study. Items to assess the perceived behavioral control were developed using past literature on TPB questionnaire construction by Ajzen	According to TPB, intention is influenced by attitude towards performing a behavior, subjective norm associated with the behavior, and perceived control over the behavior	Attitude and perceived behavioral controls were significant predictors of intention. None of the socio-demographics were significant predictors of intention	Strategies to make South Asians seek MTMS should focus on creating positive attitudes and removing barriers in seeking MTMS.
George et al, 2018	USA	To explore factors associated with community pharmacists' beliefs to improve Star Ratings scores using TPB	For 1 year (on 2016)	Beliefs associated with improving Star Ratings	Community pharmacies	N = 4 focus groups with 26 participants Pharmacists licensed in Oklahoma with a primary practice in the community setting were the target population from which we sampled	Qualitative; focus group	TPB	TPB-based discussion guide, coding of data from the TPB down to specific examples (deductive approach). The use of specific coded nodes to build up to general themes and subthemes (inductive approach)	TPB has been useful in assessing beliefs and predicting health professionals' behavioral intention. TPB also includes perceived behavioral control, because it was developed as an extension of the Theory of Reasoned Action to account for the influence of volitional control	Four focus groups were conducted with 26 participants in 2 categories: pharmacists with and without experience improving Star Ratings. Pharmacists shared and contrasted in salient, normative, and control beliefs about patient outcomes, data, financial implications, staff, technology, and other stakeholders associated with performance of improving Star Ratings. Themes regarding medication adherence, patient safety, and intention were also found	The TPB was used to explore beliefs of community pharmacists about improving Star Ratings scores. Themes that were identified will assist in future research for measuring intention to improve Star Ratings scores and the development of training and education programs
Wash et al, 2022	Portland	To identify factors that influence pharmacists' intention to prescribe	May-June, 2019	Factors that influence pharmacists' intention to prescribe	Different practice settings	N = 13 participants (12 pharmacists and one fourth-year pharmacy student); response rate 32%	Qualitative; focus groups	TPB	TPB was used to guide this study. Largely in focus groups guide development and data analysis	When following the TPB framework, interviews or focus groups are employed to identify the salient behavioral, normative, and control beliefs underlying the TPB constructs within the target population	The mean score on the awareness assessment was 6.3 ± 0.9 (7 = highest awareness). The majority (76.9%) had previous prescribing experience. Attitudes were found to be shaped by behavioral beliefs related to the impact of pharmacist prescribing on patient-centered care and practice transformation. Normative beliefs were primarily driven by outside groups past experiences. Control beliefs included the following categories: operational readiness; the relationships between comfort, competence, and confidence; and Board of Pharmacy requirements	TPB was useful for exploring pharmacists' beliefs related to their intention to prescribe using the Formulary and Protocol Compendia (FPC). Determining the relative importance of these factors in a broader population will enable stakeholders to develop interventions to improve uptake of prescribing via the FPC
Alenezi et al, 2022	UK	To explore pharmacists' roles, barriers and	January-May, 2020	Pharmacists' perceived roles, barriers and	Community pharmacies	N= 20 community pharmacists. The	Qualitative; semi-	TDF	TDF informed the development of the	TDF was developed from a synthesis of psychological theories to help apply	Pharmacists demonstrated desire to contribute to opioid therapy optimization. However, they described that they were often	The contribution of community pharmacists to optimize opioid therapy in

		determinants related to their involvement in optimizing prescribed opioids for patients with chronic pain		behavioral determinants in relation to opioid therapy optimization		inclusion criterion was currently working in community practice	structures interviews		interview guide. Excerpts from the interview transcripts were coded into one or more of the TDF domains. Data were coded systematically using a deductive approach, whereby each TDF domain served as a coding category	theoretical approaches to behavior change interventions. TDF domains represent environmental, cognitive, and social factors that may affect behavior. TDF has been widely used to understand behaviors and implementation challenges in various settings and content areas in health care, including community pharmacies [and hence is suitable in the context of this research	challenged by the lack of relevant knowledge, skills and training, inadequate time and resources, systemic constraints (such as lack of access to medical records and information about diagnosis), and other barriers including relationships with doctors and patients	CNMP is unclear and impeded by lack of appropriate training and systemic constraints. There is a need to develop innovative practice models by addressing the barriers identified in this study to enhance the contribution of community pharmacists in optimization of opioid therapy for chronic pain
Hussein et al, 2021	Canada	To select the optimal implementation strategies that can address identified factors and accelerate practice change	Not stated	(1) barrier and facilitators influencing the adoption of full scope services among pharmacy professionals; (2) optimal BCTs to address the identified barriers and facilitators	Not specified	All registered users of Pharmacy5in5 (pharmacists and pharmacy technicians) N=2696; response rate 8.4%, 24 in the interview	Mixed methods; survey, semi-structured interviews	TDF	Questionnaire and interview design and as coding framework for the qualitative analysis; triangulation of the study findings	TDF has a greater capacity to build a behavior change intervention that is more comprehensive and has a wider range of potential BCTs to address barriers and facilitators. Furthermore, mapping BCTs to corresponding TDF domains help maximize the benefit of a theory-based intervention by selecting optimal BCTs that can target pharmacy professionals' behavior	A number of key barriers were identified on an individual level (e.g., lack of clear professional identity and limited decision-making skills in ambiguous cases) and on an organizational level (e.g., lack of social support from managers and concerns about making more errors with the current workflow). Mapping the barriers and facilitators to BCTs yielded 18 BCTs to support the adoption of full scope services, including modeling, rehearsal/practice, and social support	This study highlighted several barriers that need to be addressed to facilitate pharmacy professionals working to their full scope, including professional collaboration, professional identity, and adequate training. A comprehensive intervention combining skills training with modeling, social support, and decision-making tools could encourage practice change
