


# Medication Management Frameworks in the Context of Self-Management: A Scoping Review


Lauren Cadel <sup>1,2</sup>

Stephanie R Cimino<sup>3,4</sup>

Teagan Rolf von den Baumen <sup>1</sup>

Kadesha A James<sup>1</sup>

Lisa McCarthy<sup>1,2,5</sup>

Sara JT Guilcher <sup>1,3,6</sup>

<sup>1</sup>Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada; <sup>2</sup>Institute for Better Health, Trillium Health Partners, Mississauga, Ontario, Canada; <sup>3</sup>Rehabilitation Sciences Institute, University of Toronto, Toronto, Ontario, Canada; <sup>4</sup>St. John's Rehab, Sunnybrook Health Sciences Centre, North York, Ontario, Canada; <sup>5</sup>Women's College Research Institute, Women's College Hospital, Toronto, Ontario, Canada; <sup>6</sup>Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada

**Purpose:** Many individuals take multiple prescribed and unprescribed medications, also known as polypharmacy, which can be problematic. Improving medication self-management is important; however, most medication management frameworks focus on adherence and limit the integration of the core components of self-management. Therefore, the objective of this scoping review was to identify what is reported in the literature on medication management frameworks or models within the context of self-management.

**Methods:** Electronic databases (Medline, Embase, CINAHL and Cochrane Library) and grey literature (healthcare and government organization websites) were searched for articles that described a framework or model developed or adapted for medication management, included components of self-management and was published from January 2000 to January 2020. During the screening of titles and abstracts, 5668 articles were reviewed, 5242 were excluded and 426 were then assessed at the full-text level. Thirty-nine articles met the eligibility criteria and were included in the review.

**Results:** About half of the frameworks were newly developed (n=20), while the other half were adapted from, or applied, a previous model or framework (n=19). The majority of frameworks focused on medication adherence and most of the self-management domains were categorized as medical management, followed by emotional and role management.

**Conclusion:** Medication self-management is a complex process and often impacts multiple areas of an individual's life. It is important for future frameworks to incorporate a comprehensive, holistic conceptualization of self-management that is inclusive of the three self-management domains – medical, emotional and role management.

**Keywords:** medication therapy management, self-management, framework, model, review

## Introduction

The use of medication, prescribed and unprescribed, is common for the management of both acute and chronic health conditions, as well as for the maintenance of overall health.<sup>1,2</sup> There is a high prevalence of prescription medication use worldwide, with some countries reporting an increase in medication use over the last 20 years.<sup>3–5</sup> Among individuals taking medication, there is a large portion who are taking multiple medications (ie, polypharmacy). Polypharmacy is most commonly defined as the concomitant use of five or more medications, which often includes prescription medications, over-the-counter medications and natural health products.<sup>6</sup> An alternative definition, also known as problematic polypharmacy<sup>7</sup> or medication overload<sup>8</sup> describes situations in which more medications are used than are indicated or the harms exceed the benefits.

Based on the high prevalence of medication use and polypharmacy, understanding and improving medication management is essential. Medication management

Correspondence: Sara JT Guilcher  
Leslie Dan Faculty of Pharmacy, 144  
College Street, Room 604, Toronto, ON,  
M5S 3M2, Canada  
Tel + 1-416-946-7020  
Email sara.guilcher@utoronto.ca

can be defined as, “patient-centred care to optimize safe, effective and appropriate drug therapy”.<sup>9</sup> Medication management involves a number of services aimed to improve clinical outcomes, such as: completing medication reviews and health assessments, monitoring treatment plans and efficacy and safety of therapy, providing education and promoting self-management.<sup>10</sup> Self-management is a fundamental component of optimal medication management, and is defined as

an individual’s ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition (p. 178).<sup>11</sup>

Self-management encompasses three key domains: medical, emotional and role management.<sup>12</sup> Medical management involves tasks and responsibilities related to managing or controlling one’s condition (eg taking medication, eating healthy); emotional management involves learning to manage feelings and emotions related to one’s condition (eg fear, depression, anger); and role management includes adapting or creating new responsibilities as a result of one’s condition (eg scheduling around medication-taking, limiting or finding new hobbies).<sup>12</sup>

Over the past thirty years, the promotion of self-management of chronic conditions through programs and interventions has become increasingly common.<sup>13–17</sup> Self-management programs and interventions commonly focus on the following areas to improve individuals’ clinical and psychosocial outcomes: education, goal setting, decision-making, seeking support and resources, self-advocating, problem solving and relationship building.<sup>12,18</sup> Several systematic and meta reviews have noted positive outcomes of self-management programs and interventions on health outcomes for persons with diabetes,<sup>14,16,17</sup> heart failure,<sup>19,20</sup> asthma<sup>21,22</sup> and depression.<sup>23</sup> These systematic and meta reviews included studies that ranged in quality, according to the authors’ quality assessments, from low quality to very high quality.

Surprisingly, there has been limited integration of medication management and self-management, despite the effectiveness of self-management interventions and it being a fundamental component of medication management. To date, the majority of medication management frameworks are focused on patient adherence to a specific medication regimen, with a limited focus on broader concepts of self-management. Therefore, given the high use of medications and narrow focus of medication management,

this scoping review sought to identify what is reported in the literature on medication management frameworks or models within the context of self-management.

## Materials and Methods

A scoping review was conducted to examine the extent, range and nature of research on medication self-management frameworks, summarize current research and identify gaps in existing literature on this topic.<sup>24</sup> This scoping review followed the methodological approach described by Levac et al.<sup>25</sup> and aligns with the methodological guidance of the Joanna Briggs Institute on conducting scoping reviews.<sup>26</sup> The reporting guidelines of the PRISMA-ScR checklist were also followed (see [Supplementary Table 1](#)).<sup>27</sup> A protocol was developed and registered on Open Science Framework (<https://osf.io/6ckg7>).

### Stage 1: Identifying the Research Question

The research question guiding this scoping review was: what is reported in the literature on patient- or person-level medication management frameworks or models within the context of self-management? The three main objectives were to: (a) examine the extent to which the principles of self-management were integrated into the frameworks, (b) synthesize the key aspects of self-management principles that were captured in medication management frameworks and (c) identify any gaps in the literature to propose future studies.

