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Behavioral Determinants of Older Adults' and Caregivers' Willingness to Deprescribe: A Systematic Review

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ABSTRACT

Background: Deprescribing is a strategy to optimize medication use and to prevent medication harm. Despite the fact that behavioral theories have been shown to be useful in explaining health behaviors, the literature on deprescribing relies almost exclusively on attitudes as an explanatory factor for deprescribing behavior. This study systematically reviews the literature that made explicit use of the constructs included in health behavior theories (HBTs) to explain older adults' and informal caregivers' deprescribing behavior and outcomes.

Methods: Studies were screened from five electronic databases by two reviewers. Quantitative interventional and non-interventional studies applying at least one HBTs or construct from these theories to older adults' or informal caregiver' intention or behavior to deprescribe, were included. Studies that used the patients' attitudes toward deprescribing (PATD) questionnaire or its revised version were excluded.

Results: A total of 11 non-interventional studies and 11 interventional studies were identified, seven of which applied HBTs, and the other 15 used constructs from the HBTs. Health literacy and locus of control were identified as moderator variables. Only two studies targeted informal caregivers' deprescribing intentions or behavior.

Conclusions: HBTs are not systematically used. However, combining the main HBT constructs reported in the literature offers a better explanation of the (intention to) engage in deprescribing.

Trail Registration: The study protocol (ID: CRD42022378157) was published on PROSPERO.

1 | Background

Polypharmacy, or using five or more medications at a time, is a common practice in modern healthcare (Reeve et al. 2022). Although patients may benefit from taking multiple medicines, it becomes problematic when the medication's potential harms outweigh its potential benefits. Although polypharmacy increases the risk of inappropriate medication use and adverse drug reactions, it is estimated that over 50% of older people may be experiencing problematic polypharmacy (Nordin Olsson, Runnamo, and Engfeldt 2011; Spinewine et al. 2007). Therefore, the World Health Organization (WHO 2017) has identified the reduction of inappropriate polypharmacy as a key public health goal. As prescribing medication has become an essential dimension

of the health care for older adults aged 60 and over (United Nations 2020), several campaigns and projects encouraging to reduce prescribed medication have seen the light, including the BMJ's *Too Much Medicine* campaign (Moynihan et al. 2013) and the *Choosing Wisely* project (Grimshaw et al. 2020), both of which recognize the problem of overuse as being "low value care".

Since the WHO report, the interest in deprescribing has grown consistently (Pickering et al. 2020). Deprescribing is defined by Reeve and colleagues (2022, XXV) as *"a planned/ supervised process of dose reduction or the stopping of medicines that may be causing harm or conferring no additional benefit"*. It is not only concerned with protecting people from potential harm, but also with reversing the clinical, economic, and environmental burden of unnecessary polypharmacy (Gnjidic et al. 2022; Reeve et al. 2022; Roux et al. 2022).

Deprescribing is a feasible and safe process (Page et al. 2016). However, despite the patients' general willingness to be involved in the decision-making process regarding medication, physicians report a certain reluctance or unwillingness from patients to engage in deprescribing (Reeve et al. 2018). Therefore, it is important to understand the factors that contribute to older adults' and caregivers' deprescribing intention and/or behavior. Although no single factor or set of factors provides an appropriate explanation for a given behavior, the use of existing health behavior theories (HBTs) provides a better understanding of these factors in a comprehensive way.

HBTs typically consist of a combination of social, cognitive, and motivational psychological constructs that explain human health-related behavior. They help to understand why people behave in certain health-related ways, and to predict health-related behaviors (Glanz and Bishop 2010; Gehlert and Ward 2019). The best-known and most widely used theories are the Health Belief Model (HBM; Rosenstock 1974), the Protection Motivation Theory (PMT; Rogers 1975) which builds on the HBM, and the Theory of Planned Behavior (TPB; Ajzen 1991), which is in itself an extension of the Theory of Reasoned Action (TRA; Ajzen and Madden 1986). Social Cognitive Theory (SCT) is another model that offers not only predictors of a behavior change, but also *"… principles on how to inform, enable, guide, and motivate people to adapt habits that promote health and reduce those that impair it"* (Bandura 2004, 146). Compared to previous models, the SCT goes further by adding environmental and social factors (Bandura 1988).

Although the abovementioned theories aim to *explain* health-related behavior, others try to *describe* the process of behavior change. Given that behavior change involves processes that take place over time, the Trans-Theoretical Model of change (TTM; Prochaska and DiClemente 1983) conceives of behavior change as a process that involves moving through a series of six stages of change: pre-contemplation, contemplation, preparation, action, maintenance, and termination (Prochaska and Velicer 1997).

The HBM, PMT, TRA/TPB, SCT, and TTM mainly consider individual and psychological factors that influence or describe health-related behavior. To complement these, one can also focus on the way in which individual health behavior is shaped by the social and physical environment. This is the case in the Social Ecological Model (SEM; McLeroy et al. 1988), which distinguishes between environmental factors in the micro-, meso-, and macro-environment that impact on health-related behavior. In addition, to encourage behavior change based on the "choice architecture" (i.e., the way in which stimuli are presented in the environment), the concept of *nudging* has emerged and is used in many interventions to influence health-related behavior (Thaler and Sunstein 2008).

HBTs have been successfully applied to a wide range of health-related behaviors, including medication adherence in older adults. According to a systematic review by Patton and colleagues (Patton et al. 2017), several studies draw on one of the psychological theories mentioned for the development of interventions to improve medication adherence in older adults. However, data on the use of HBTs for deprescribing are more limited. A number of systematic reviews have looked at the attitudes and willingness of older adults and informal caregivers to deprescribe (Chock et al. 2021; Oktora, Edwina, and Denig 2022; Seewoodharry et al. 2022; Weir et al. 2021). But these reviews have mainly concentrated on studies using one particular assessment tool, notably the patients' attitudes toward deprescribing questionnaire (PATD) and its revised version (rPATD), which focuses exclusively on attitudes as an explanatory factor to deprescribe. Despite the widespread use of the PATD and rPATD, these tools fail to consider other potentially relevant constructs from social cognitive models (Linsky et al. 2015). An exception to this is the systematic review by Evrard and colleagues (Evrard et al. 2022) which drew on the Theoretical Domains Framework (TDF) to identify barriers and enablers to deprescribing benzodiazepine receptor agonist (BZRA). Yet while this framework classifies different behavioral determinants, it does not propose a verifiable relationship between these constructs and behavior change, even though it includes HBT-derived constructs (Atkins et al. 2017).

Finally, most of the existing literature fails to identify potential moderators, that is, variables that affect the strength of the effects of psychological or environmental determinants of deprescribing. One such moderator is health literacy, which is increasingly recognized as a factor that influences health-related behaviors, and known to often be less high amongst older people (Sørensen et al. 2015). As such it could well influence older adults' deprescribing decisions (Holmes and Todd 2017), but has not been considered extensively in research on deprescribing.

To date, no review has specifically examined the use of different psychological theories to understand deprescribing intention and/or behavior from the patients' perspective, despite their relevance to explain the intention and behavior of deprescribing and inform the development of deprescribing interventions. To address this issue, the present systematic review aimed to achieve three objectives: (1) to explore published literature that applied HBTs to older adults' and informal caregivers' deprescribing intention and/or behavior; (2) to document the predictive value of different HBTs and the construct they include in predicting deprescribing intention and/or behavior; and (3) to identify the use of HBTs (or their constructs) in the design and evaluation of deprescribing interventions.

2 | Methods

The current systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al. 2021). The systematic review protocol was published on PROSPERO (CRD42022378157) on December 3, 2022 and follows the 2020 PRISMA checklist for reporting systematic reviews (see Supporting Materials 1).

2.1 | Search and Selection Strategy

To find and select studies for inclusion in the review, a literature review was performed of studies available on five databases: PubMed, Embase, Scopus, PsychINFO, and Cochrane, from the inception until January 31, 2023. A follow-up search was carried out on July 17, 2024. The search process was developed with the help of a medical librarian and followed a two-step approach. First, a search was performed in PubMed and Embase, based on three initial concepts: (1) the study population, that is, "older adults", "elderly", "aged, 80 and over" [MeSH], "geriatrics" [MeSH], informal caregivers; (2) intervention, that is, "deprescribing", "deprescriptions" [MeSH], "withdrawal", "dose reduction"; "polypharmacy" [MeSH], "inappropriate prescribing"; and (3) theory/construct, that is "psychology theory" [MeSH], "health belief model" [MeSH], "social cognitive theory", "self-efficacy" [MeSH], "theory of planned behavior", "nudge", "health literacy" [MeSH]. The words in the title and abstract, as well as indexing terms used to describe the articles were analyzed, and a list of synonyms of each of these concepts was established. The research equation was then developed by combining the search terms and transcribed for each database (see Supporting Material 2). In the second step, a hand-search of the first 200 results on Google Scholar was performed for gray literature, and the reference list from included articles was retrieved and searched for eligibility.