Lindner et al, 2022	Australia	To investigate Austrian community pharmacists' willingness to administer immunizations in the future	Not stated	Percentage of employed Austrian community pharmacists willing to administer immunizations, a ranking of relevant requirements and barriers to implementation of an immunization service and desired training specifications	Community pharmacies	N=3086; response rate 12.3% All registered employed community pharmacists in Austria	Quantitative; cross-sectional survey	TDF	The questionnaire was based on best practice guidelines and the TDF. The following domains of the TDF were addressed in the study: skills, professional role and identity (section 1); beliefs about capabilities, intentions goals, environmental context and resources, social influences (section 2); goals (section 3).	TDF is an integrative framework validated as a method 'for theoretically assessing implementation problems'	Willingness to administer immunizations after appropriate training and legislative regulation was stated by 82.6% (n=314) of participants. It was demonstrated that pharmacists willing to immunize were significantly younger than their counterpart (38 [IQR 31–49] years vs. 45 [IQR 37.5–54] years; OR 1.06; 1.03–1.09, 95% CI; p<0.001). 'Legal liability' was considered the most critical barrier to service implementation, 'seeing blood' and 'close patient contact' as least critical. Pharmacists not willing to immunize showed a higher probability to evaluate personnel resources (OR 2.98; 1.35–6.58, 95% CI; p=0.007), close patient contact (OR 2.79; 1.46–5.34, 95% CI; p=0.002) and management of side effects (OR 2.62; 1.21–5.67, 95% CI; p=0.015) as (highly) critical. The majority assessed the 'right timing for training' to be after the foundation training with a 2-yearly renewal	Austrian community pharmacists show a strong willingness to administer immunizations while highlighting important requirements and barriers towards service implementation
Rushworth et al, 2018	UK	To quantify issues of access to GPs, community pharmacies and prescribed medicines in older people resident in the Scottish Highlands.	Not stated	Not stated	General public	N =1042, response rate 54.2%	Quantitative; survey	TDF	The attitudinal statements were developed with reference to the TDF	TDF was derived from 33 psychological theories and 128 theoretical constructs, which are organized into 14 overarching domains. The statements were developed around those domains most relevant to access to prescribed medicines (e.g. memory, attention and decision processes social influences, emotions etc.)	The majority reported convenient access to GPs (89.1%) and community pharmacies (84.3%). Older age respondents were more likely to state that their access to GP services was not convenient and those in rural areas to community pharmacies. For access to prescribed medicines, those in poorer health and taking five or more regular prescribed medicines were more likely to state access not convenient. PCA identified three components of beliefs of capabilities, emotions and memory. Those with poorer health had more negative scores for all. Those reporting issues of access to prescribed medicines had more negative scores for beliefs of capabilities while those of	While the majority of respondents have convenient access to their GP practice, pharmacy and prescribed medicines, there is a need for further review of the pharmaceutical care of those of older age with poorer health, living alone in the more remote and rural areas and taking five or more prescribed medicines

											older age, living alone, and taking five or more regular prescribed medicines had more negative scores for emotions	
Mohammed et al, 2021	Saudi Arabia	To explore the experiences, perceptions and barriers of Saudi pharmacists about their uptake of non-traditional roles using TDF	Not stated	pharmacist's perceptions, current opportunities and key challenges towards the uptake of non-traditional roles	Not specified	N=14 Qualified Saudi pharmacists who were in the UK as part of their further study.	Qualitative; interviews	TDF	Identified themes were triangulated with the domains in TDF	TDF enables the identification of appropriate components of planned behavioral interventions, the barriers and enablers which need to be addressed, and the way behavior changes brought through the interventions can be measured and understood	Participants showed an overall positive attitude towards the uptake of non-traditional roles. Participants felt that there was wider support available for pharmacists at the policy level to uptake non-traditional roles. However, a need for greater recognition of roles by other healthcare professionals and patients were identified. Participants alluded to reluctance of some physicians to take on board the suggestions from a pharmacist. Key barriers to uptake of non-traditional roles were related to environmental context and resources domain of TDF. For example, participants discussed the need for even further practical experiences during their undergraduate degree to become ready to adopt non-traditional roles in clinical practice	Participants of this theoretically informed qualitative study showed an overall positive attitude towards the way pharmacy practice is progressing in Saudi Arabia and their uptake of non-traditional roles. However, there is a need to improve interdisciplinary working, patient awareness of pharmacist competencies and their educational preparedness in furthering their uptake of non-traditional roles. Addressing such barriers and promoting uptake of novel roles by pharmacists is imperative in the context of emerging COVID-19 and future pandemics
Seubert et al, 2018	Not stated (likely Australia)	To describe the development of a behavior change intervention to enhance information exchange between pharmacy personnel and consumers during OTC consultations in community pharmacies	Not stated	Development of a behavior change intervention	Community pharmacies	Community pharmacist, pharmacy staff and consumers	Mixed methods; systematic review, focus groups, intervention development, intervention feasibility study	TDF	Coding of focus groups findings was based on TDF domains. A behavioral diagnosis on the target behavior, as described in the BCW	BCW is a validated framework developed to assist researchers to apply the COM-B model in any setting to develop an intervention strategy. TDF is a validated derivation of the COM-B that provides a more detailed understanding of determinants of behavior from which an intervention strategy can be developed	Education, persuasion, environmental restructuring, and modelling were determined to be potential intervention functions	A systematic, theoretically underpinned approach was applied to develop candidate interventions to promote information exchange in OTC consultations
Seubert et al, 2019	Australia	To explore the feasibility of interventions using situational cues to promote information exchange between pharmacy personnel and consumers, during OTC consultations	Not stated	Phase 1 (literature review): enhance communication during OTC consultations. Phase 2 (focus groups): barriers and facilitators for information exchange during OTC consultations Phase 3 (intervention strategy development): intervention functions and the resulting BCTs that would most	Community pharmacies	Pharmacy staff and consumers	Mixed methods study; audio-recording, OTC consultations, consumer questionnaires and interviews, and pharmacy personnel interviews	TDF	Phase 2: The results of the focus group discussions were coded and mapped to the TDF Phase 3: using the BCW framework, intervention functions and the resulting BCTs that would most suitably address these barriers were identified	BCW assists health researchers to apply the COM–B model of behavior in any setting, to develop an intervention strategy. The TDF allows for a more detailed understanding of the determinants of behavior. The BCW links intervention functions, which are the active components that can be used in an intervention strategy and can be observed and replicated, with BCTs	Pharmacy personnel perceived that the badges positively impacted consumers' ability to identify the position of personnel they engaged with. Data collection methods were deemed practical and acceptable	Effective interventions are necessary to promote information exchange to enhance appropriate management in community pharmacies

				suitably address these barriers were identified Phase 4 (intervention feasibility study): ffeasibility study to determine if the intervention strategy could work								