### Stage 2: Identifying Relevant Studies

Relevant studies were identified by searching four electronic databases (Medline (Ovid Interface), Embase (Ovid Interface), Cumulative Index to Nursing and Allied Health Literature (EBSCO Interface) and Cochrane Library from January 1, 2000, to January 8, 2020. The search strategy was developed in consultation with a librarian at the University of Toronto and adapted for each database. Keywords and medical subject headings, such as medication management, framework, model and self-management, were combined with Boolean and proximity operators (see [Supplementary Table 2](#) for Medline search strategy). The search of electronic databases was conducted on January 8, 2020. In addition to database searches, grey literature was searched on TSpace (University of Toronto research repository) and relevant healthcare and government organization websites (eg

World Health Organization, National Institute of Health). Reference lists of included articles were reviewed to ensure the inclusion of all relevant literature.

### Stage 3: Study Selection

For inclusion in the scoping review, articles were required to meet the following criteria: (a) described a model or framework originally developed or adapted by authors for medication management; (b) included components of self-management; (c) peer-reviewed literature or grey literature; and (d) published between January 1, 2000, and January 8, 2020. The search was limited to the year 2000 because the majority of research on self-management occurred after this date.<sup>12</sup> Articles were excluded if any of the following criteria were met: (a) described models of care (interventions, programs, etc.) that were not guided by a concrete model/framework related to medication self-management; (b) models/frameworks that had not been adapted to include components of medication management or self-management; (c) the model/framework was lacking details on what changes/adaptations were made to the model/framework for medication self-management; (d) models/frameworks that only included self-efficacy for medication-taking behaviour as the self-management component; (e) opinion pieces; and (f) conference abstracts or articles in which the full-text was not accessible.

Study selection was conducted using EndNote X8 for de-duplication (reference manager software) and Covidence for screening (online review management software). Following Bramer's method, EndNote X8 was used to de-duplicate the exported articles from the database searches.<sup>28</sup> The core study team (SJTG, LC, KAJ, TR) used a spreadsheet in Microsoft Excel 2016 to facilitate an interrater screen of a subset of titles and abstracts. All disagreements were discussed until consensus was reached and revisions were made to the eligibility criteria, as needed. Once good agreement (defined as >0.80)<sup>29</sup> was achieved, the remainder of the titles and abstracts were imported into Covidence and divided among three reviewers (LC, KAJ, TR) to be screened by a single reviewer. After the completion of title and abstract screen, the core study team (SJTG, LC, TR, SRC) completed an interrater screen of 100 full-text articles (in subsets of 25) to test their agreement. Following each subset of 25 full-text articles, percent agreement was calculated and clarifications were made to the eligibility criteria as needed. After achieving good agreement (>0.80), all full-text articles were double-screened (two separate reviewers

screened each article). Disagreements were reviewed by a third screener (senior author) to make the final decision on inclusion.

### Stage 4: Charting the Data

A data extraction sheet was created in Microsoft Excel 2016, which was piloted by the extractors (LC, TR, SRC) to ensure consistency in the data extracted from the articles. Questions and disagreements were discussed until clarification or consensus was achieved. A spot check (review of extracted data) was completed (LC, TR) on 15% of the articles to ensure the accuracy of extracted information. The following data were extracted from each article: general information, study characteristics, population characteristics, framework characteristics, intervention characteristics, study outcomes and key findings.

### Stage 5: Collating, Summarizing and Reporting the Results

Extracted data were compared across variables. Descriptive numerical analysis and thematic analysis were conducted and are presented below. The data were also critically analyzed to identify current gaps in the literature and develop suggestions for future research, practice and policy.

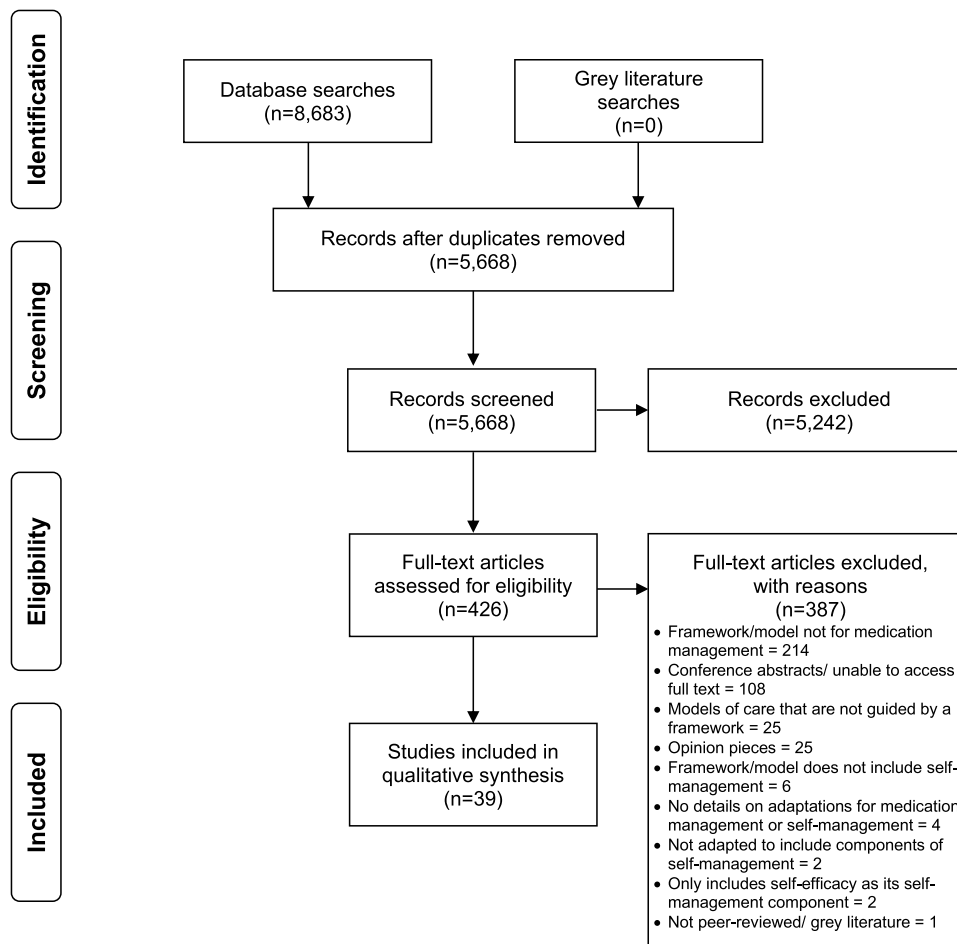
## Results

### Search Results

The database searches identified 8683 articles and no additional articles were found from the grey literature searches (see Figure 1). Following the removal of duplicates, 5668 articles remained for title and abstract screening. The full-text of 426 articles were reviewed. Following full-text review, 39 articles met all of the criteria and were included in the scoping review (see Table 1 for study characteristics of included articles).