Duplicates were removed using Rayyan (Ouzzani et al. 2016), and two reviewers (S.J. and R.M.) independently screened the titles and abstracts. Full text of the eligible articles was examined by the two reviewers (S.J. and R.M.) before a final inclusion decision. Disagreements between the two reviewers were resolved by consulting a third reviewer (S.V.).

2.2 | Eligibility Criteria

Studies were included according to the following inclusion criteria: (1) population: studies that involved older adults aged 60 years and/or informal caregivers, such as family caregivers. For this study, the United Nations (United Nations 2020) definition of older people was adopted; (2) intervention (if present): inclusion of at least one HBT (e.g., TPB, HBM, …) or at least one construct (e.g., perceived control, subjective norms, …) from these theories; (3) outcome: deprescribing intention or behavior, explained by at least one HBT or construct, whose results came directly from older adult or informal caregiver; and (4) study design: all designs that considered HBT-based studies of deprescribing intention or behavior, including analytical observational studies such as cross-sectional, case–control, and cohort studies, as well as interventional studies, such as randomized/non-randomized control trials and/or quasi-experimental studies, and mixed-method studies with relevant and usable quantitative data.

The exclusion criteria comprised (a) studies that applied the PATD and/or the rPATD without any changes in the original questionnaire (adding items related to HBTs constructs) or without demonstrating any relationship between the HBTs construct and the willingness to deprescribe item, since four systematic reviews already exist that synthesize the results of studies that used PATD/rPATD (Chock et al. 2021; Seewoodharry et al. 2022; Oktora, Edwina, and Denig 2022; Weir et al. 2021), and we want to identify complementary factors to those of the rPATD; (b) studies that examine predictors of constructs that are directly related to intention and behavior, without quantitative information on the relationship between the construct and deprescribing intention or behavior; (c) qualitative studies, due to their inability to quantify the predictive value of a theory or construct; (d) reviews, editorials, case reports and case series, opinions, and letters; (e) studies conducted in populations receiving palliative care, or being at the end of life, due to their specific situation and particular needs; (f) studies not written in English; (g) studies lacking key information, abstracts, and author information, and for which full text is not available.

Eligibility criteria were piloted on a random selection of 10 studies. The results of the pilot test were discussed with a third reviewer (S.V.) and eligibility criteria were further adjusted.

2.3 | Quality Assessment

The quality of the studies included in the review was independently assessed by two reviewers (S.J. and R.M.), using the JBI assessment Tool (Barker et al. 2023). This critical appraisal tool is applicable to the most common study designs that can be found in the systematic reviews, such as RCT, cohort study, cross-sectional study, and case–control study (Zeng et al. 2015), and allows to assess the quality of each study by considering whether it meets a predetermined set of criteria ("yes", "no", "unclear", or "not applicable") (Barker et al. 2023). As only quantitative data were considered in this systematic review, the tool was used to assess the quantitative part of studies with a mixed methods design. Information on methodological quality was extracted and reflected in the results and discussion of this systematic review. Studies were not excluded on the basis of quality assessment.

2.4 | Data Extraction and Synthesis

One reviewer (S.J.) extracted the data from the included studies, using a pre-piloted extraction form to extract data concerning the studies' identification (e.g., first author, publication year, country, setting, and aims of study), population (e.g., inclusion and exclusion criteria, sample size, and baseline characteristics), methods (e.g., design, HBTs/constructs from these theories used, constructs measurements, and analysis methods), intervention, results, and methodological quality (see Supporting Material 3). A second reviewer (R.M.) verified the accuracy of the data extraction.

Given the high degree of clinical and methodological heterogeneity of the studies included in this review, as well as the inconsistent use of HBTs and constructs, it was not possible to conduct a meta-analysis. The information from the studies was

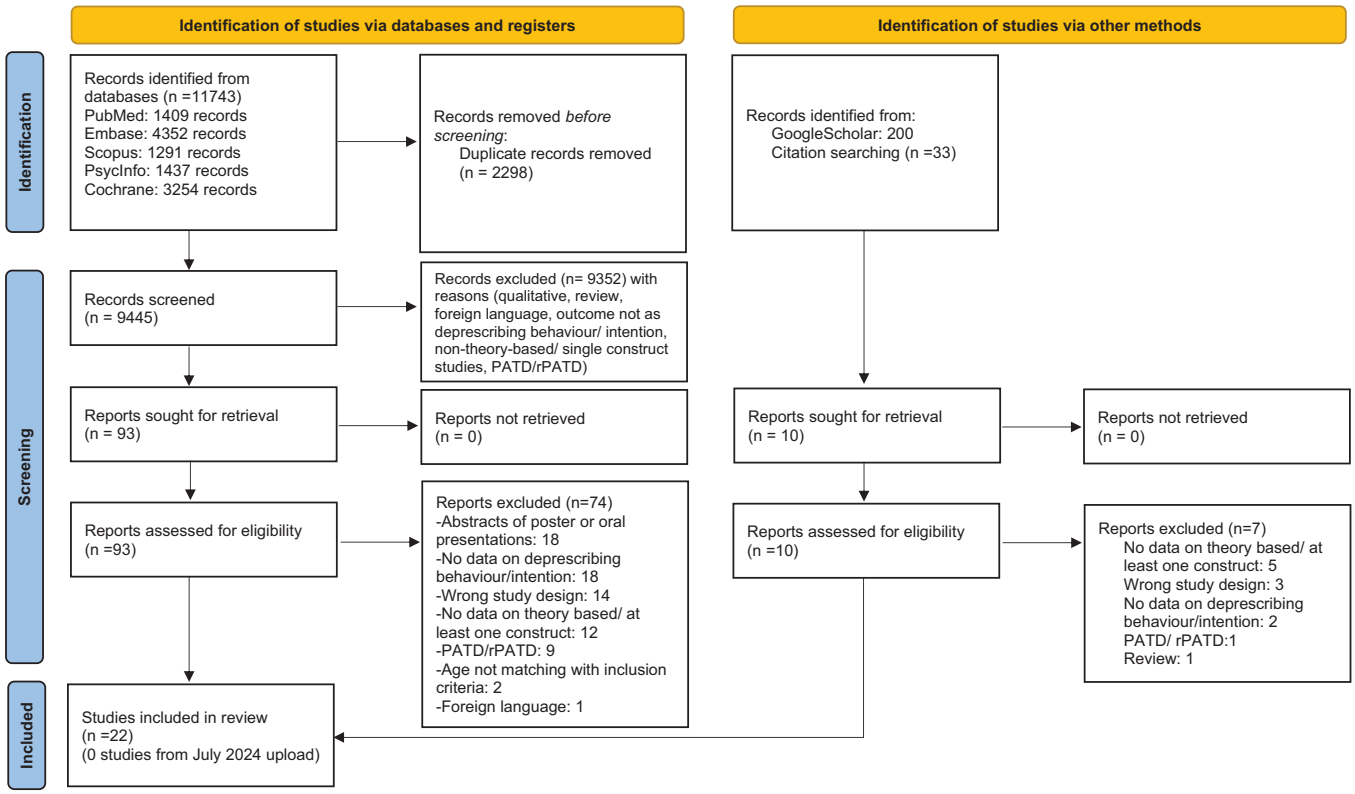

FIGURE 1 | PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers, and other sources. [Color figure can be viewed at wileyonlinelibrary.com]

therefore summarized in a narrative description. For observational studies, this narrative includes the constructs that explain the intention or behavior of deprescribing, and if applicable, the importance of the contribution of the psychological theory or construct in predicting these. For interventional studies, it refers to the psychological theory or construct that was used for the development of the intervention and/or its influence on deprescribing intention or behavior.

3 | Results

3.1 | Literature Search

As illustrated in the PRISMA flowchart (Figure 1), the electronic database search identified 11,743 records, 9445 of which were screened after removal of duplicates. Of these, 93 full-text records were assessed for eligibility and 19 were included. Three additional records were identified through Google Scholar and citation searching, giving a final sample of 22 records. No new studies were identified in the July 2024 follow-up. It should be noted that the results of this review reflect the search strategy that sought to identify HBTs or the constructs in HBTs, with a direct relationship to deprescribing intention and/or behavior, rather than exhaustively identifying predictors of these constructs. Therefore, studies, such as Vordenberg and Zikmund-Fisher's (2020) study, which investigated the predictors of concern about deprescribing without analyzing the direct relation between concern and deprescribing intention and/or behavior, were excluded.

3.2 | Characteristics of Included Studies

The narrative review comprises 11 observational studies and 11 interventional studies. Regarding the study population, 12 reports were exclusively concerned with older adults (i.e., 60 years old or older) while nine reports involved an adult population with an average age of 50 years and older, including people over 60 years old. One study (Dijkstra, Jaspers, and van Zwieten 2008) included a younger population with a mean age of 44 years old. Only one study targeted informal caregivers, and another one targeted both older adults and informal caregivers. Most studies took place in an ambulatory setting ($n = 17$), one in a nursing home (NH), and for four studies the setting was unclear.