Isenor et al, 2018	Canada	To identify the relationship between barriers and facilitators to pharmacist prescribing and self-reported prescribing activity using the TDF(v2)	Not stated	1) the extent of self-reported pharmacist prescribing, 2) pharmacists' perceptions on their prescribing role, 3) barriers and facilitators to pharmacist prescribing using the TDF (v2), 4) relationship between respondents' perceptions of factors that may influence pharmacist prescribing by TDF domain and self-reported prescribing activity.	All licensed pharmacists that are members of the Pharmacy Association of Nova Scotia (PANS)	N=87 (11.5%) All licensed pharmacists that are members of the PANS	Quantitative; cross-sectional survey	TDF (version 2)	To map each survey question according to the TDF domains	Understanding environment and context is critical for implementing new practices and using the TDF can identify barriers and facilitators at the individual pharmacist and pharmacy team levels, as well as in the broader context including ethical, legal, political and financial dimensions, but also those that are less quantifiable, such as nonfinancial organizational incentives, and peer pressure	The three domains that respondents most positively associated with prescribing were Knowledge (84 %), Reinforcement (81 %) and Intentions (78 %). The largest effect on prescribing activity was the Skills domain (OR 4.41, 95% CI, 1.34-14.47)	Applying the TDF(v2), our study identified barriers and facilitators at the individual practitioner (e.g. knowledge and skills), pharmacy (e.g. adequate time and staffing for prescribing), regulatory (e.g. concerns related to liability) and health care system (e.g. physician relationship, limited reimbursement) levels. The TDF(v2) domains provided a valuable structure for comparing respondent beliefs and attitudes about a primary outcome variable (prescribing activity). This allowed for the simple logistic regressions to be built, but the inherent co-linearity between TDF(v2) domains prevents a multivariate model from being produced, which makes it challenging to study how the TDF(v2) domains may be related to one another.
Patton et al, 2021	Ireland	(1) Explore barriers/facilitators influencing community pharmacists' provision of medication adherence support (MAS) to older patients prescribed multiple medications; (2) Identify theoretical domains to target for behavior change; (3) Select BCTs to deliver to pharmacists to enhance MAS provision	Not stated	(1) Explore determinants that influence community pharmacists' provision of MAS to older patients; (2) Identify exactly what could be targeted to change pharmacists' behavior; (3) Select BCT to deliver as part of a training package and implementation strategies to include in future studies	Community pharmacies	Phase 1 (interviews): N=15, pharmacists working in a registered community pharmacy in Northern Ireland. Phase 2 (survey): N=143 (27.4%), community pharmacists working in the region of Northern Ireland	Mixed methods; semi-structured interviews, cross-sectional survey	TDF (version 1)	Phase 1 (interviews): interview topic guide Phase 2 (survey): development of the questionnaire Data analysis: TDF domains served as coding categories Triangulation of findings: a domain was deemed important if it was frequently coded in the qualitative analysis and/or the findings from the quantitative analysis	Can act as a 'theoretical lens' to explore health providers' clinical behaviors and gain a more comprehensive understanding of the key influences of that behavior. The selection of TDF1 was supported by a discriminant content validity exercise undertaken by Huijq et al. which recommended 'keeping to the 12 original domains as a basis for the development of TDF questionnaires'	Phase 1 (interviews): Barriers and facilitators included inadequate remuneration, time and knowledge of solutions and professional confidence. Phase 2 (survey): Potential barriers included inadequate training in motivational techniques and difficulties with decision-making Triangulation: seven domains (e.g. skills, motivation/goals) were identified as targets and mapped across to 18 BCTs (e.g. behavioral practice/rehearsal, prompts/cues).	The use of a comprehensive theoretical model of behavior change has helped go beyond identifying the barriers commonly cited in the literature (e.g. time, reimbursement). This theory-based approach has facilitated an exploration of other important areas to target for behavior change such as pharmacists' skills and approaches to decision-making

									Mapping of findings: TDF guided selection of BCT			
Cardwell et al, 2018	Northern Ireland	To explore community pharmacists' views on the facilitators and barriers towards the utilization of a screening tool as a guide to conducting structured medicines use review (MURs)	Not stated	Not stated	Community pharmacies	N = 18 Community pharmacists working in pharmacies affiliated with the Community Pharmacy Placement Network (which provides a structured placement program for pharmacy students), who had undertaken the necessary training in the provision of MURs	Qualitative; semi-structures interviews	TDF	Semi-structured interviews were conducted with community pharmacists using a TDF-based topic guide	Not stated	Based on the analysis of 15 interviews, 11 TDF domains ('Knowledge', 'Skills', 'Social and professional role and identity', 'Beliefs about capabilities', 'Beliefs about consequences', 'Reinforcement', 'Goals', 'Memory, attention and decision process', 'Environmental context and resources', 'Social influences', 'Behavioral regulation') were deemed relevant. Facilitators included: knowledge of patients, clinical knowledge, perceived professional role, patients' clinical outcomes, influence of peers. Barriers included: prioritization of other clinical activities, inability to access patients' clinical information, perceived alienation from the primary healthcare team and staffing issues	Using the TDF, key facilitators and barriers were identified in the use of a screening tool as a guide to conducting MURs. These findings may assist in further development of MURs as a means to optimize patients' medicines use
Paudyal et al, 2019	UK	To determine community pharmacists' training, experiences and behavioral determinants in counselling and management of homeless population	November 2016 -March 2017	Pharmacists' perspectives, pharmacists' training, pharmacists' experiences and behavioral determinants	Community pharmacies	Community pharmacists	Quantitative; survey	TDF (version 2)	To construct questionnaire items	Not stated	Less than a third (n=101, 32.2%) indicated that they knew where to refer a homeless patient for social support. Broaching the subject of homelessness was outside their comfort zone (n=139, 44.3%). Only four (1.2%) respondents could correctly answer all knowledge assessment questions	Community pharmacist identified lack of education, training opportunities and guidelines in counselling and management of homeless persons requiring interventions to improve skills and opportunities
Gemmeke et al, 2021	Holland	To assess community pharmacists' perceptions on providing fall prevention services, and to identify their barriers and facilitators in offering these fall prevention services including deprescribing of fall risk-increasing drugs (FRIDs)	February - June 2020	Not stated	Community pharmacies	N= 466 pharmacists, response rate 44%. 16 pharmacists were interviewed	Mixed methods; survey, interviews	COM-B model	Applied to analyze and interpret the qualitative data	The COM-B model is a widely used behavioral change theory and therefore a suitable framework to identify needs to change. The COM-B model has been used to describe healthcare providers' dependencies to express a desired behavior	Pharmacists are motivated to provide fall prevention services, but their capability differs. They have had diverse opportunities to provide fall prevention, with key facilitators being efficient collaboration and establishment of multidisciplinary agreements. Pharmacists indicated that major barriers were patient's unwillingness to cease medication, the complexity of deprescribing, limited goal-setting behavior, a lack of time, and a lack of financial compensation. It has previously been reported that pharmacists believe they should be involved in fall prevention; however, only a minority have actually been involved	Community pharmacists deem themselves capable of providing fall prevention services, and they are motivated to do so, particularly by deprescribing FRIDs. However, they perceive the decision-making of FRID deprescribing as complex due to difficulties in weighing fall risk against treatment benefit. Pharmacists believe they could provide better fall prevention services in collaboration with other disciplines