### Study Characteristics

There was a fairly even distribution between quantitative (n=15)<sup>30-44</sup> and qualitative (n=12)<sup>45-56</sup> study designs, with few mixed method studies (n=3)<sup>57-59</sup> and several other article types (eg reviews; n=9).<sup>60-68</sup> From 2013 to 2019, there was an increase in the number of articles published yearly (total=24),<sup>30-32,36-42,47-51,54,55,57-61,64,67</sup> when compared to the 11 years prior (2002 to 2012; total=15).<sup>33-35,43-46,52,53,56,62,63,65,66,68</sup> The studies identified were conducted across 12 different countries: the



**Figure 1** PRISMA flow diagram of included articles.

United States (n=24),<sup>30,31,33,34,36,39,40,43–46,48,50,51,53,56,59–63,65,67,68</sup> China (n=2),<sup>38,42</sup> the Netherlands (n=2),<sup>35,55</sup> Singapore (n=2),<sup>49,64</sup> South Africa (n=2),<sup>37,47</sup> South Africa and Kenya (n=1),<sup>57</sup> Australia (n=1),<sup>66</sup> Canada (n=1),<sup>41</sup> Israel (n=1),<sup>52</sup> Malaysia (n=1),<sup>58</sup> Philippines (n=1)<sup>32</sup> and the United Kingdom (n=1).<sup>54</sup> Of the 39 articles, only one study involved more than one country.<sup>57</sup>

The majority of frameworks or models were developed, adapted or applied to adults and older adults, but two were for a younger population (adolescents and young adults).<sup>36,39</sup> The most common target populations were adults with HIV (n=10)<sup>30,36,37,43–45,53,57,63</sup> and cardiovascular disease (n=5).<sup>46,49–51,65</sup> Of the included articles that had a study population (n=30), the majority reported the age and sex or gender of participants.<sup>30–38,41–46,51,56</sup> There was a fairly even distribution of males and females, with mean ages ranging from 21 to 81 years. Other demographic characteristics reported in about half of the studies

were ethnicity/race<sup>30,31,33,34,36,39–46,48–51,56,59,67</sup> and education level.<sup>30–38,41–46,51,55,56</sup> The most common ethnicities/races studied were Caucasian and African American among individuals who had at least some college education. Demographic characteristics that were not consistently reported included: income level, marital status, household composition, employment status and comorbidities. The overall sample sizes ranged from 6 to 2213 (mean=265; median=136).

## Framework Characteristics

Approximately half of the included articles developed and presented a new framework (n=20), while the other half adapted previously existing frameworks, or applied them to their findings (n=19; see Table 2 for framework characteristics). New frameworks and models were developed by research teams through the use of statistical modeling (structural equation models, confirmatory factor models, measurement models, path analysis; n=8), data collected

**Table 1** Characteristics of Included Articles (n=39)

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Alsalmán and Smith (2013) <sup>60</sup>	United States	<ul style="list-style-type: none"> <li>To critique adherence concepts and terminology</li> <li>To present a new medication-taking behaviour framework</li> <li>To identify future applications of the new framework</li> </ul>	Neither <sup>†</sup> Review	NR	N/A	<ul style="list-style-type: none"> <li>The framework emphasizes a patient-centred approach and highlights current challenges with medication-taking data</li> </ul>
Archipoli, et al (2016) <sup>30</sup>	United States	<ul style="list-style-type: none"> <li>To analyze the impact of a model consisting of communicative factors, health behaviour factors and medication self-efficacy on medication adherence</li> </ul>	Quantitative Cross-sectional study	People living with HIV	334	<ul style="list-style-type: none"> <li>Patient-provider communication is positively associated with medication self-efficacy</li> <li>Medication self-efficacy is positively associated with adherence</li> </ul>
Bartlett Ellis and Welch (2017) <sup>61</sup>	United States	<ul style="list-style-type: none"> <li>To identify behaviours associated with medication-taking and medication adherence that have been reported in qualitative studies</li> </ul>	Neither Meta-ethnographic qualitative literature review	Adults with chronic kidney disease and multiple co-existing chronic conditions	108 (total across all included studies)	<ul style="list-style-type: none"> <li>Medication-taking and medication adherence behaviours were identified in 3 contexts: patient-provider clinical encounters; pharmacy encounters; and day-to-day management</li> </ul>
Beusterien et al (2008) <sup>45</sup>	United States	<ul style="list-style-type: none"> <li>To explore factors and medication characteristics that impact medication adherence</li> </ul>	Qualitative Descriptive	People living with HIV	35	<ul style="list-style-type: none"> <li>Six themes related to medication adherence were identified: regimen complexity/medication features; lifestyle fit; emotional impacts; side effects; effectiveness; and communication</li> </ul>
Blalock (2011) <sup>62</sup>	United States	<ul style="list-style-type: none"> <li>To explain how behavioural science theories may enhance the quality of medication use among prescription medication users</li> </ul>	Neither Review	NR	N/A	<ul style="list-style-type: none"> <li>The quality of research on medication use could be improved with an ecological model focused on medication self-management</li> </ul>
Bright and Stanton (2018) <sup>31</sup>	United States	<ul style="list-style-type: none"> <li>To expand and test a model of adherence that involves approach-oriented coping strategies</li> </ul>	Quantitative Longitudinal	Women with breast cancer receiving their first endocrine therapy treatment	130	<ul style="list-style-type: none"> <li>Support for depressive symptoms and social factors are importance considerations for medication adherence</li> </ul>

(Continued)

Table I (Continued).