Tables 1 and 2 provide a summary of the characteristics and results from each study. It is important to note that more than half of the studies (59.09%) investigated deprescribing behavior, whereas three studies also explored the predictors of previous attempts to deprescribe. Seven of the studies (31.82%) applied HBTs, and more specifically SCT ($n = 3$), SCT combined with TPB ($n = 1$), TTM ($n = 1$), COM-B ($n = 1$), and nudging ($n = 1$). Overall, the constructs that were most represented in the sample were self-efficacy ($n = 10$), knowledge about medication ($n = 5$), subjective norms/provider recommendation ($n = 5$), beliefs about medication ($n = 4$), concerns about medication side-effects ($n = 3$), perceived medication risk/or medication side-effects ($n = 4$), attitudes ($n = 4$), and social support to deprescribe ($n = 3$). However, the way in which authors referred to constructs was not always consistent. To address this, constructs as referred to in the studies were grouped according to the

TABLE 1 | Description of characteristics of observational included studies.

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Dijkstra, Jaspers, and van Zwieten (2008), Netherlands	To identify psychological and psychiatric factors involved in patients' decision to discontinue treatment	Design: cross-sectional study with prospective design $N = 286$ Sampling: unclear (people who responded to the advertisement in newspaper and Internet sites)	Community-dwelling participants. Currently and former AD users. Mean age (SD): AD users 44.3 (12) years; former users 41.2 (13.6) years 81.1% female	Theory: SCT Concepts: Goals intention, self-efficacy, perceived benefits, perceived pros and cons of discontinuing, perceived side effects	Linear regression between goals intention and the variables. Logistic regression analysis used to predict discontinuation. Reported *p* values, OR (odds ratios)	Outcome: discontinuation behavior Goals intention was the only variable that significantly predict discontinuation behavior (OR = 2.08; [95% CI 1.41–3.07]; $p < 0.001$). Predictors goals intention: pros of discontinuation ($\beta = 0.40$, $p < 0.001$); cons of discontinuation ($\beta = -0.23$, $p = 0.003$); self-efficacy ($\beta = 0.17$, $p = 0.01$); perceived side-effects ($\beta = -0.06$, $p = 0.38$)

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Gillespie, Mullan, and Harrison (2019), Australia	To explore attitudes, beliefs, and experiences regarding polypharmacy and deprescribing, and to investigate the influence of health literacy on older adults' attitudes and beliefs toward deprescribing	Design: cross-sectional study $N = 137$ Sampling: purposive sampling	Community-dwelling patients taking five or more medications Median age 76 years 60.5% females	Theory: no Concepts: Health literacy (functional, communicative, and critical); attitude (PATD questionnaire)	Spearman's correlation to test associations between PATD items; Mann–Whitney *U* test or Kruskal–Wallis *H* test to investigate differences between groups of dichotomous or multinomial non-parametric items Reported *p* values	Outcome: deprescribing intention Positive correlation between willingness to stop one or more medications and critical HL ($r_s = 0.198, p < 0.021$) and overall AAHLS scores ($r_s = 0.229, p < 0.009$). Attitudes: Feeling of taking a large number of medications ($r_s = 0.299$, $p < 0.001$); being comfortable with the number of medications ($r_s = -0.335, p < 0.000$); feeling of taking medication that the person no longer need ($r_s = 0.442, p < 0.000$); accepting taking more medications for health condition ($r_s = -0.154$, $p < 0.075$)

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Kurlander et al. (2019), US	To evaluate the association between concern about proton pump inhibitors (PPI) related adverse effects and prior attempts to deprescribe, and to evaluate patients' experiences discussing adverse effects with provider, knowledge of PPI adverse effects, and willingness to deprescribe	Design: cross-sectional study $N = 755$ Sampling: probability weighted random process	Patients who use a PPI for GERD, and having a primary care provider Mean age (SD) 49 (16) years 71% female	Theory: no Concepts: concern about adverse effects, provider recommendation	Multivariable logistic regression analysis to identify associations between previous attempts to stop PPI and variables: concerns about side effects, physician's recommendation, upper GI bleeding, age and sex Based on regression results predicted probabilities were calculated for deprescribing Reported *p* value and OR with 95% CI	Outcome: deprescribe intention and prior attempt to deprescribe Intention was related with recommendation by PCP 71%, versus 77% by GE or 95% by pharmacist ($p < 0.001$) Prior attempt to stop PPI associated with provider recommendation to stop (OR = 3.26, 95% CI [1.82–5.83]); concern about adverse effects (OR = 5.13, 95% CI [2.77–9.51] for slightly, OR = 12.0, 95% CI [6.51–22.2] for somewhat, and OR = 19.4, 95% CI [9.75–38.70] for extremely concerned

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Lai et al. (2021), Australia	To explore family members' knowledge, perceptions of effectiveness and willingness to support deprescribing medication for their relatives	Design: cross sectional study $N = 66$ Sampling: convenience sampling	Informal caregivers of nursing home residents, with dementia diagnosis and were taking one or more psychotropic 45% of participants were an adult child of the resident, 29% were a spouse/partner, 9% were a sibling, 11% were another relative, 1% was not a relative and 5% did not state their relationship to the resident	Theory: no Concepts: knowledge, beliefs about side-effects	Paired *t*-tests to differences in mean recognition rates, Wilcoxon rank tests for effectiveness and deprescribing support. Reported *p* value	Outcome: deprescribing support Family members more likely: to recognize non-psychotropic medications ($t(63) = -2.03$, $p < 0.05$), they were also more likely to support the deprescription of psychotropic medications than non-psychotropic medications ($T = 24.64$, $z = -2.56$, $p = 0.01$)
Øren A. (2009), Norwegian	To investigate the motivation for initiation, temporary discontinuation, and permanent discontinuation of hormone replacement therapy (HRT) use among women	Design: cross-sectional study $N = 2028$ Sampling: unclear (telephone survey)	Community-dwelling women. Mean age (SD) 53.3 (5.3) years 12.7% current users of HTR, 24.8% previous users and 37.4% ever-users	Theory: no Concepts: anxious about side-effects, attitudes toward HRT, doctor recommendation	Mean, SD, and frequencies reported. Multivariable logistic regression analysis of predictors. OR, AOR and 95% CI reported.	Outcome: deprescribing behavior Permanent discontinuation reasons among prior users: anxious of side effects (55%); experienced side effects (36%) and GP recommendation to cease (7%) Permanent discontinuation among ever-users: negative attitude toward HRT (OR = 19.7 [95% CI 8.9, 43.2]).

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Rababa and Rababa'h (2020), Jordan	To assess older adults' knowledge and awareness of the adverse effects of PPI and their willing to deprescribe, and to examine the predictors of PPI duration of use and discontinuation	Design: cross-sectional study $N = 120$ Sampling: convenient sampling	Community-dwelling patients who regularly visited the healthcare centers Mean age (SD) 61.35 (6.49) years 50.8% female	Theory: no Concepts: concerned about side effects, GP recommendation	Mean, SD, and frequencies in knowledge and awareness of PPI. Chi-square test of differences in the participants' degrees of willingness to stop PPI. Logistic linear regression to examine PPI predictors of previous attempts to stop PPI	Outcome: deprescribing intention and previous attempts to deprescribe 64% of the patients expressed willingness to stop PPI due to adverse effects. Concerns about PPI side effects was a predictor of previous attempts to stop PPI (OR = 1.079, [95% CI [1.018–1.144]), as GP recommendation (OR = 5.207, 95% CI [0.787, 34.44])

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TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Reeve et al. (2019), Australia	To explore the attitudes and beliefs of older adults and caregivers toward deprescribing, and to identify what individual characteristics (if any) were associated with these attitudes and beliefs	Design: cross-sectional study Patients: $N = 386$ Caregivers: N = 205 Sampling: unclear (who responded to various media, organizational, community, and networking advertisements)	Older adults, who taking at least one regular prescription. Median age 74 (70–81) years 57.3% female Caregivers of an older adult taking at least one regular prescription Median age of care recipient 81 (75–86.25) years 52.4% female	Theory used: no Concepts: attitudes (rPATD questionnaire); perceived physical and mental health, perceived autonomy, self-management medication (capability), trust in physician, goals of care	Binomial regression analysis to determine predictors of deprescribing. Reported OR with 95% CI	Outcome: deprescribing intention Statistical significant predictors of willingness to deprescribe: Older adults: concerns about stopping (OR = 0.12, 95% CI [0.004, 0.34]) Caregivers: self-management of medications by care recipient (OR = 0.29, 95% CI [0.09, 0.97]); caregiver assessment of their care recipient being in good/excellent physical health (OR = 3.71, 95% CI [1.13–12.23]); increased burden (G = 0.287, $p < 0.008$); decreased appropriateness (G = −0.342, $p < 0.008$)

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Rozsnyai et al. (2020), Switzerland	To determine the willingness toward deprescribing in older adults	Design: cross-sectional study *N* = 300 Sampling: unclear (GP selection in the German-speaking canton)	Community-dwelling participants with multimorbidity, polypharmacy, and able to read and speak German language Mean age (SD) 79.1 (5.7) years 47% female	Theory: no Concepts: items in the questionnaire related to knowledge (be unsure about how to deprescribe; not knowing how to deprescribe); opportunities (available studies; GP lakes time/support to deprescribing discussion); subjective norms (take mediation to please family); belief in good relationship with GP and feeling of security to deprescribe	*t*-test and Chi-square to compare participants willingness versus unwillingness to deprescribe; Multi variable mixed effects logic regression model to assess the association of questionnaire items and willingness to deprescribe. Reported *p* values, OR with 95% CI	Outcome: deprescribing intention Positive association between patients' beliefs about having a good relationship with GP and safety about deprescribing (OR = 11.3 [95% CI 4.6, 27.0]); new studies (OR = 8.0 [95% CI 3.8, 16.9]); feeling of taking too many medicines (OR = 2.53, 95% CI [1.16, 5.51]); feeling of taking a large number of medicines (OR = 1.90, 95% CI [1.02, 3.54]). Negative association between willingness to deprescribe and be unsure about how to stop a medicine (OR = 0.33 [95% CI 0.2, 0.6) and having prior bad experience (OR = 0.4 [95% CI 0.2, 0.8]); be worried about missing future benefits, if medication was stopped (OR = 0.57, 95% CI [0.31, 0.04]); feeling that physician given up on patient if he recommended to stop a medication (OR = 0.51, 95% CI [0.22, 1.16]).