Hattingh et al, 2019	Australia	To explore the factors that contributed to the successful implementation and ongoing provision of enhanced and extended services in Western Australian community pharmacies	October 2017 - February 2018	The factors that contributed to the successful implementation and ongoing provision of enhanced and extended services	Community pharmacies	N=28 pharmacists. Pharmacists working in WA who were providing enhanced and/or extended professional services	Qualitative; semi-structures interviews	COM-B model	The COM-B model was applied post hoc to the thematic analysis to explore whether there was an overlap between themes and the model	COM-B model provides a framework for understanding behavior and incorporates the practice context 'opportunity component' and more internal aspects 'motivation and capability components'. This model highlights the need to consider both pharmacist capabilities and motivation as well as local opportunities and the policy framework in planning to introduce new services	Factors that impacted on provision of services: 1) pharmacist characteristics, 2) local needs, structures and support, and 3) an enabling practice framework	Both pharmacy and pharmacist aspects should be considered during implementation and maintenance of new professional services

Bertilsson et al, 2021	Australia	To identify factors affecting recruitment of patients in community pharmacies participating in a multicenter trial of a pharmacy asthma service in Australia (Pharmacy Trial Program – Asthma and Rhinitis Control (PTP-ARC)	Not stated	1. Capability: physical or psychological 2. Opportunity: physical or social 3. Motivation: reflective or automated	Community pharmacies	N=47 out of 50 eligible pharmacists All pharmacists involved in the PTP-ARC trial whose staff had not successfully recruited any patients or whose pharmacy had no active participants in the trial	Qualitative; semi-structures interviews	COM-B model	To analyze findings. The exploration of pharmacists' experiences applied COM-B model	The COM-B model was developed to analyze behavior change when implementing new interventions. The COM-B model has been widely used in implementation research, including in the general implementation of asthma guidelines in community pharmacy and clinical pathways in complex tertiary clinical settings	Seventeen factors were isolated and mapped to COM-B model. Psychological capability (recruitment hesitancy, research literacy and health literacy), physical capability (technological barriers, staffing issues and pharmacy busyness), physical opportunity (patient busyness, trial timing, study protocol, support and location), social opportunity (health literacy and supportive milieu), reflective motivation (incentive for participation, simplification) and automatic motivation (patient attitudes and pharmacist-felt experience) were factors affecting pharmacists' participation. Challenges included: issues with the software, unfamiliarity with research procedures generally (and specifically with the PTP-ARC protocols), the patients' lack of interest and pharmacists' lack of time	Incorporating the COM-B model in the BCW suggests interventions and policies likely to be effective when addressing the highlighted barriers. To propel evidence-based trials towards practice implementation, user-friendly software, pharmacists' training on research and patient-engagement and adequate remuneration to address pharmacist time issues need to be key foci for health services design and implementation research
Pinto et al, 2006	USA	(1) design and test a reliable and valid survey instrument for assessing patients' perceptions of diabetes-related pharmaceutical care services. (2) determine factors affecting patient retention in pharmaceutical care services	February-April 2001	(1) Patients' perceptions of diabetes-related pharmaceutical care services. (2) Factors affecting patient retention in pharmaceutical care services	Community pharmacies	Type 1 and type 2 diabetes patients who had received diabetes-related pharmaceutical care within community pharmacy. Total of 71 surveys returned (46.67%)	Quantitative, cross-sectional survey	HBM	The survey was developed based on the constructs of the HBM. Based on the factor analysis results, the items that formed the constructs of the HBM were summed to get a total score value for each factor	Leaders in the field of psychosocial research state that as a starting point, at a minimum, a combination of constructs from the HBM needs to be tested for understanding health behaviors	In the absence of pharmaceutical care, patients felt susceptible to at least one of 8 diabetes-related conditions. For these conditions, about 48% to 95% of patients perceived that their threat had reduced because of pharmaceutical care. Accordingly, more than half perceived the services as beneficial, with counseling for blood sugar monitoring rated as the most beneficial. All respondents rated the services as helpful, and 64 intended to continue regular utilization. Overall helpfulness of the service and patient retention were positively correlated. Perceived susceptibility predicted perceived threat reduction. Perceived threat reduction, blood sugar monitoring, and overall helpfulness of the service predicted patient retention in the service. Factor analysis extracted 4 factors: perceived threat reduction, perceived susceptibility, perceived benefits, and blood sugar monitoring	Two key constructs of the HBM influence use of diabetes related pharmaceutical care services: perceived susceptibility and threat reduction. In an effort to increase patient retention, pharmacists need to assess patient perceptions and structure their services to address patient perceptions and concerns
Alatawi et al, 2016	Saudi Arabia	To test the HBM as a predictor of type 2 diabetes (T2D) medication adherence as measured with multiple new or established self-report adherence instruments. The specific objectives: (1) assess self-report of medication-taking in a Saudi T2D convenience sample, (2) investigate self-reported HBM constructs for T2D, its complications, and medication-taking in this sample, and (3) test	June 1-July 24, 2014	Three measures collected self-report of medication adherence: new multi-dimensional adherence measure (MDAM), previously validated stage of change, and medication-taking recall- 7days (MTR-7)	Outpatient pharmacy	N= 222; response rate 87.4% Patients with T2D, over the age of 18, and who were on at least one prescribed diabetes medication	Quantitative; cross-sectional survey	HBM	Largely in questionnaire design, data interpretation and discussion. The authors state: responses to the HBM items comprise the HBM construct summary scores for Perceived Susceptibility, Perceived Severity, Perceived Benefits, Self-efficacy, and Cues to Action; these were adapted from portions of the 18-item Expanded Health Belief Model Questionnaire (EHBMQ) for T2D.	HBM provides an established theoretical framework for studying adherence and suggests that adherence with a health behavior is explained by associations among six health beliefs/values constructs	For adherence, most reported taking the prescribed dose every time taken; however, 60% were not taking it the prescribed number of times per day and 50%, not the prescribed time of day (interval). Over 40% reported low adherence on stage of change and MTR-7. Perceived susceptibility, perceived medication benefits, and self-efficacy were significant HBM predictors for medication adherence	The MDAM has research and practice potential because it evaluates sub-behaviors of medication-taking separately and as a score. Patient perceptions and beliefs should be assessed as part of a patient-centered medication adherence intervention.