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Brown et al (2012) <sup>46</sup>	United States	<ul style="list-style-type: none"> <li>To explore factors that help atrial fibrillation patients take medications as prescribed</li> <li>To develop a model of the medication adherence process</li> </ul>	Qualitative Descriptive	Persons living with atrial fibrillation	38	<ul style="list-style-type: none"> <li>The model integrates the patient voice and displays many factors and complexities with medication adherence</li> </ul>
Coleman et al (2014) <sup>47</sup>	South Africa	<ul style="list-style-type: none"> <li>To explore medication adherence and propose a mobile phone medication adherence monitoring framework</li> </ul>	Qualitative Case study	Elderly people living in retirement villages	12	<ul style="list-style-type: none"> <li>A high percent of elderly people are non-adherent</li> <li>The monitoring framework could improve adherence by sending and escalating reminders</li> </ul>
Corneli et al (2016) <sup>57</sup>	South Africa and Kenya	<ul style="list-style-type: none"> <li>To explore reasons for medication non-adherence and factors impacting decisions not to adhere</li> </ul>	Mixed Method Exploratory cross-sectional study	Women who participated in the FEM-PrEP trial	Qualitative: 88 Quantitative: 224	<ul style="list-style-type: none"> <li>Reasons for medication non-adherence were grounded in 5 areas: individual factors; trial characteristics and study pill regimen; patient-provider relationship; clinical setting; and the disease</li> </ul>
de Guzman et al (2013) <sup>32</sup>	Philippines	<ul style="list-style-type: none"> <li>To develop and test and medication adherence model relative to numerous factors</li> </ul>	Quantitative Cross-sectional study	Older adults	325	<ul style="list-style-type: none"> <li>Factors related to medication adherence are connected and solutions should be multi-faceted</li> </ul>
Dilorio et al (2004) <sup>34</sup>	United States	<ul style="list-style-type: none"> <li>To analyze a psychosocial model of medication self-management</li> </ul>	Quantitative Repeated measures	Adults with epilepsy	320 <sup>‡</sup>	<ul style="list-style-type: none"> <li>Medication self-management is impacted by psychosocial factors (social support, stigma)</li> </ul>
Fransen et al (2009) <sup>35</sup>	Netherlands	<ul style="list-style-type: none"> <li>To examine factors that determine patients' adherence to short-term treatment</li> </ul>	Quantitative Prospective observational study	Adults with dyspepsia using short-term proton pump inhibitor treatment	347	<ul style="list-style-type: none"> <li>Medication adherence was affected by concerns with medications, limited social support, lower self-efficacy, increased complaints and beliefs that complaints could not be changed</li> </ul>
Ghose et al (2019) <sup>48</sup>	United States	<ul style="list-style-type: none"> <li>To examine how a transitional housing program for women recently released from incarceration impacts medication adherence</li> </ul>	Qualitative Grounded theory	Women with HIV released from incarceration	43	<ul style="list-style-type: none"> <li>Housing initiated processes (empowerment, cognitive and emotional re-engagement, health-seeking behaviours) that improved adherence</li> </ul>

(Continued)



Table I (Continued).

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Gifford and Groessl (2002) <sup>63</sup>	United States	<ul style="list-style-type: none"> <li>To propose a framework and discuss components of a program for the self-management of chronic HIV disease</li> </ul>	Neither Review	People living with HIV	N/A	<ul style="list-style-type: none"> <li>Key components of a self-management program include: goal setting; planning; communication; information seeking; and symptom management</li> </ul>
Goh et al (2017) <sup>64</sup>	Singapore	<ul style="list-style-type: none"> <li>To identify factors affecting adherence and evaluate the association of the factors with adherence</li> </ul>	Neither Systematic review	Rheumatic patients	N/A	<ul style="list-style-type: none"> <li>Five main categories related to adherence were identified: patient factors; therapy factors; condition factors; health system factors; and social/economic factors</li> </ul>
Guy et al (2018) <sup>36</sup>	United States	<ul style="list-style-type: none"> <li>To identify the association between adherence, emotional support seeking and active coping</li> </ul>	Quantitative Cross-sectional study	Young African American men who have sex with men who have HIV	49	<ul style="list-style-type: none"> <li>Emotional support seeking was significantly associated with adherence through active coping</li> </ul>
Koh et al (2018) <sup>49</sup>	Singapore	<ul style="list-style-type: none"> <li>To explore factors affecting medication adherence</li> </ul>	Qualitative Descriptive	Persons living with atherosclerotic cardiovascular disease	20	<ul style="list-style-type: none"> <li>Factors affecting medication adherence included: complex regimens; lack of support; perceived seriousness of condition; and cost</li> </ul>
Lau et al (2017) <sup>38</sup>	China	<ul style="list-style-type: none"> <li>To examine factors impacting medication adherence using structural equation modeling</li> </ul>	Quantitative Exploratory cross-sectional study	Older Chinese community-dwelling adults	593	<ul style="list-style-type: none"> <li>Improved medication adherence was associated with fewer chronic diseases; more medication categories; lower fear of sharing scores; and higher willingness to share and self-care agency scores</li> </ul>
Li et al (2007) <sup>65</sup>	United States	<ul style="list-style-type: none"> <li>To describe a theoretical framework for antihypertensive medication compliance</li> </ul>	Neither Review	Chinese immigrants with hypertension	N/A	<ul style="list-style-type: none"> <li>The framework was built on four constructs: motivation; cultural health perceptions; modifying factors; and cultural health activities</li> </ul>
McCann et al (2008) <sup>66</sup>	Australia	<ul style="list-style-type: none"> <li>To present a model for medication adherence self-efficacy for chronic mental illness</li> </ul>	Neither Review	Individuals with chronic mental illness	N/A	<ul style="list-style-type: none"> <li>Medication adherence is multidimensional and includes factors related to self-efficacy, relationships, and social, psychological and environmental support</li> </ul>

(Continued)

Table 1 (Continued).

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Mickelson et al (2016) <sup>50</sup>	United States	<ul style="list-style-type: none"> <li>To describe and analyze the medication management of older adults with heart failure using the macrocognitive workflow framework</li> </ul>	Qualitative Descriptive	Older adults with heart failure	61	<ul style="list-style-type: none"> <li>Macrocognitive processes affected medication management and were often collaborative</li> </ul>
Nantha et al (2019) <sup>58</sup>	Malaysia	<ul style="list-style-type: none"> <li>To create an integrated behavioural model for diabetic medication compliance</li> </ul>	Mixed Method Protocol Cross-sectional study	Adults with type 2 diabetes	Study 1: Expecting 20 interviews, 10 for focus groups Study 2: Expecting 200	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Newman-Casey et al (2013) <sup>67</sup>	United States	<ul style="list-style-type: none"> <li>To review educational interventions, identify their effect on glaucoma medication adherence and how they use Health Behaviour Theory</li> </ul>	Neither Systematic Review	Glaucoma	N/A	<ul style="list-style-type: none"> <li>There are limited high quality studies using education for glaucoma medication adherence</li> </ul>
Paterson et al (2018) <sup>41</sup>	Canada	<ul style="list-style-type: none"> <li>To examine the relationship between medication adherence and depressive symptoms, self-efficacy, problem solving and neurocognitive abilities</li> </ul>	Quantitative Cross-sectional study	Renal transplant recipients	211	<ul style="list-style-type: none"> <li>Problem solving and self-efficacy were positively associated with medication adherence</li> </ul>
Piette et al (2006) <sup>68</sup>	United States	<ul style="list-style-type: none"> <li>To present a conceptual framework to understand influencing factors on responses to medication costs</li> </ul>	Neither Review	Chronically ill patients	N/A	<ul style="list-style-type: none"> <li>Medication costs are impacted by patient and clinician characteristics, type of medication, and the health system</li> </ul>
Roe et al (2009) <sup>52</sup>	Israel	<ul style="list-style-type: none"> <li>To explore reasons people with serious mental illness stop taking prescription medication</li> </ul>	Qualitative Descriptive	Serious mental illness	7	<ul style="list-style-type: none"> <li>Medication non-adherence is contextual and based on subjective experiences</li> </ul>
Schafheutle et al (2018) <sup>54</sup>	United Kingdom	<ul style="list-style-type: none"> <li>To describe strategies for medication-taking following hospital discharge</li> <li>To identify members of one's social network involved in medication-taking strategies</li> </ul>	Qualitative Descriptive	Chronic obstructive pulmonary disease	12	<ul style="list-style-type: none"> <li>Strategies for medication-taking did not change from pre-hospitalization</li> <li>Social networks assisting with medication-taking were: family and health-care professionals</li> </ul>