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TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Sake et al. (2019), Australia	To elicit the risk perceptions of benzodiazepine receptor agonist (BZRA) users and to explore the association of risk perceptions with their sociodemographic factors or medication use profiles (past withdrawal attempt, length of use, and future willingness to try behavioral alternatives)	Design: cross-sectional study $N = 75$ Sampling: convenience sampling	Community-dwelling participants who were taking BZRA Mean age (SD) 54.3 (16.7) years 67% female	Theory used: no Construct: perceived risk	Pearson correlation coefficient to analyze the association between BMQ scores and risk perception scores. Linear regression to predict total risk perception scores based on demographic/clinical/beliefs related variables. Binary logistic regression to determine BZD withdrawal attempts and preferences for behavioral therapies differed with risk perception. Reported OR with 95% CI and p values	Outcome: deprescribing intention and previous attempts to deprescribe Total risk perception scores did not significantly influence prior attempts to deprescribe (OR = 0.67, 95% CI [0.441, 1.002]), but risk perception scores for activities within 3–4 h of taking BZD was predictor of behavioral alternatives (OR = 1.58, 95% CI [1.09, 2.252]). Significative correlation between BMQ concerns scores and risk perception ($\beta = 0.484$, $p < 0.001$)

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TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Simões et al. (2021), Portugal	To determine patients' attitudes and beliefs regarding medication use and their willingness to deprescribe	Design: mixed-method study $N = 387$ Sampling: convenience sampling by GP referral	Community-dwelling older patients with polypharmacy (five or more medications/day) Mean age 76.7 years 59.7% female	Theory: no Concepts: attitudes, beliefs about medicines, perceived morbidity, perceived risk-benefit balance	Mean and media scores for beliefs about medicines. Reported *p* values	Outcome deprescribing intention Against deprescribing: higher number of perceived morbidities (Mean difference = 0.97 [0.41, 1.52], $p = 0.001$); perception that the benefits of medication outweigh the risks (Mean difference = 1.97 [0.22, 3.72], $p = 0.027$); lower beliefs about medication overuse (favor deprescribe 40.2% versus against 59.7% $p < 0.001$) and beliefs on medication benefits (favor deprescribe 64.3% versus against 72.9%, $p = 0.003$)

(Continues)

TABLE 1 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Theory used, theoretical concepts considered	Analysis	Outcome/Findings
Ten Wolde et al. (2008), Netherlands	To understand the social-cognitive factors of BZRA cessation among BZRA users	Design: cross-sectional study with prospective design $N = 356$ Sampling: unclear (who responded to paper media advertisements)	Community-dwelling patients chronic BZRA users, with a daily use for at least 3 months Mean age (SD) 55.4 (13.7) years 81.4% female	Theory used: TPB and SCT Concepts: positive and negative outcomes, self-efficacy, social norms and disengagement beliefs	Correlation matrix between the intention and cognitive variables. Regression analysis to predict the intention by the cognitive variables. Hierarchical logistic regression to predict deprescribing behavior at T2 by cognitive variables. Reported OR with 95% CI and p values	Outcome: deprescribing behavior Predictors of intention to taper at T1: perceiving benefits of quitting ($\beta = 0.44$, $p < 0.001$), feeling self-efficacious ($\beta = 0.14$, $p < 0.05$), expecting lower negative long-term outcomes ($\beta = -0.20$, $p < 0.05$) and less disengagement beliefs ($\beta = -0.15$, $p < 0.05$). Social norms ($\beta = -0.03$, $p > 0.05$). Intention was the only variable that significantly predict BZRA cessation at T2 (OR = 1.39, 95% CI [1.19, 1.62])

TABLE 2 | Description of characteristics of interventional included studies.

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
Allary et al. (2020), Canada	To identify psychological factors that can predict BZRA discontinuation among older adults	Design: RCT $N = 73$, program completer $N = 60$ Sampling: stratified block randomization method (data comes from PASS 60+ RCT)	Participants using BZRA at least for 2 years Mean age (SD) 69 (5.84) years 83.3% female	PASSE 60+ program, composed by 12 cognitive-behavior therapy (CBT) sessions 12 months follow-up	Theory: no Concepts: self-perceived competencies, social support	Hierarchical logistical regression analysis to assess the association between success or failure at T2, T3, and T4 and predictors. Reported OR with 95% CI and *p* values	Outcome: BZRA discontinuation Social support satisfaction was discontinuation predictor at T2 (OR = 1.14, 95% CI [1.02, 1.29]); self-perceived competence was predictor at T4 (OR = 1.48, 95% CI [1.03, 2.11]). No significant predictor at T3
Bélanger L et al. (2005), Canada	To explore self-efficacy explaining compliance with a BZRA taper schedule and taper outcome	Design: RCT (secondary data) $N = 52$; taper only $n = 25$, combined $n = 27$ Sampling: unclear	Patients that used BZRA for sleep, more than 50% of the nights for at least 3 months Mean age (SD) 63.2 (6.2) years 48.1% female	Three harms: taper medical supervision of BRZA alone; taper supervision with 10 CBT sessions; CBT without supervision taper program 10 weeks follow-up	Theory: no Concepts: self-efficacy	*t*-test for independent samples. Two-way repeated measures ANOVA to the differences between treatment conditions and patients who were medication-free and those who were not. Reported *p* value	Outcome: BZRA discontinuation At the end of follow-up: Medication-free patients reported higher SE ratings than non-medication-free counterparts (mean = 95.4 (SD ± 7.7) vs. 82.0 (SD ± 7.7] $p < 0.0064$); no overall differences in self-efficacy between medication-free in taper only and combined program (mean taper only 92.5 (SD = 9.9) versus combined 97.1 (SD = 5.8, $p < 0.139$)

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
Belleville and Morin (2008), Canada	To assess the differences between individuals who reached a drug-free status, at the end of the intervention, and individuals who did not	Design: RCT (secondary analysis) $N = 53$ Sampling: unclear	Community-dwelling patients that taking a medication to sleep, more than three nights a week for at least 3 months Mean age (SD) 55.3 (11.4) years 62% female	Two harms: taper intervention alone; taper intervention with CBT 6 months follow-up, measures pre-, 1-, 3-, and 6 months	Theory: TTM Concepts: readiness to change, self-efficacy, decisional balance	Mixed model analysis of variance (ANOVA) to assess differences between medication use status as a between groups variable and time of assessment as a within-group variable (symptoms measures, self-perceived health and change model variables). Reported effect size and *p* value	Outcome: deprescribing behavior No association between stage of change and taper outcome. Participants who reached and maintained a drug-free status increase self-efficacy (general self-efficacy general effect sizes = 1.19, 95% CI [0.55, 1.84]; situational self-efficacy effect size = 1.48, 95% CI [0.83, 2.12]); readiness to change ($F[2, 5] = 4.72$, $p < 0.05$); Decisional balance ($F(2, 5) = 4.84$, $p < 0.05$)
Campbell et al. (2021), US	To test the impact of a multicomponent behavioral intervention to reduce the use of high-risk anticholinergic medication in primary care	Design: cluster randomized study $N = 556$ Intervention group $n = 254$, control group $n = 298$ Sampling: convenience sampling	Community-dwelling participants with an existing or new medication order for a target anticholinergic Mean age (SD) 72.1 (6.4) years 80.1% female	Story-based video providing educational content and modeling interaction with healthcare provider Duration 3.5–4.5 min Measure 12 months pre- and post-intervention	Theory: no Concept: "nudging"	Descriptive statistics to differences by group and time. Logistic regression models to assess discontinuation in the two groups, before and after the intervention Reported *p* value	Outcome: deprescribing behavior Nudge intervention did not produce a significant reduction in the proportion of older adults using anticholinergics. (pre- 6.2% vs. post-intervention 5.1%; $p = 0.6326$)