		the ability for self-reported health beliefs to predict specific medication-taking behaviors among the sample										
Ziaei et al, 2015	UK	To investigate Internationally Trained Pharmacists (ITPs') perceptions of their communication proficiency and the resultant impact on patient safety	May-July 2010	ITPs' perceptions of their communication proficiency and the resultant impact on patient safety	Community & hospital pharmacies	31 European Economic Area (EEA) and 11 non-EEA pharmacists practicing in the UK	Qualitative, focus groups	Model of Communicative Proficiency (MCP)	MCP was used as a simple instrument to understand the findings. Using the model in this way allowed researchers to offer suggestions for change, or how, or where to concentrate efforts for improvement and/or training	Based on MCP and further research, the Canadian English Language Benchmark Assessment for Nurses (CELBAN) was successfully designed, which was the first nationally validated, occupation-specific language assessment tool designed to assess the language proficiency of internationally trained nurses seeking licensure in Canada	ITPs experienced communication difficulties through new dialects, use of idioms and colloquial language in their workplace. The differences between the "BBC English" they learned formally and the "Street English" used in GB also led to difficulties. Culture was also recognized as an important aspect of communication. ITPs in this study were adamant that communication difficulty did not compromise patient safety	Communicative deficiency of ITPs arose primarily from two sources: linguistic competence and socio-cultural competence. These deficiencies could have negative implications for patient safety. The findings of this study should be taken into account when designing adaptation programs for ITPs
Odukoya et al, 2014	USA	To describe the process used by community pharmacy staff to detect, explain, and correct e-prescription errors.	October 2012-April 2013	The process used by community pharmacy staff to detect, explain, and correct e-prescription errors	Community pharmacies	N = 13 pharmacists and 14 technicians	Mixed methods; observations, interviews, focus groups	Three-step error recovery model	The error recovery model constructs were used to develop the interview guide and helped to create probes to the interview questions. The codes were conceptualized by using constructs of the three-step error recovery framework, that is, detection, explanation, and correction	The concept of error recovery was employed to guide the exploration of the e-prescription error recovery process in community pharmacies. The application of human factors concepts offers a novel approach to improving patient safety in community pharmacies. To explore e-prescription error recovery in community pharmacies, a human factors approach was employed. Most error recovery studies have been carried out in other industries, with minimal error recovery research in health care settings	Most of the e-prescription errors were detected during the entering of information into the pharmacy system. These errors were detected by both pharmacists and technicians using a variety of strategies which included: (1) performing double checks of e-prescription information; (2) printing the e-prescription to paper and confirming the information on the computer screen with information from the paper printout; and (3) using colored pens to highlight important information. Strategies used for explaining errors included: (1) careful review of patient's medication history; (2) pharmacist consultation with patients; (3) consultation with another pharmacy team member; and (4) use of online resources. In order to correct e-prescription errors, participants made educated guesses of the prescriber's intent or contacted the prescriber via telephone or fax. When e-prescription errors were encountered in the community pharmacies, the primary goal of participants was to get the order right for patients by verifying the prescriber's intent	Pharmacists and technicians play an important role in preventing e-prescription errors through the detection of errors and the verification of prescribers' intent
Desai et al, 2015	USA	(1) explore the characteristics of internet buyers of medicines/vitamins. (2) examine the association between health care use and buying medicines /vitamins online drawing on Andersen's health care utilization framework. (3) examine the factors	Cross-sectional, data from 2007	(1) characteristics of internet buyers of medicines/vitamins. (2) Association between health care use and buying medicines/vitamins online. (3) Factors predicting discussion of internet information with health providers	Used data from National Cancer Institute's Health Information National Trends Survey	N = 7674 buyers Model 1 used data from 4428 buyers and Model 2 from 5030 buyers	Quantitative; cross-sectional survey	Andersen Behavior Model	Guided independent variable selection to identify factors associated with accessing medications/vitamins online for Model 1. Additionally a parallel model (Model 2), was developed to identify factors associated with discussions of online information. This model	Using a model like the Andersen Model could be extremely important for exploratory research in this area as little is known about online behavior. Having the Andersen Model as the guiding framework would help strengthen the study and provide structure. Moreover this framework allows evaluating health behaviors in the model which included use of health services which were recognized as an important aspect to health. Additionally, the framework acknowledges	About 85% of online buyers had a regular provider, but only 39% talked to the provider about online information even though most (93.7%) visited the provider R1 times/year. Multivariate analyses found internet health product consumers were more likely to be over 50 years old, have insurance and discuss the internet with their provider than non-internet health product consumers. Moreover, discussion of internet information was more likely if consumers had a regular provider and perceived their communication to be at least fair or good in general	There is a clear association of online buying with age, frequency of visits and discussing online information Although most online buyers visited a provider in the prior year, only a minority discussed the internet with them. This suggests a missed opportunity for providers to help patients navigate internet buying, particularly if they are a patient's regular provider and the patient perceives their communication as good

		predicting discussion of internet information with health providers							emerged from findings from Model 1 and included most independent variables from Model 1 with the inclusion of perceived quality of communication	the influence of other behaviors on actions. Hence this framework allowed for evaluating one behavior (buying online) in the context of other behaviors (use of health services and talking to providers)		