(Continued)



Table I (Continued).

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Schrijvers et al (2014) <sup>55</sup>	Netherlands	<ul style="list-style-type: none"> <li>To describe the adherence process from the patients' perspective</li> </ul>	Qualitative Grounded Theory	Hemophilia	21	<ul style="list-style-type: none"> <li>Adherence was impacted by: acceptance of hemophilia; feelings and fearing symptoms; understanding of hemophilia and prophylaxis; and behavior</li> </ul>
Simoni et al (2006) <sup>43</sup>	United States	<ul style="list-style-type: none"> <li>To test a model of adherence among inner-city HIV-positive patients on antiretroviral therapy</li> </ul>	Quantitative Longitudinal Evaluation	HIV-Positive Men and Women on Antiretroviral Therapy	136	<ul style="list-style-type: none"> <li>Baseline adherence self-efficacy predicted patients' self-reported adherence</li> </ul>
Swanlund et al (2008) <sup>56</sup>	United States	<ul style="list-style-type: none"> <li>To explore medication self-management among older adults</li> </ul>	Qualitative Descriptive	Community-dwelling older adults	19	<ul style="list-style-type: none"> <li>Self-management capability is positively impacted by: living orderly and aging well</li> </ul>
Weaver et al (2005) <sup>44</sup>	United States	<ul style="list-style-type: none"> <li>To study and test a stress and coping model of factors associated with adherence and HIV viral load</li> </ul>	Quantitative Secondary analysis of a longitudinal randomized trial	Adults with HIV	322	<ul style="list-style-type: none"> <li>Adherence is predicted by avoidance-oriented coping, which is impacted by social support and negative mood</li> </ul>
Saslo (2007) <sup>53</sup>	United States	<ul style="list-style-type: none"> <li>To observe the culture of living with HIV and its impact on adherence to care plans</li> </ul>	Qualitative Ethnography	Adults with HIV	6	<ul style="list-style-type: none"> <li>Adherence was impacted by: literacy; fear; disease; and policies</li> </ul>
Qu et al (2018) <sup>42</sup>	China	<ul style="list-style-type: none"> <li>To examine adherence to pre-exposure prophylaxis</li> <li>To identify if information, motivation and behavioural skills are significantly associated with adherence</li> <li>To explore objective factors for non-adherence to pre-exposure prophylaxis</li> <li>To describe factors of non-adherence for future interventions</li> </ul>	Quantitative Secondary analysis of randomized placebo-controlled trial	Men who have sex with men (at risk of contracting HIV)	331	<ul style="list-style-type: none"> <li>Adherence was not associated with social psychological factors in the model</li> </ul>
O'Brien (2014) <sup>59</sup>	United States	<ul style="list-style-type: none"> <li>To identify factors associated with medication adherence and non-adherence</li> <li>To describe medication self-management processes</li> </ul>	Mixed Method Descriptive explanatory study	Older adults	268	<ul style="list-style-type: none"> <li>Assistance from caregivers positively impacted medication adherence</li> </ul>

(Continued)

Table I (Continued).

Author (Year)	Country	Objective	Method Study Design	Participants	Sample Size	Key Findings
Mondesir et al (2019) <sup>51</sup>	United States	<ul style="list-style-type: none"> <li>To explore influences on medication adherence using the World Health Organization Multidimensional Adherence Model</li> </ul>	Qualitative Descriptive	Adults with coronary heart disease	18	<ul style="list-style-type: none"> <li>Adherence was impacted by factors related to the: patient; social and economic; therapy; and health system</li> </ul>
Messina et al (2016) <sup>40</sup>	United States	<ul style="list-style-type: none"> <li>To examine motivational constructs for non-medical use of pain relievers, stimulants and sedatives/ tranquilizers</li> </ul>	Quantitative Cross-sectional study	Undergraduate students	1016	<ul style="list-style-type: none"> <li>Non-medical use of pain relievers, stimulants and sedatives/tranquilizers may be driven by self-treatment and recreational use</li> </ul>
MacDonell et al (2016) <sup>39</sup>	United States	<ul style="list-style-type: none"> <li>To test a model of medication adherence, specific to social cognitive factors</li> </ul>	Quantitative Cross-sectional study	Ethnic and racial minority HIV-positive youth	2213	<ul style="list-style-type: none"> <li>Adherence was positively associated with higher self-efficacy and readiness</li> <li>Adherence was negatively associated with substance use and psychological symptoms</li> </ul>
Kekwaletswe et al (2017) <sup>37</sup>	South Africa	<ul style="list-style-type: none"> <li>To duplicate and build on a multicomponent model of antiretroviral therapy adherence</li> </ul>	Quantitative Cross-sectional study	HIV positive people taking antiretroviral therapy	304	<ul style="list-style-type: none"> <li>Adherence was associated with: reduced depression; reduced alcohol use; and higher self-efficacy beliefs</li> </ul>
Dehn (2010) <sup>33</sup>	United States	<ul style="list-style-type: none"> <li>To clarify the association of adherence to cystic fibrosis treatments to numerous factors</li> </ul>	Quantitative Descriptive and correlational	Adults with cystic fibrosis	173	<ul style="list-style-type: none"> <li>Adherence was significantly associated with: problem-focused coping and physician partnership</li> </ul>

**Notes:** † The article was not original research (ie, qualitative, quantitative or mixed methods). ‡ Three participants were excluded from all analyses (incomplete assessments or withdrawal post-baseline).