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
Elsesser and Sartory (1998), Germany	To investigate the psychological predictors of BZRA withdrawal success	Design: quasi-experimental study $N = 44$ Sampling: unclear (who responded to advertisements, and who were referred from center of psychology)	Community-dwelling participants, regular users of BZRAs for at least 3 months and having already at least one unsuccessful withdrawal attempt Mean age (SD) 49.95 (14.38) years 56.8% female	Two harms: Standard anxiety management training; complains management training 6 months follow-up Measure pre-and post-intervention	Theory: no Concepts: Locus of control	Means, *t*-test, and Chi-square to group comparisons; correlation between variables pre-treatment. Reported *p* values	Outcome: deprescribing behavior Drop-outs reported a higher level of perceived internal control than successful completers ($t(26) = 2.63$; $p < 0.01$); Unsuccessful completers reported higher perceived internal control than successful completers at pre- ($t(16) = 2.36$; $p < 0.05$) and post-treatment ($t(17) = 2.22$; $p < 0.05$)
Martin et al. (2013), Canada	To develop and test an educational tool for older adults that increases risk perception about BZRA through knowledge acquisition and change in beliefs	Design: quasi-experimental study $N = 144$ Sampling: unclear (who responded to community pharmacies invitation)	Community-dwelling older adults having at least five prescriptions medications including a BZRA for at least three consecutive months Mean age (SD) 74.9 (6.5) years 73% female	Educational tool with questions to test participants knowledge about BZRA, following the correct answers and self-assessment and education about potential inappropriate use, side effects, drug–drug interactions and age physiologic changes information	Theory: SCT, constructivist learning theory and social comparison theory Concepts: perceived risks, knowledge about risk, beliefs about medication, self-efficacy	Chi-square to compare risk and no risk groups; McNemar's test to changes within groups; Univariate logistic regression, independent *t*-tests and paired *t*-tests of concepts and knowledge in outcomes. Reported *p* value	Outcome: deprescribing intention After intervention: 45.1% of participants reported increased risk perception. RISK group had: increase in overall knowledge score (RISK group mean = 1.77, [SD = 0.13] vs. NO RISK group mean = 0.86 [SD = 1.10], $p < 0.001$); lower scores on the necessity subscale (mean change score = −1.31, 95% CI [−2.3, −0.4]); higher scores on concerns subscale (mean change score 3.72, 95% CI [2.9, 4.5]) and a greater necessity-concerns differential (mean change score −5.03, 95% CI [−6.4, −3.6]); improvements in self-efficacy for discontinuing BZD (mean change score = 31.24 [95% CI 17.9, 44.6], $p < 0.001$)

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
Martin and Tannenbaum 2017a), Canada	To examine whether the EMPOWER intervention triggered patients' motivation to deprescribe by increasing knowledge and concern about BZRA, augmented patients' capacity and self-efficacy to BZRA taper, and to create opportunities to discuss and receive support in deprescribing process	Design: Realist evaluation using a mixed-method study *N* = 261 Sampling: randomly sampling	Community-dwelling patients, chronic users of BZRA medication Mean age (SD) was 74.6 (6.3) years	Assessment of educational intervention—EMPOWER brochure Pre- and post-intervention	Theory: COM-B Concepts: knowledge about BZD, beliefs, self-efficacy, perceived risk	Means and SD, Chi-square and independent *t*-tests for outcomes. Risk differences with 95% CI for the proportion of participants in each group who demonstrated increased knowledge, enhanced concern and increased self-efficacy withdrawal. Reported *p* values	Outcome: deprescribing intention and behavior Intension related to: improved knowledge (risk difference = 58.5, 95% CI [46.98, 67.44]); lower perceived BZD necessity (risk difference = 56.03 [95% CI 44.63, 64.81]); increase concern (risk difference = 67.67, 95% CI [57.36, 74.91]); perception of risk about BZRA (risk difference = 35.14, 95% [CI 23.06, 45.39]) Those who decided to deprescribe: increased self-efficacy for tapering (risk difference = 56.9, 95% CI [45.4–65.8])

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
Martin and Tannenbaum (2017b), Canada	To examine whether cognitive status affected the comprehension and success rates of the EMPOWER patient-centered educational approach to deprescribing of BZRA	Design: post-hoc analysis of EMPOWER randomized trial $N = 261$ Mild cognitive impairment (MCI) $n = 122$ Normal cognition $n = 139$ Sampling: randomly sampling (participants from EMPOWER post-intervention (Tannenbaum et al. 2014)	Older adult community-dwelling with polypharmacy (≥5 medications), taking at least one chronic BZRA prescription (≥3 months) Mean age (SD) 74.4 (6.3) 71.6% female 73.8% with MCI 69.8% with normal cognition	Educational intervention—EMPOWER brochure 6 months follow-up, measures pre-, 1-, and 6-weeks and 6 months	Theory: no Concepts: knowledge, self-efficacy, change beliefs	Chi-square test to compare baseline characteristics of MCI and non-MCI participants. Univariable logistic regression to report outcomes comparing the two groups. Multivariate analysis for variables associated with MCI. Reported proportions with 95% CI and OR with 95% CI	Outcome: deprescribing behavior and change in knowledge, self-efficacy and beliefs Dose reduction + cessation (multivariate OR = 1.07, 95% CI [0.62–1.83]) Compared to participants with normal cognition, those MCI had the same ability to: improve in knowledge (multivariable OR = 1.06, 95% CI [0.62, 1.80]); change in beliefs (multivariable OR = 0.84, 95% CI [0.48–1.43]); improve self-efficacy for tapering (multivariable OR = 0.89, 95% CI [0.52–1.54])

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
O'Connor et al. (2008), Canada	To assess the effect of improving self-efficacy in successful BZD discontinuation	Design: RCT $N = 82$ Usual treatment $n = 41$, group support $n = 22$, CBT $n = 23$ Sampling: unclear	Community-dwelling patients taking BZRA for at least 2 years and having a BZRA dependence diagnosis for at least 2 months. Mean age (SD) for those receiving treatment as usual 48.22 (9.5), group support was 48.19 (9.8) and CBT was 47.35 (9.9) Usual treatment 27.9% were female, group support 10.47% were female, and CBT 13.95% female	PASS program Three harms: taper only (treatment as usual) with physician counselling; CBT with taper program; group support with taper program Harm 1: 26 months follow-up, measures pre-intervention, 20 weeks, 3 and 26 months post-intervention Harm 2 and 3 included 1 year after harm 1. 11 months follow-up, measures pre-intervention, 20 weeks, 3 and 11 months post-intervention	Theory: no Concepts: self-efficacy, social support	Multivariate analysis between different time periods. Means and SD to changes in different groups in different times periods and between succeeders and non-succeeders. Logistic regression of variables predicting successful outcome. Reported *p* value	Outcome: deprescribing behavior Succeeders reported: more social support ($t[50] = 2.22$, $p < 0.03$), increased overall self-efficacy ($F[2, 44] = 8.86$, $p < 0.005$, effect size = 0.17), higher self-efficacy in coping without BZRA ($t[46] = 3.77$, $p < 0.001$) and higher self-efficacy in coping with difficult situations ($t[46] = 4.98$, $p < 0.001$)

(Continues)

TABLE 2 | (Continued)

Authors name, year of publication, country	Study objective	Study type, sample size (*N*), sampling technique	Study population	Intervention	Theory used, theoretical concepts considered	Analysis	Intervention outcome
O'Connor et al. (2004), Canada	To replicate the finding of O'Connor et al. (1999) to investigate a psychological profile associated with distress in BZRA use	Design: quasi-experimental study $N = 33$ Failure group $n = 21$ and success group $n = 12$ Sampling: unclear (responded to advertisements, and clinical referrals)	Community-dwelling participants that had been used BZRA for at least 8 weeks Mean age (SD) 46.7 (9.8) years 63.6% female	Standard counselling and support to deprescribing E months follow-up, measure 2 weeks and 1 month pre-intervention, 4–10 days and 3 months post-intervention	Theory: no Concepts: self-efficacy, social support	Univariate analysis to assess the impact of variables on the end-point measures (success vs. failure taper outcome). Chi-square test, Fisher's exact test, and one-way analysis of variance, or unpaired *t*-test were used to assess differences between groups	Outcome: deprescribing behavior Self-efficacy in the succeeders ($\bar{x}(12) = 61.6$ (31.4) at T0 to $\bar{x}(12) = 76.7$ (28.9) at T1; $p < 0.04$) but decreased in the non-succeeders ($\bar{x}(20) = 56.0$ (27.9) at T1 to $\bar{x}(18) = 39.4$ (37.5); $p < 0.04$) at T1. Significant interaction effect of time period and success on discontinuation self-efficacy ($F[1, 27] = 6.9$, $p < 0.01$). Successful withdrawal was also characterized by a higher social support satisfaction
Tannenbaum et al. (2014), Canada	To test the effectiveness of direct patient education about drug harms on BZD discontinuation	Design: RCT $N = 303$ Intervention group $n = 148$ Control group $n = 155$ Sampling: randomly sampling	Community-dwelling participants, chronic users of BZRA medication Mean age (SD) 75 (6.3) years 69% female	Education intervention EMPOWER brochure 6 months follow-up	Theory: SCT, constructivist learning theory and social comparison theory	Risk difference to assess primary outcome Multiple logistic regression to control possible confounding factors	Outcome: deprescribing behavior Achievement discontinuation (OR = 8.1, 95% CI [3.5–18.5]; AOR = 8.3, 95% CI [3.3–20.9]

HBTs construct to which they actually refer (see Supporting Material 4).