Waddell et al, 2017	Australia	To map the leadership and management domain of the Australian Advanced Pharmacy Practice Framework (APPF) against the model of transformational leadership and make comment on the potential utility of the APPF to develop advanced practitioners in the area of leadership and management	Not stated	Extent of mapping of the framework to the elements of the model	Mapping in Australia	Not applicable	Mapping	Alimo-Metcalfe and Alban-Metcalfe model of transformational leadership	Used as a tool to map the Australian framework	In the introduction, the authors describe several different leadership models and the development of these over time. The model used was selected on the basis that it was developed and validated within the UK public service, particularly the National Health Service (NHS) and included middle-level managers. The authors stated that this model of leadership was determined by Health Workforce Australia (HWA) to be the most suitable to meeting the needs of leaders in the Australian healthcare system	There were broad differences between the APPF and a model of transformational leadership. The APPF focuses heavily on 'organizational' skills such as strategic vision and setting direction, while the model of transformational leadership focused on the 'people skills' of effective leaders. The APPF mapped primarily to the 'Leading the Organization' dimensions of transformational leadership	There are significant differences between the leadership and management competencies of the APPF and the dimensions of transformational leadership. Future work on the competency standards for general and advanced levels of practice should include or refer to an evidence-based model of transformational leadership
Qudah et al, 2021	Not applicable	To identify barriers and facilitators of patients' engagement in pharmacy consultations and investigate the impact of patients on pharmacists' counseling behavior	Not applicable	(1) predictors of patient participation in medication counselling, (2) the influence of patients on pharmacist counseling behavior	Community pharmacies	Patients participating in patient-pharmacist communication	Systematic review	Street's Linguistic Model of Patient Participation in Care (LM)	Data synthesis (mapping)	Street's LM framework suggests that the term participation in the pharmaceutical consultation means more than simply seeking advice. Understanding factors and patient characteristics affecting pharmacist-patient consults has the potential to help develop better training and education programs and resources for both pharmacists and patients to ensure patient-centered care and consultations	Fifty studies from 1983 to 2019, including 37 using self-reported data, were identified. Patient involvement in patient-pharmacist communication was influenced by enabling factors for participation ranged from patients' beliefs and past experiences to demographic characteristics such as gender and age. Pharmacists' participative behavior with patients was positively associated with patients' engagement and perceived patient cues in the conversation	Pharmacy encounters should no longer be viewed as controlled simply by pharmacists' expertise and agendas. Patient factors also appear to influence patient-pharmacist communication. Additional research needs to address the identified facilitators and barriers to enhance patient participation and pharmacist counseling behavior
Chevalier B et al, 2017	Australia	To explore hospital pharmacists' and patients' views about what constitutes effective communication exchanges between pharmacists and patients	November 2015 - April 2016	(1) What aspects of a conversation make it effective; (2) What's important to you; (3) What makes a good conversation; (4) Why do you think it was effective; (5) What would have made it more effective	Inpatient wards and outpatient clinics	N= 12 pharmacists and 48 patients Pharmacists who provided clinical pharmacy services. Eligible patients were prescribed three or more medications to manage a chronic disease(s) and had been admitted to a clinical area in which a study pharmacist practiced	Qualitative; semi-structures interviews	Communication Accommodation Theory (CAT)	Pharmacists' and patients' opinions of effective pharmacist–patient exchanges were analyzed using a process of inductive thematic analysis and then mapped to the CAT strategies	CAT has been widely used in healthcare communication research. Five CAT strategies will facilitate the analysis of pharmacists' and patients' perspectives of effective conversations	An overall shared goal was the assurance of patients' confidence in managing their medications at home. To facilitate this, patients focused mainly on pharmacists' delivery of medication information and interpersonal behaviors. Pharmacists' themes included building rapport, but also emphasized patients' understanding of their medications and their level of engagement as indicators of patients' confidence in self-managing their therapy. Participants provided rich exemplars for each of the themes	Pharmacists and patients provided valuable insights about what makes pharmacist–patient interactions effective. Patient-identified preferences for pharmacist–patient exchanges may help guide pharmacy students and practitioners to engage patients in effective conversations

Murad et al, 2017	Canada	To determine face needs, threats and the strategic communication strategies used to address these within community pharmacist-patient interactions	Not stated	(1) main activities of community pharmacists (2) interactional contexts appear to contain face implications (3) types of face needs and threats implicated in these contexts	Community pharmacies	25 audio recordings of patient-pharmacist interactions in eight different pharmacies were used in this study	Exploratory descriptive design	Face-work theory	As a guiding framework and for data analysis	Face-work involves a set of coordinated communication practices in which communicators build, maintain, protect, or threaten personal dignity, honor, and respect. In Face-work theory, the concept of face represents claimed social image in the interaction	Looking at the process of 25 patient-pharmacist interactions as they occurred has provided insight into face concerns within the main activities of pharmacist practice in community pharmacies. Pharmacists engaged in assessing patient knowledge, providing medication information, and investigating patients' medication use and self-management activities. Pharmacists followed common work patterns when communicating with their patients. The interactional contexts with face implications reflect how the patient and the pharmacist approached each other to accomplish their goals and their reaction to the flow of events in the encounter	Face-work Theory is a novel approach to understand processes and out- comes of patient-pharmacist interactions in community pharmacies. Linking speech acts with face needs and threats may help to elucidate how pharmacist-patient interactions achieve both task oriented and interpersonal goals
Luder et al, 2016	USA	To survey new enrollees in a community pharmacy, employer-based diabetes and hypertension coaching program to describe the characteristics, health beliefs, and cues to action of newly enrolled participants	November 2011-November 2012	The survey analyzed 12 constructs of the HBM, TPB, and Theory of Reasoned Action (TRA)	Community pharmacies	N= 154 patients All newly enrolled patients in the diabetes and hypertension coaching programs.	Quantitative; cross-sectional survey	HBM, TPB, and TRA	Largely for questionnaire development	HBM, TPB, and TRA are effective models for explaining behavior and predicting patient preventative actions. No studies were found which describe the patient behaviors and health beliefs that predict enrollment into disease management programs in a community pharmacy	The strongest cue to action for enrollment was the financial incentives offered by the employer. White patients were significantly more motivated by financial incentives	A top factor motivating patients to enroll in a disease management coaching program was the receipt of financial incentives. Significant differences in HBM, TPB, and TRA responses were seen for patients with different demographics