**Abbreviations:** NR, not reported; N/A, not applicable; HIV, human immunodeficiency virus.

from interviews and focus groups (n=6) and literature syntheses (n=4). One new framework was developed from literature syntheses and focus groups and one framework lacked sufficient details on how it was developed. Adapted frameworks were most commonly based on social cognitive theory, behaviour change models and medication adherence models. Similar to newly developed frameworks, adapted frameworks were often based on quantitative surveys (n=7), literature syntheses (n=4), qualitative data from interviews and focus groups (n=3) or a combination (n=3). No frameworks were developed or adapted through co-design sessions with participants.

The majority of self-management domains (eg adherence; self-efficacy; depression; and seeking advice, support and relationships) included in the frameworks were categorized as medical management (eg medication/treatment adherence, medication/adherence self-efficacy, medication-taking behaviour), followed by emotional management (eg depression, emotional impact) and role management (eg problem solving, day-to-day management, spirituality). Across all frameworks, developed, adapted and applied, the most common domains (not limited to self-management) were related to adherence, self-efficacy, depression, social support and regimen

**Table 2** Framework Characteristics

Author (Year)	Name of Framework/ Model	Description	Target Population	New or Adapted Framework
Alsaman and Smith (2013) <sup>60</sup>	Medication-Taking Behavior	<ul style="list-style-type: none"> <li>A framework describing all medication-taking behaviours (how, when and how much patients take prescribed medications) using new concepts and measures</li> </ul>	NR	New
Archiopoli, et al (2016) <sup>30</sup>	Mediating Model	<ul style="list-style-type: none"> <li>A model examining the relationship between behavioural health factors and interpersonal communication factors with medication self-efficacy and medication adherence</li> </ul>	People living with HIV	New
Bartlett Ellis and Welch (2017) <sup>61</sup>	Medication-taking across the care continuum and adherence-related outcomes	<ul style="list-style-type: none"> <li>A framework to organize medication-taking behaviours within clinical encounters, pharmacy encounters and day-to-day management</li> </ul>	Adults with chronic kidney disease and multiple coexisting chronic conditions	New
Beusterien et al (2008) <sup>45</sup>	Patient reported adherence diagram	<ul style="list-style-type: none"> <li>A framework illustrating the relationship of themes (emotional impact, communication, effectiveness, side effects, lifestyle fit and regimen complexity/medication features) that have an influence on adherence to therapy</li> </ul>	People living with HIV	New
Blalock (2011) <sup>62</sup>	Proposed ecological framework for medication self-management	<ul style="list-style-type: none"> <li>A framework based on an ecological model identifying goals at 5 levels (patient, family, providers, system and social policy/government regulations) that impact medication use and self-management</li> </ul>	NR	Adapted
Bright and Stanton (2018) <sup>31</sup>	Stress and coping model of endocrine therapy adherence	<ul style="list-style-type: none"> <li>A model that incorporates social support, coping and depressive symptoms to test their influence on adherence</li> </ul>	Women with breast cancer receiving their first endocrine therapy treatment	New
Brown et al (2012) <sup>46</sup>	Conceptual model of adherence to oral anticoagulants	<ul style="list-style-type: none"> <li>A model outlining the adherence process to oral anticoagulants (includes contextual factors, knowledge, motivation, habit formation, self-efficacy and adherence)</li> </ul>	Persons living with atrial fibrillation	New
Coleman et al (2014) <sup>47</sup>	Mobile phone adherence monitoring framework (MPAMF)	<ul style="list-style-type: none"> <li>A mobile health framework for medication self-efficacy among elderly individuals, with an adherence monitoring system</li> </ul>	Elderly people living in retirement villages	New
Corneli et al (2016) <sup>57</sup>	Conceptual model illustrating factors related to non-adherence in FEM-PrEP	<ul style="list-style-type: none"> <li>A model of commonly reported factors related to non-adherence</li> </ul>	Women who participated in the Preexposure Prophylaxis Trial for HIV Prevention among African Women (FEM-PrEP)	Adapted

(Continued)

Table 2 (Continued).

Author (Year)	Name of Framework/ Model	Description	Target Population	New or Adapted Framework
de Guzman et al (2013) <sup>32</sup>	Emerging model of medication adherence	<ul style="list-style-type: none"> <li>A structural equation model identifying the relationships that have a positive effect on medication adherence (behavioural attitude, perceived behavioral control, subjective norm)</li> </ul>	Older adults	New
Dilorio et al (2004) <sup>34</sup>	Modified model of epilepsy self-management for medications	<ul style="list-style-type: none"> <li>A model of epilepsy self-management for medications that includes personal, social and provider-specific variables</li> </ul>	Adults with epilepsy	Adapted
Fransen et al (2009) <sup>35</sup>	Theoretical model: determinants of patient adherence	<ul style="list-style-type: none"> <li>A theoretical model of patient-related factors impacting adherence to short-term proton pump inhibitor treatment</li> </ul>	Adults with dyspepsia using short-term proton pump inhibitor treatment	Adapted
Ghose et al (2019) <sup>48</sup>	Housing's effect on adherence	<ul style="list-style-type: none"> <li>A conceptual framework that includes subjective and material processes and examines how housing affects advances in antiretroviral adherence</li> </ul>	Women with HIV released from incarceration	Adapted
Gifford and Groessl (2002) <sup>63</sup>	HIV disease self-management	<ul style="list-style-type: none"> <li>A conceptual framework for understanding and categorizing determinants of HIV disease self-management and health outcomes</li> </ul>	People living with HIV	Adapted
Goh et al (2017) <sup>64</sup>	Hand model of medication adherence in rheumatic factors	<ul style="list-style-type: none"> <li>A model of five categories of factors that affect medication adherence</li> </ul>	Rheumatic patients	Adapted
Guy et al (2018) <sup>36</sup>	Mediation model	<ul style="list-style-type: none"> <li>A model examining the association between active coping, emotional support seeking and treatment adherence</li> </ul>	Young African American men who have sex with men who have HIV	Adapted
Koh et al (2018) <sup>49</sup>	Integration of WHO framework of adherence and Levesque's framework for health care access	<ul style="list-style-type: none"> <li>A framework for understanding how system, social, economic and patient related factors impact medication adherence</li> </ul>	Persons living with atherosclerotic cardiovascular disease	Adapted
Lau et al (2017) <sup>38</sup>	Structural equation model of five-dimensional factors on medication adherence among older adults	<ul style="list-style-type: none"> <li>A hypothetical model of medication adherence that incorporates healthcare team, patient, disease, therapy and socioeconomic related factors</li> </ul>	Older Chinese community-dwelling adults	Adapted
Li et al (2007) <sup>65</sup>	Modified sick role behaviour model	<ul style="list-style-type: none"> <li>A model consisting of four constructs to predict their impact on medication compliance</li> </ul>	Chinese immigrants with hypertension	Adapted
McCann et al (2008) <sup>66</sup>	Self-efficacy model of medication adherence	<ul style="list-style-type: none"> <li>A model of medication adherence that consists of five core factors and contextual influences</li> </ul>	Individuals with chronic mental illness	New
Mickelson et al (2016) <sup>50</sup>	Macrocognitive workflow of medication management	<ul style="list-style-type: none"> <li>A model outlining the macrocognitive workflow of medication management and includes artifacts, actors and actions</li> </ul>	Older adults with heart failure	Adapted

(Continued)

Table 2 (Continued).