3.3 | Quality of the Studies

The overall quality of the studies included in this review was medium according to JBI assessment tool. Three cross-sectional studies (Gillespie, Mullan, and Harrison 2019; Reeve et al. 2019; Sake et al. 2019) met all the evaluation criteria, while three other studies were of poor quality (Belleville and Morin 2008; Dijkstra, Jaspers, and van Zwieten 2008; Øren 2009). Details regarding the critical appraisal for each study are summarized in Table 3.

3.4 | Explanatory Value of HBTs and Constructs in Observational Studies

3.4.1 | HBTs

Of the 11 observational studies that investigated the psychological factors that predict or explain deprescribing intention and/or behavior, only two tested HBT models. The first (Dijkstra, Jaspers, and van Zwieten 2008) tested if deprescribing behavior could be explained by the SCT, and the second (Ten Wolde et al. 2008) by a combination of SCT and TPB. Dijkstra, Jaspers, and van Zwieten (2008) study showed that a combination of expected positive and negative consequences of discontinuation, perceived side-effects of medication, perceived benefits of medication use, and self-efficacy explained 28.8% of the variance in the intention to deprescribe, while goals intention (i.e., self-instructions to attain certain outcomes or perform particular behavior) significantly predicted discontinuation. In the study by Ten Wolde and colleagues (Ten Wolde et al. 2008), outcome expectations, self-efficacy, social norms, and disengagement beliefs were found to be significant predictors of the intention to deprescribe, explaining 31% of the variance of the intention. These same variables explained 10.9% of the variance in deprescribing behavior. The addition of intention to deprescribe increased the explained variance in behavior by 8%, with the latter being the only statistically significant individual variable to predict deprescribing behavior.

3.4.2 | Constructs From HBTs

Of the studies that investigated the explanatory value of different constructs without reference to a specific behavioral theory, five examined intentions to deprescribe as an outcome, three examined intention and previous attempts, and one deprescribing behavior. The studies that used the PATD questionnaire and its revised version were excluded from this review, with the exception of three studies (Gillespie, Mullan, and Harrison 2019; Reeve et al. 2019; Rozsnyai et al. 2020) which had added extra variables related to HBTs constructs to predict or explain deprescribing intention and/or behavior. Based on these studies, several constructs can be identified as enablers of or barriers to older adults and/or informal caregivers' deprescribing intention and/or behavior, or as moderators of the relationship between these variables and the intention or behavior:

Enablers. Risk perception (Sake et al. 2019), concerns about side effects (Rababa and Rababa'h 2020), the emergence of new studies about medication benefits and harms (Rozsnyai et al. 2020), and good relationship with the GP (Rozsnyai et al. 2020) were found to be statistically significant enablers of the intention to deprescribe by older adults. Furthermore, the belief of taking a large number of medicines (Gillespie, Mullan, and Harrison 2019; Rozsnyai et al. 2020), of taking too many medications (Rozsnyai et al. 2020), or of taking medications that are no longer needed (Gillespie, Mullan, and Harrison 2019) were also statistically significant enablers of deprescribing intention. In one study, perceived side effects (Øren 2009) also appeared to have an influence on deprescribing behavior. Concern about side effects was also significantly associated with previous attempts to stop medication (Kurlander et al. 2019; Rababa and Rababa'h 2020), as was the GP recommendation (Kurlander et al. 2019). However, risk perception about medication harm did not significantly influence past medication withdrawal (Sake et al. 2019). Instead, it was significantly related to the intention to try behavioral alternatives (Sake et al. 2019).

Barriers. Being unsure of how to engage in deprescribing (Rozsnyai et al. 2020), previous deprescribing experience (Rozsnyai et al. 2020), perceived morbidity (Simões et al. 2021), and the perception that medication benefits outweigh risks (Simões et al. 2021) were all found to be negatively associated with the intention to deprescribe. Likewise, concerns about stopping medication (Reeve et al. 2013) and comfort with the number of medications (Gillespie, Mullan, and Harrison 2019) proved to be significant barriers to deprescribing intentions. In contrast, fear of missing out on future medication benefits if a medication was stopped (Rozsnyai et al. 2020) and the belief that the recommendation to stop a medication meant the doctor was giving up (Rozsnyai et al. 2020) did not prove to be significant barriers to deprescribing intention.

Moderators. Health literacy was found to have a positive association with willingness to deprescribe in one study (Gillespie, Mullan, and Harrison 2019). More particularly, willingness to deprescribe was correlated with critical health literacy and with the scores on the overall All Aspects of Health Literacy Scale (AAHLS).

3.4.3 | Informal Caregivers

The perception that the care recipient was in good or excellent physical health (Reeve et al. 2019), as well as his/her low perceived capability to self-manage medication (Reeve et al. 2019) were predictors of informal caregivers' intention to deprescribe. In addition, informal caregivers' knowledge of medication and their belief that the relative was experiencing side effects of the medication were also found to support deprescribing (Lai et al. (2022).

3.5 | HBTs and Constructs in Interventional Studies

Whereas the above studies aimed to identify the factors that influence deprescribing, others used an HBT or constructs thereof

TABLE 3 | Critical appraisal of the included for included studies.

Critical appraisal of the included cross-sectional studies (JBI critical appraisal checklist for analytical cross-sectional studies)

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	% Y
Dijkstra, Jaspers, and van Zwieten (2008)	U	N	N	Y	Y	Y	Y	Y	62.5%
Gillespie, Mullan, and Harrison (2019)	Y	Y	Y	Y	Y	Y	Y	Y	100%
Kurlander et al. (2019)	Y	Y	Y	U	Y	Y	U	Y	75%
Lai et al. (2022)	Y	Y	N	Y	Y	N	N	N	50%
Øren A. (2009)	U	N	U	N	U	U	N	Y	12.5%
Rababa and Rababa'h (2020)	U	Y	Y	U	Y	N	Y	Y	62.5%
Reeve et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	100%
Rozsnyai et al. (2020)	Y	Y	Y	U	Y	Y	Y	Y	87.5%
Sake et al. (2019)	Y	Y	Y	Y	Y	Y	Y	Y	100%
Simões (2021)	Y	Y	U	U	Y	Y	Y	Y	75%
Ten Wolde et al. (2008)	N	U	N	Y	Y	Y	Y	Y	62.5%
	%Y	63.64%	72.73%	55.55%	55.55%	90.91%	72.73%	72.73%	90.91%

Y = yes; N = No; U = unclear; NA = not applicable; JBI Critical Appraisal Checklist for Cross-sectional studies: Q1 = Were the criteria for inclusion in the sample clearly defined?; Q2 = Were the study subjects and the setting described in detail?; Q3 = Was the exposure measured in a valid and reliable way?; Q4 = Were objective, standard criteria used for measurement of the condition?; Q5 = Were confounding factors identified?; Q6 = Were strategies to deal with confounding factors stated?; Q7 = Were the outcomes measured in a valid and reliable way?; Q8 = was appropriate statistical analysis used?

Critical appraisal of the included quasi-experimental studies (JBI critical appraisal checklist for quasi-experimental studies)

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	%Y
Elsesser and Sartory (1998)	U	U	U	U	Y	U	Y	Y	U	33.33%
Martin et al. (2013)	Y	Y	Y	N	Y	U	Y	Y	Y	77.77%
Martin and Tannenbaum (2017a)—Realist evaluation	Y	Y	U	N	Y	N	Y	Y	Y	66.67%
Martin and Tannenbaum (2017b)	Y	N	U	N	Y	U	Y	Y	Y	55.56%
O'Connor et al. (2004)	Y	Y	U	N	Y	U	Y	Y	U	55.56%
	%Y	80%	60%	20%	0%	100%	0%	100%	100%	60%

Y = yes; N = No; U = unclear; NA = not applicable; JBI Critical Appraisal Checklist for Quasi-experimental Studies: Q1 = Is it clear in the study what is the "cause" and what is the "effect" (i.e., there is no confusion about which variable comes first)?; Q2 = Were the participants included in any comparisons similar?; Q3 = Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?; Q4 = Was there a control group?; Q5 = Were there multiple measurements of the outcome both pre and post the intervention/ exposure?; Q6 = Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?; Q7 = Were the outcomes of participants included in any comparisons measured in the same way?; Q8 = Were outcomes measured in a reliable way?; Q9 = Was appropriate statistical analysis used?