Luke et al, 2021	Canada	To elucidate the factors influencing the integration of pharmacogenomics (PGx) testing by pharmacists in their practices and to use the BCW approach to inform future intervention options to support pharmacists with this integration	February-April 2017	Not stated	Pharmacists who completed the PRIME training program irrespective of setting	10 out of the 21 pharmacists who completed the PRIME training program participated in the interviews	Qualitative; semi-structures interviews	TDF and COM-B model	TDF domains were applied as deductive codes to the interview data to describe the subjective accounts of the participants' experiences with PGx testing in practice. Themes relating to the barriers and facilitators to implementing PGx services were then mapped onto the corresponding components of the COM-B model	TDF can guide the identification of the determinants of service implementation that exist at multiple levels (e.g., the individual level, the organizational level, and the health-system level), however, the majority of its domains relate to factors that govern behavior often conventionally considered to occur at an individual level. A unique feature of the TDF is that it complements COM-B model for understanding behavior. The domains of the TDF have been mapped onto the components of the COM-B model, each of which represents antecedents for behavior and is, thus, a potential target for interventions aimed at promoting behavior change	The application of the TDF framework revealed "internal" facilitators and barriers with respect to integrating PGx testing in pharmacy practice. Successful implementation was dependent on features of the pharmacists' professional identities, practice environments, self-confidence, and the perceived benefits of adding PGx testing to their practice. Potential interventions to improve the implementation of the PGx service included preparing pharmacists for managing an increased patient load, helping pharmacists navigate the software and technology requirements associated with the PGx service, and streamlining workflows and documentation requirements	Pharmacists must possess a combination of factors for implementation to be successful. The TDF model was used to articulate the barriers and facilitators of service implementation. Enablement, environmental restructuring, and persuasion are the potential intervention types suggested by the BCW to address these barriers and equip primary care pharmacists with the capability, opportunity, and motivation to implement and deliver a PGx service in their practice
Viegas et al, 2021	Portugal	To characterize physical activity promotion actions taking place in the Portuguese community	November - December 2018	Not stated	Community pharmacies	N = 2745 community pharmacists; response rate 14.4%	Quantitative; cross-sectional survey	COM-B model and TDF	Questionnaire development	Theories of behavior change can support the identification of the main drivers and challenges faced by pharmacists	Three out of four participants reported to promote physical activity in their daily routine, of which 87.7% reported doing it in only a few attendances. The majority (92.3%) mentioned to provide information orally, with walking being the activity most promoted (99.4%). More	Physical activity promotion in the Portuguese community pharmacies is still not present as daily activity. Younger pharmacists seem to better understand

		pharmacies, as well as the major facilitators and barriers faced by pharmacists in their daily practice									active and younger pharmacists were more likely to promote physical activity. Nearly all pharmacists (98.7%) believed it was important or very important to practice regular physical activity for the health, but only 41.4% of the respondents were able to correctly identify the WHO general recommendations for physical activity. The lack of coordination with other healthcare professionals, lack of interest by customers and lack of time were the main barriers, all scoring above the scale mid-point	this need and could easily integrate this practice in their daily routine. Possibilities for including pharmacies and pharmacists as promoters of physical activity in the primary health care sector in the future are discussed in the light of these findings
Faisal et al, 2021	Canada	To explore factors affecting implementation of a real-time adherence-monitoring, multidose-dispensing system in community pharmacies	November 2019 to June 2020	Not stated	Not stated	Pharmacists and pharmacy assistants who packaged and dispensed medications in smart multidose packages and monitored real-time medication intake via a web-portal remotely for older adults	Mixed methods; semi-structured interview, survey	The Technology Acceptance Model (TAM), TPB, and COM-B model	interview development; analysis (mapping) of themes	It has been argued that TAM alone cannot predict healthcare providers' beliefs about the use of health-related technology, therefore, we used an integrated approach of combing two behavior theories (TPB and COM-B model) with TAM framework to add rigor to the study	The study results indicated that pharmacists valued the availability of real-time medication intake data and perceived that it could be a useful tool to aid in clinical decision-making related to therapy. The study identified numerous factors that were not solely related to pharmacy workflow; they included pharmacists' perceived patient determinants and product features which may impact the implementation of such interventions in community pharmacy settings	Products with real-time adherence monitoring capabilities are valued by pharmacists. A careful assessment of infrastructure—including pharmacy workload, manpower and financial resources—is imperative for successful implementation of such interventions in a community pharmacy setting
Abdu-Aguye et al, 2021	Nigeria	To understand barriers/facilitators to optimal medication counselling by conducting a behavioral analysis using the COM-B model, TDF, and BCW as a basis for identifying evidence-based intervention strategies and policy categories that could be used to improve outpatient medication counselling by pharmacy staff in hospital settings	January-March 2020	Thirteen questions under four main themes, and explored areas including dispenser views on their current medication counselling practices and their perceptions of selected facilitators and barriers to effective patient counselling	Outpatient pharmacies located within hospitals	N=25 Pharmacists or pharmacy technicians who have worked for at least 6 months, and are actively involved in day-to-day outpatient medication counselling	Qualitative; semi-structures interviews	COM-B model and TDF	TDF & COM-B: Interview guide design. Data analysis: Themes identified from interviews were deductively coded using TDF domains as a priori codes, and then mapped on to the relevant COM-B component. The behavioral analysis was conducted using the BCW to identify