Author (Year)	Name of Framework/ Model	Description	Target Population	New or Adapted Framework
Nantha et al (2019) <sup>58</sup>	Integrated behavioural model of medication compliance	<ul style="list-style-type: none"> <li>An integrated behavioural model of medication compliance that incorporates external variables, indirect and direct determinants</li> </ul>	Adults with type 2 diabetes	Adapted
Newman-Casey et al (2013) <sup>67</sup>	Model of glaucoma medication adherence	<ul style="list-style-type: none"> <li>A conceptual model of medication adherence that includes components of knowledge, barriers to adherence and perceived stress</li> </ul>	Glaucoma	New
Paterson et al (2018) <sup>41</sup>	Model of adherence by renal transplant recipients	<ul style="list-style-type: none"> <li>A model that examines the impact of sociodemographics, neurocognitive abilities, depressive symptoms, self-efficacy and problem solving on medication adherence</li> </ul>	Renal transplant recipients	New
Piette et al (2006) <sup>68</sup>	Framework for understanding chronically ill patients' medication cost problems	<ul style="list-style-type: none"> <li>A framework consisting of factors that impact cost-related medication non-adherence</li> </ul>	Chronically ill patients	New
Roe et al (2009) <sup>52</sup>	Process of choosing not to take medication	<ul style="list-style-type: none"> <li>A model of the steps involved in the decision to stop taking medication</li> </ul>	Serious mental illness	New
Schafheutle et al (2018) <sup>54</sup>	Medication work	<ul style="list-style-type: none"> <li>A framework describing types of medication work that patients with chronic obstructive pulmonary disease use post-discharge</li> </ul>	Chronic obstructive pulmonary disease	Applied Cheraghi-Sohi et al's medication work framework
Schrijvers et al (2014) <sup>55</sup>	Model of adherence to prophylaxis in hemophilia	<ul style="list-style-type: none"> <li>A model to describe factors impacting adherence to prophylaxis</li> </ul>	Haemophilia	New
Simoni et al (2006) <sup>43</sup>	Model of social support and adherence	<ul style="list-style-type: none"> <li>A cognitive-affective model of adherence to highly active antiretroviral therapy and the impact of social support</li> </ul>	HIV-Positive Men and Women on Antiretroviral Therapy	New
Swanlund et al (2008) <sup>56</sup>	Medication self-management model	<ul style="list-style-type: none"> <li>A model for predicting one's self-management capability and the overall successful or unsuccessful self-management of a medication regimen</li> </ul>	Community-dwelling older adults	New
Weaver et al (2005) <sup>44</sup>	Stress and coping model of medication adherence	<ul style="list-style-type: none"> <li>A model of latent factors and indicators of latent factors that affect adherence to highly active antiretroviral therapy</li> </ul>	Adults with HIV	New
Saslo (2007) <sup>53</sup>	Saslo's model for adherence to HIV treatment	<ul style="list-style-type: none"> <li>A model of HIV treatment adherence that includes themes related to fear, trust, self-worth, finances, literacy and disease</li> </ul>	Adults with HIV	New
Qu et al (2018) <sup>42</sup>	Information motivation behaviour skills model of medication adherence behavior	<ul style="list-style-type: none"> <li>A model that examines the relationship between knowledge, behaviour and motivation and their impact on adherence rate</li> </ul>	Men who have sex with men (at risk of contracting HIV)	Adapted

(Continued)

**Table 2** (Continued).

Author (Year)	Name of Framework/ Model	Description	Target Population	New or Adapted Framework
O'Brien (2014) <sup>59</sup>	Conceptual framework	<ul style="list-style-type: none"> <li>A framework that incorporates contextual factors (risk and protective) and self-management processes to examine their effect on medication adherence</li> </ul>	Older adults	Adapted
Mondesir et al (2019) <sup>51</sup>	World Health Organization multidimensional adherence model	<ul style="list-style-type: none"> <li>A model based on the five factors of the World Health Organization's adherence model</li> </ul>	Adults with coronary heart disease	Applied the World Health Organization Multidimensional Adherence Model
Messina et al (2016) <sup>40</sup>	3 Models: 1. Non-medical use of pain relievers 2. Non-medical use of tranquillizers and sedatives 3. Non-medical use of stimulants	<ul style="list-style-type: none"> <li>Three models that incorporate latent constructs impacting the non-medical use of pain relievers, tranquilizers and sedatives and stimulants</li> </ul>	Undergraduate students	New
MacDonell et al (2016) <sup>39</sup>	Model of medication adherence	<ul style="list-style-type: none"> <li>A model of medication adherence that incorporates social and cognitive factors</li> </ul>	Ethnic and Racial Minority HIV-Positive Youth	New
Kekwaletswe et al (2017) <sup>37</sup>	Structural equation model among HIV positive people taking antiretroviral therapy	<ul style="list-style-type: none"> <li>A model of latent and measured variables on adherence to antiretroviral therapy</li> </ul>	HIV positive people taking antiretroviral therapy	Adapted
Dehn (2010) <sup>33</sup>	Adapted health belief model	<ul style="list-style-type: none"> <li>An adapted model to examine the relationship between sociodemographic characteristics, modifying factors and treatment adherence</li> </ul>	Adults with cystic fibrosis	Adapted

**Abbreviations:** NR, not reported; HIV, human immunodeficiency virus.

complexity/factors (eg number and size of pills, frequency of refills). There were no major differences between the framework domains from quantitative and qualitative studies.

## Discussion

This scoping review analyzed the range and nature of research on medication self-management frameworks. Within the three self-management domains (ie, medical, emotional and role management), the vast majority focused on medical management (eg adherence, medication-taking behaviour, medication self-efficacy, relationships with healthcare providers), with a limited focus on emotional and role management. Further, within medical management,

the majority of studies focused specifically on medication adherence and lacked a comprehensive, holistic conceptualization of self-management. Given the prevalence of individuals taking medications and the potential for problematic polypharmacy,<sup>7,69</sup> it is important that research and clinical practice conceptualizes medication management beyond adherence to promote person-centred care.