(Continues)

TABLE 3 | (Continued)

Critical appraisal of the included RCT studies (JBI critical appraisal checklist for randomized controlled trials)														
References	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Q11**	**Q12**	**Q13**	**%Y**
Allary et al. (2020)	Y	U	Y	U	U	U	U	Y	Y	N	N	Y	U	38.46%
Bélanger et al. (2005)	Y	U	Y	U	U	U	U	Y	Y	Y	N	N	Y	46.15%
Belleville and Morin (2008)	U	U	U	U	U	U	N	Y	Y	Y	N	U	N	23.08%
Campbell et al. (2021)	Y	U	U	U	N	U	U	Y	Y	N	Y	Y	N	38.46%
O'Connor et al. (2008)	N	U	Y	U	Y	Y	U	Y	Y	Y	Y	Y	U	61.54%
Tannenbaum et al. (2014)	Y	Y	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	92.31%
	%Y	66.67%	16.67%	66.67%	16.67%	33.33%	33.33%	0%	100%	100%	66.67%	50%	66.67%	33.33%

Y = yes; N = No; U = unclear; NA = not applicable; JBI Critical Appraisal Checklist for Randomized Controlled Trials: Q1 = Was true randomization used for assignment of participants to treatment group?; Q2 = Was allocation to treatment groups concealed?; Q3 = Were treatment groups similar at the baseline?; Q4 = Were participants blind to treatment assignment?; Q5 = Were those delivering treatment blind to treatment assignment?; Q6 = Were outcomes assessors blind to treatment assignment?; Q7 = Were treatment groups treated identically other than the intervention of interest?; Q8 = Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?; Q9 = Were participants analyzed in the groups to which they were randomized?; Q10 = Were outcomes measured in the same way for treatment groups?; Q11 = Were outcomes measured in a reliable way?; Q12 = Was appropriate statistical analysis used?; Q13 = Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?.

to develop interventions aimed at promoting deprescribing intentions and/or behavior. In these studies, HBT was either used to understand the mechanisms underlying the effectiveness of an intervention's effectiveness (Martin and Tannenbaum 2017a) or to understand deprescribing behavior at post-intervention (Belleville and Morin 2008). The interventions involved in these studies varied from sending an educational brochure (Martin et al. 2013; Martin and Tannenbaum 2017b; Tannenbaum et al. 2014) or presenting a video with educational content (Campbell et al. 2021), to participate in cognitive-behavioral programs (Allary et al. 2020; Bélanger et al. 2005; Belleville and Morin 2008; O'Connor et al. 2008), anxiety management training program (Elsesser and Sartory 1998), or a combination of those with a tapering program. One study involved standard counselling and support to deprescribing without any structured therapy (O'Connor et al. 2004). The effects of these interventions were evaluated using a retrospective pre- and post-test design, pre- and post-test with control group, and pre- and post-test with follow-up, intermediate testing, and post-test. The eight intervention studies that included a follow-up test had a follow-up varying between 1 week and 26 months (Allary et al. 2020; Belleville and Morin 2008; Elsesser and Sartory 1998; Martin and Tannenbaum 2017a, 2017b; O'Connor et al. 2004; O'Connor et al. 2008; Tannenbaum et al. 2014).

3.5.1 | HBTs

The SCT, along with constructivist learning theory, was used by Martin and colleagues (Martin et al. 2013) to guide the development and evaluation of an educational intervention. Different key constructs of the SCT, including perception of the risk of taking BZRA, knowledge, beliefs about medicines, and self-efficacy were measured at pre- and post-intervention. Although the intervention was found to have an effect on different constructs, self-efficacy was the only one that proved to be associated with deprescribing intention. The same educational intervention was repeated by Tannenbaum and colleagues (2014), resulting in a positive effect on deprescribing behavior, yet the determinants that were associated with this behavioral effect were not specified. In a realist evaluation of the intervention, Martin and Tannenbaum (2017a) applied the COM-B model to explore its effectiveness by looking at the mechanisms that contributed to the positive outcomes, finding that the educational intervention had changed the beliefs about BZRAs, and more specifically decreased the necessity score and increased the concern score. Participants who had the intention to deprescribe also showed an improvement of their knowledge, a greater risk perception of BZRA, and improved self-efficacy. The same authors (Martin and Tannenbaum 2017b) also analyzed the effects of the educational intervention on older adults with mild cognitive impairment (MCI). It was found that, like participants with normal cognition, MCI participants also achieved full BZRA discontinuation, and showed the same change in beliefs, knowledge and self-efficacy as those with normal cognition.

Belleville and Morin (2008) used a combination of SCT and TTM constructs ("stage of change", "readiness-to-change", "decisional balance", and "self-efficacy"), to understand the differences between individuals who were successful and those who were not in a deprescribing intervention. They did not find an association between categorical stages of change and taper outcome, but participants who achieved and maintained deprescribing behavior

in the 6 months post-intervention showed a steeper decline in the readiness-to-change score compared to those that relapsed or did not succeed in deprescribing. In addition, the decisional balance scores increased and remained higher after withdrawal for those that succeeded in deprescribing. A similar pattern was also found for self-efficacy to deprescribe.

Campbell and colleagues (Campbell et al. 2021) developed a multicomponent intervention to deprescribe incorporating nudge techniques, yet could not find a significant change in deprescribing behavior as a result of the intervention.

3.5.2 | Constructs From HBTs

Five studies applied at least one construct featured in a HBT to understand the results of a deprescribing intervention on behavior (Allary et al. 2020; Bélanger et al. 2005; Elsesser and Sartory 1998; O'Connor et al. 2004; O'Connor et al. 2008). Overall, the construct that appears to be most consistently responsible for post-intervention change across these studies is self-efficacy (Bélanger et al. 2005; O'Connor et al. 2004; O'Connor et al. 2008) or perceived competence (Allary et al. 2020), followed by social support (Allary et al. 2020; O'Connor et al. 2008).

In a different vein, Elsesser and Sartory (1998) investigated the influence of locus of control in the success of deprescribing behavior. They found that participants who relapsed during the tapering process and those who completed the intervention without success reported higher levels of perceived internal control following the intervention than successful completers.

4 | Discussion

This systematic review is the first to provide a systematic review of empirical studies that have used HBTs, or constructs included in these theories, to investigate older adults' or their informal caregivers' intention to engage in deprescribing. It shows the relationship between HBT constructs and the deprescribing intention and/or behavior. A thorough understanding of the factors that influence a behavior is an important condition for the development of effective health interventions (Davis et al. 2015). It is therefore increasingly recognized that HBTs can be used to understand and explain health behavior to change, and improve the effectiveness of health interventions.

A first finding appearing from this review is that, despite the availability of HBTs and their common application to a large variety of health-related behaviors, these theories have been little used to explain and predict deprescribing outcomes (i.e., intention or behavior). Secondly, it appears that whereas several HBTs exist and have been validated on other behaviors, the few studies that used HBTs in relation to deprescribing primarily relied on the SCT, and that even then often only some constructs were used. Among those studies that used constructs without reference to a specific HBT, self-efficacy was the most widely used and analyzed construct. The review also showed that the majority of the constructs that were used in this research emphasized individual rather than social and environmental factors. It is important to note that some primary studies presented a medium to poor methodological quality, which may have resulted in an exaggerated overall estimate of the outcomes, especially in the association between the construct and the deprescribing intention and/or behavior.

4.1 | Explaining Deprescribing Intention and/or Behavior

Among the studies that aimed to explain deprescribing intention and/or behavior, only two studies used an HBT. Their results suggest that the intention to deprescribe shows a strong relationship with deprescribing behavior, and that this intention is, in turn, influenced by the constructs from the SCT and TPB (i.e., outcome expectations, self-efficacy, and social norms). So, consistent with the TPB (Ajzen 1991), it is important to consider older adults' outcome expectations, self-efficacy, and perceived social norms to influence their intention to deprescribe, and thereby their actual deprescribing behavior. However, apart from these two studies, all other ones only examined the association between a few constructs and deprescribing intention or behavior, and generally did so without reference to a specific HBT. This makes the empirical evidence regarding the explanatory or predictive value of the models themselves rather limited. In other words, it is possible to identify the different determinants associated with deprescribing intention and/or behavior with a relative degree of certainty, but not to drawn firm conclusions about the capacity of any HBT to predict deprescribing.

Amongst the individual factors that impact on deprescribing behavior, the most important primary determinants are attitudes, perceived risk, subjective norms, and perceived control. With regard to attitudes, defined as *"a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor"* (Eagly and Chaiken 1993, 1), deprescribing intentions appear to be influenced not only by attitudes toward medication taking, but also toward deprescribing. So, in order to stop or reduce medication, it seems important to develop favorable attitudes toward deprescribing and to associate desirable behavioral outcomes with deprescribing.

The same applies to perceived risk, which is a construct that is highlighted as a key factor for the adoption of protective health behaviors in several theories, including the TRA/TPB, the HBM, and the PMT (Vong et al. 2022). In the studies of this review, its importance was shown through different findings, despite the lack of reference to any theory. For instance, perceived medication risk and/or medication side-effects is akin to the idea of perceived severity, which is featured in the HBM. Similarly, perceived morbidity or perceived physical and mental health effects of deprescribing are related to perceived susceptibility, which is also included in the HBM (Renner et al. 2015). Beliefs about medication was also found to be a factor that could influence deprescribing intention, in the sense that older adults who were against deprescribing believed that the benefits of medication outweighed the risks of taking medication. This is compatible with the conclusion of a previous systematic review which found that perceived need is inversely associated with deprescribing (Reeve et al. 2013).