areas requiring change to improve counselling. Once these areas were identified, evidence-based intervention and policy functions required to support these changes were then selected from the BCW	The TDF may be used together with the COM-B model, and both of these frameworks can help researchers better understand the determinants of different behaviors, and clearly identify targets for behavioral change interventions. The outer parts of the wheel then provide a systematic way of identifying relevant intervention and policy categories based on what is understood about the behavior(s) underlying them	Findings revealed shortfalls in pharmacy staff capability, opportunity and motivation with respect to outpatient medication counselling. To improve their counselling behaviors, change was identified as necessary in eight TDF domains namely 'knowledge', 'interpersonal skills', 'memory' 'environmental context', 'social influences', 'intentions', 'reinforcement' and 'beliefs about capabilities'. Seven intervention functions including 'education', 'training', 'modelling', 'enablement' and 'environmental restructuring', in addition to three policy categories ('guidelines', 'regulations' and 'environmental/social planning') were also identified as relevant to future intervention design.	The use of BCW/TDF combined framework likely led to the identification of a wider range of potential barriers to medication counselling than has been reported in the literature. Various factors were identified as affecting medication counselling by the pharmacy staff, with several of them requiring changes if counselling was to be improved upon. Multi-component interventions combining several of these intervention functions are recommended for hospital authorities and other relevant stakeholders to improve outpatient medication counselling
Bright et al, 2021	USA	To identify patient perceptions related to pharmacogenomic testing in the community pharmacy setting	2-17 June, 2016	Interview questions include content about performing pharmacogenomic testing and interpreting pharmacogenomic	Community pharmacies	N=19 Adult patients taking either a selective serotonin reuptake inhibitor (SSRI) and/or clopidogrel/prasugrel/ticagrelor	Qualitative; semi-structures interviews	Rubin and Rubin framework and TPB	Interview guide: Rubin and Rubin framework Interview questions: TPB	Not stated	Four themes related to patient perceptions of pharmacogenomic testing were consistently observed across multiple interviews: 1) trust, 2) experience, 3) risk/benefit, and 4) clarity.	These themes may influence the desire to pursue pharmacogenomic testing

				testing for the purpose of clinical decision making								
Jonkman et al, 2020	Namibia	1) Identify patient-reported barriers and facilitators to managing chronic non-communicable diseases (NCDs); 2) characterize common patient-reported medication and health related needs with chronic NCDs	September 2018-January 2019	1) Barriers and facilitators to managing chronic NCDs; 2) patient-reported medication and health related needs of Namibians with chronic NCDs	Public hospitals, private hospitals, and community pharmacies	N=20 Adults, with at least one chronic medical problem (e.g. hypertension), who were coming to pick up an outpatient prescription	Qualitative; semi-structures interviews	HBM, TPB, and the Explanatory Models of Illness (EMI)	To develop the interview guide. The constructs identified of particular importance were obtained from the HBM and TBM. Concepts from the EMI model were used to elicit cultural perceptions around the chronic disease	Not stated	Themes identified included: 1) participants were motivated to seek care when they were symptomatic; 2) participants felt motivated to care for their condition to improve their own lives and their families for their family's sake; 3) participants integrated information from a variety of sources into their disease knowledge; 4) participants describe wanting to be more engaged in managing their health and wanting support to help manage their condition; 5) participants describe awareness of lifestyle changes necessary to improve health, but face many barriers to achieving them	This study identified key factors that are essential for pharmacists and other healthcare professionals to be aware of to support patients who are diagnosed with an NCD. Healthcare providers should consider strategies to engage patients to harness their motivations, enhance health education, and create systems to reduce barriers to addressing lifestyle
Fingleton et al, 2018	UK	To establish how non-prescription medicine (NPM) dependence is treated by doctors in specialist substance misuse treatment services and to identify perceived barriers to providing treatment	Survey: May-October 2015; Interview: date not specified	To establish current practice and whether changes to service provision are needed to facilitate treatment	Specialist substance misuse treatment services	Doctors	Mixed methods; survey, semi-structured interviews	TDF and COM-B	A selection of survey questions was derived from COM-B model to determine behaviors needed to change to facilitate the treatment of NPM dependence. The interview topic guide was developed based on TDF	TDF allows to understand behavior-change processes, design interventions to enhance healthcare practice and assess implementation problems. The COM-B model enables understanding of influences on behavior	Most respondents were unaware of specific guidelines for the treatment of non-prescription medicine dependence. The most frequently identified barriers to providing treatment identified by interviewees were limited resources or capacity and the challenges presented by this client group	There is a clear need for specific clinical guidelines for the treatment of NPM dependence; research into effective treatment methods for this client group may be required to ensure that guidelines are evidence-based
Okuyan et al, 2022	Turkey	To determine the intention to receive COVID-19 vaccine and to identify the factors related to it based on the HBM framework among Turkish pharmacists	December 2020 - January 2021	Intention to receive COVID-19 vaccine and to factors related to it among Turkish pharmacists	Community pharmacies	N = 2631 pharmacists; response rate 36.5%	Quantitative; cross-sectional survey	Transtheoretical Model of Behavior Change and HBM	Questionnaire development	Not stated	Around 74.7% pharmacists had an intention to receive the COVID-19 vaccine. In model 1, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were associated with their intention to receive the COVID-19 vaccine. In model 2, the intention to receive COVID-19 vaccine was associated with being male, years of experience in the professional field, not having contracted COVID-19, having a pharmacy staff who had contracted COVID-19, and having had received seasonal fu shot within the previous year	This study highlights the factors related to the intention of the pharmacists to receive COVID-19 vaccines. HBM is the strongest predictor for vaccination intention and could be used to develop behavioral change techniques to promote vaccination

TBP: Theory of Planned Behavior; HBM: Health Belief Model; COM-B: Capability, Opportunity, and Motivation Behavior model; BCW: Behavior Change Wheel; TDF: Theoretical Domain Framework; BCT: Behavior Change Techniques; MTM: medication therapy management; OTC: over the counter; GP: general practitioners.