While limited, there were a few frameworks that included a more holistic approach to medication self-management.<sup>50,56,62</sup> For example, Blalock used behavioural science theories (eg social cognitive theory, theory of social support, Health Belief Model) to describe how to improve medication use among individuals requiring pharmacotherapy.<sup>62</sup> An ecological model was used to

present factors impacting medication use at five levels – characteristics of the patient; services from providers; support from family, friends and small groups; characteristics of the community and health care system; and social policy and government regulations. Blalock then proposed a framework specific to medication self-management that built on the ecological model and Fisher's self-management model<sup>70</sup> to incorporate specific intervention goals at each level. The author highlighted the value of using this as a guiding framework for medication self-management, but also identified the need to further develop it as knowledge evolves.

A more holistic framework for medication self-management was also presented by Mickelson et al.<sup>50</sup> A qualitative study was conducted among older adults with heart failure to describe the medication management work process (effort and time to produce or accomplish something) and adapt Unertl et al's Workflow Elements Model.<sup>71</sup> The adapted model contained five main process, each containing subprocesses: sensemaking (information gathering, adapting mental models, story building), planning (generating action plans, adapting plans, anticipatory thinking), monitoring (problem detection, tracking), decision making (applying rules, pattern matching, mental stimulation, making trade-offs) and coordinating (reconciling information, managing interdependencies, negotiating). Furthermore, these frameworks highlight the intrinsic complexities of medication management that are critical to consider when developing programs, interventions and initiatives targeting medication self-management.

Importantly, medication-taking has a substantial impact on an individual's life.<sup>72</sup> For example, a systematic review was conducted by Mohammed et al to explore medication burden among patients with experience taking medications.<sup>72</sup> This review identified patients' experiences with medication-related burden (ie, burden caused by medication routines, medication characteristics, adverse events, healthcare system, social life), medication-related beliefs (individual attitudes, coping skills, outside influences) and medication-taking practices (following instructions, accepting medication use, modifying care plans). Further, Mohammed et al's review highlighted the impact of medications and medication burden on the day-to-day lives of individuals taking medications, as it interfered with their daily activities and influenced their beliefs, attitudes and overall quality of life. The impact of medication management on an individual's life extends beyond medical management to include emotional and role

management. Therefore, it is critical for medication self-management frameworks to be all-encompassing of the self-management domains.

Frameworks that took into account the participants' sociodemographic and clinical characteristics are lacking based on our scoping review. Medication self-management may be impacted by micro, meso and macro level factors. Micro, or individual, level factors can impact medication use and the potential for polypharmacy, as age, gender, cognitive and physical ability and multimorbidity have been noted in the literature to affect medication-taking behaviour.<sup>73–78</sup> For example, a systematic review was conducted by Smaje et al (2018) to identify factors associated with medication adherence in older patients and found that older age, multimorbidity, cognitive impairment and being male were negatively associated with adherence.<sup>74</sup> Additionally, characteristics of a medication regimen, including complexity, dose, frequency and side effects can also impact medication adherence.<sup>79–83</sup> Increased regimen complexity results in reduced medication adherence, as identified in a systematic review by Pantuzza et al (2017) that examined evidence on the association between medication regimen complexity and adherence.<sup>79</sup> Similarly, a qualitative study conducted by O'Donovan et al (2019) in the United Kingdom explored the impact and management of medication side effects among individuals 18 or older who had experienced side effects.<sup>84</sup> It was identified that participants used non-adherent behaviours as a method of coping with side effects. Further, many of these individual level factors have also been identified as having an impact on general self-management,<sup>85–87</sup> which adds a layer of complexity to medication self-management.

Macro or system level factors can also have an impact on medication self-management. This review identified that, to date, the majority of frameworks for medication self-management were from the United States (n=24), with an overall lack of global representation. Medication self-management may look different in different regions or countries based on healthcare system and funding structures, insurance coverage and support from and access to healthcare providers.<sup>88,89</sup> In an analysis of health data from 1980 to 2016, Sarnak et al compared drug spending and trends in the United States, Australia, Canada, France, Germany, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom.<sup>88</sup> The United States had considerably higher prescription drug spending and drug prices than the other high-income countries. Americans were also



more likely to experience high out-of-pocket costs for medications. High out-of-pocket medication costs can impact medication self-management, as an inability to afford medications may lead to cost-related nonadherence.<sup>90</sup> It is important to acknowledge contextual factors in the development and application of medication self-management frameworks. In addition, more work is needed to explore what sociodemographic and clinical characteristics, as well as what system level factors impact medication self-management in order to understand if, and how, frameworks can be applied to different populations in different contexts.

## Future Work

This scoping review highlighted several gaps in the literature and areas for future work. First, it is important for future research to develop a framework for medication self-management that directly incorporates patients' and providers' voices (ie, through co-design) and can be applied to a broader population of individuals taking medications. Integrating the thoughts, experiences, beliefs and concerns of persons with lived experience and providers is important, as patients are the ones self-managing and impacted by these processes on a day-to-day basis and providers are supporting patients with their health conditions and medications. More specifically, co-design would allow for the collaborative development of a framework that meets the needs of patients and providers. Second, a framework that encompasses all components of medication and self-management should be developed and validated. Current frameworks mostly focus on adherence, rather than incorporating the impact of experiences, beliefs and preferences on self-management behaviour. Frameworks guide research and consequently clinical practice recommendations.<sup>91,92</sup> Advancing the collective knowledge on medication self-management can help patients and providers navigate self-management and related self-management support.

## Limitations

There are a few limitations of this scoping review that should be noted. First, it is possible that relevant articles were missed based on the databases and grey literature searched. Second, our search was conducted in English, so it is possible that articles published in other languages were not identified. Third, some may note that a critical appraisal of included articles was

not undertaken. However, critical appraisal is a less common and optional component for scoping reviews.<sup>27</sup>

## Conclusion

Medication self-management is complex and has the potential to impact multiple aspects of an individual's life, including mental and physical well-being, as well as day-to-day activities. The majority of frameworks included in this review focus on medical management, with few incorporating components of emotional and role management. It is important to acknowledge the impact medication self-management can have on all aspects of one's life and focus future work on developing and validating holistic frameworks for medication self-management that can be applied to a broad population.

## Data Sharing Statement

All data analyzed in this scoping review are included in this published article and its supplementary files.

## Ethics Approval and Informed Consent

Not applicable.

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