Subjective norms are another construct that emerges from this review as a relevant determinant of deprescribing. Although this construct may have less influence on deprescribing intention, people's subjective norms of provider expectations were found to related not only to previous deprescribing attempts, but also to deprescribing behavior (Doekhie et al. 2020).

Lastly, perceived control is related to a number of HBTs, such as the SCT (Bandura 1988), and TPB (Ajzen 1991). It is conceptually compatible with Bandura's perceived self-efficacy construct (Ajzen 1991). Although self-efficacy in itself is not a sufficient condition for health behavior change (Graf et al. 2021), an older person's perceived self-efficacy to deprescribe and to cope with difficult situations without medication was found to be a determinant of deprescribing behavior in nearly all studies.

Overall, these findings suggest that deprescribing behavior or intentions are complex and are the result of a variety of internal influences. More research is needed to investigate the contextual and environmental influences on deprescribing outcomes.

4.2 | The Socio and Physical Environmental Context

Although theories and constructs from theories highlighting psychological determinants have been used to some extent to explain deprescribing intention and/or behavior or to develop and evaluate the effects of deprescribing interventions, very little attention has been paid to environmental factors. Although the process of deprescribing takes place in a social and organizational context and under the supervision and guidance of a healthcare provider, the socioecological model which combines individuals' psychological determinants with factors in the social and physical environment appears not to have inspired any application with regard to deprescribing behavior. Yet, not only social but also physical environmental factors may influence deprescribing outcomes (Linsky et al. 2019). Amongst the physical barriers to deprescribing that have been identified in the literature are: time constraints during clinical encounters, fragmentation of care between clinicians and health systems, availability of multidisciplinary staff, limited rigorous evidence to guide deprescribing, and institutional goals and culture (Linsky et al. 2019; Scott et al. 2015), but these factors have not been integrated into a conceptual or theoretical model. A new questionnaire was developed to assess barriers and facilitators to BZRA deprescribing, taking into account the environmental context and resource dimension (Lynch et al. 2024). However, the theoretical background of this questionnaire was the TDF framework and not an HBT. In addition, the current review identified social support as an important facilitator of deprescribing behavior, yet without clarifying how this support influenced the decision to deprescribe, and how it relates to the other, psychological determinants. Deprescribing can be influenced by more direct support, as in the management of medication deprescribing, but also by indirect support, including verbal encouragement and advice (Gallant 2003). Further research is thus necessary to better understand the underlying mechanism by which support influences deprescription and the influence of environmental factors on deprescribing outcomes.

4.3 | Moderating Factors of Deprescribing

Two potential moderators of deprescribing intention and/or behavior were identified in this review: health literacy and locus of control. Health literacy, or a person's ability to access, understand, evaluate, and apply health-related information, may influence individual participation in the deprescribing decision-making process. It allows patients to understand and evaluate decisions about treatment regimens, including inappropriate prescribing (Parekh et al. 2018). As an important empowerment strategy, a patient's level of health literacy should thus be considered by researchers and practitioners, as a potential moderating factor influencing the success of deprescribing.

Locus of control is another potential moderator identified in this review. The finding, albeit only in one study, that unsuccessful intervention completers have higher levels of internal locus of control contrasts with the fact that patients with a higher internal locus of control are generally more likely to comply with medical advice, adhere to the doctor's recommendations (Henninger et al. 2012) and to use less medication (Musich et al. 2020). Furthermore, since the belief in a given outcome is determined by one's own actions, it can also have a number of effects on self-efficacy (Rosenstock, Strecher, and Becker 1988). People with a higher internal locus of control also show high self-efficacy in managing their health and life problems (Musich et al. 2020). As such, further research is needed to better understand the moderating effect of locus of control in older adults and informal caregivers with regard to deprescribing.

4.4 | Deprescribing Interventions

Apart from explaining deprescribing, HBT and their concepts have also been used to develop and test interventions to promote deprescribing behavior. Again, only very few studies developed the intervention with explicit reference to a particular HBT or a combination of theories, or to explore the mechanisms underlying the effectiveness of an intervention. Moreover, the educational intervention that were based on such theories did not apply them consistently, and analyzed the outcomes of the educational intervention using a different theory, thus jeopardizing the potential benefit of using a coherent theoretical to develop an intervention (Prestwich et al. 2014, 2015). Indeed, theory is not only a means to evaluate effectiveness, but above all also a way to build an evidence-based practice (Prestwich et al. 2014; Van Den Broucke 2012). By structuring and consolidating existing empirical evidence to help understand the way and the reasons why interventions do or do not work, theory plays an important role in improving intervention effectiveness (Van Den Broucke 2012). Yet in most of the studies that were identified for this review, constructs that were used to understand intervention outcome were considered without reference to a particular theory.

4.5 | Informal Caregivers' Factors

Informal caregivers play an important role in medication management, which includes making decisions about adjusting, reducing, or stopping medication (Gillespie, Mullan, and Harrison 2014). However, the determinants of deprescribing by

informal caregivers have received very little attention in research. Only a few studies were found that investigated this issue, none of which was based on a full HBT. Yet, consistent with the findings for older adults, the results of studies of caregivers suggest that support for deprescribing is influenced by perceptions, beliefs, and attitudes, more specifically the belief that the care recipient is experiencing side effects from their medication, and the perception that care recipient is in good health and thus less vulnerable. As such, deprescribing may benefit from educating caregivers about the importance of medication reviews for people in poor health, who are in fact most likely to be exposed to medication-related risks (Reeve et al. 2013; Scott et al. 2015). Our review also highlighted that a perceived lower ability of the care recipient to self-manage medication is associated with the informal caregiver's intention to support deprescribing. This is consistent with Pohontsch et al.'s (2018) finding that informal caregivers are more likely to interfere with medication management if they perceived a decline in the care recipient's abilities.

Further efforts are needed to better understand the internal and external factors associated with informal caregivers' involvement in deprescribing and the differences between older adults and informal caregivers in the factors leading to deprescribing. This will help to better address the needs of each individual, taking in account the values and preferences of the target population.

4.6 | Limitations

This review is not without limitations, some of which are related to the choices made in selecting the studies to be included in the review. Firstly, although the study focused on studies published in English and delivered to older adults, defined as 60 years or older, or to informal caregivers, some of the studies included younger populations if they also included participants aged 60 years and over. The inclusion of younger persons may have influenced the results, as some of the factors or determinants involved in intention or behavior are likely to change with age.

Secondly, our review did not focus on any particular category of medication, while it is known that some medications can be addictive if taken for long periods. Dependence may therefore be a confounding factor that influenced some results.

Thirdly, the only considered quantitative studies, since it wanted to better understand the predictive value of specific theories. However, only very few studies were found that used full theories, and the way in which the constructs were named could differ across studies. This led us to code these constructs based on textual inferences. In addition, the measures that were used to operationalize the dimensions included in these theories varied from study to study, as did the statistical analysis and presentation of results, which made meta-analysis impossible.

Finally, although this review was subject to extensive electronic and hand searches, it is possible that some studies were missed, when they were not correctly indexed in the literature databases. In addition, the methodological quality of some studies was low, but the same weaknesses were found in most of the included studies.

Despite these limitations, however, this review is the first to provide an up-to-date overview of factors that may influence the willingness of older people to engage in deprescribing, drawing in studies from various countries and backgrounds. The main factors that were identified through this review could be integrated into a hypothetical model (Figure 2), which also outlines the assumed interactions between the relevant constructs, and as such provides a basis for further research. It is noted that the existing instruments that are widely used to assess patients' determinants of deprescribing, such as the rPATD (Reeve et al. 2016), or Patient Perceptions of Deprescribing (PPoD; Linsky et al. 2017), do not cover all the concepts identified in this review. Specifically, they do not capture subjective norms, social support, or perceived control. As such, our results point to a need to expand and improve existing instruments or develop new ones.

The use of instruments that consider a broader range of factors that may facilitate or hinder deprescribing may help health care professionals (HCPs) to formulate recommendations for deprescribing and develop more effective deprescribing interventions (Radcliffe et al. 2023). Deprescribing interventions are more likely to be effective when they are carried out by a well-integrated multidisciplinary team, and in particular with the involvement of other non-medical health care professionals, such as nurses and advanced nurse practitioners (Radcliffe et al. 2023). The biopsychological approach that is characteristic of nursing practice provides a good basis to explore the different determinants of deprescribing that are included in the hypothetical model resulting from this review, such as attitudes, beliefs, perceived control, or health literacy. The long-term relationship which nurses develop with patients, be it in hospitals, NHs, home health care, community settings, or any other geriatric settings, allows them to have privileged contact with them (Sun et al. 2021). This leads to a better understanding of their priorities and preferences, which are considered important dimensions in the willingness to engage in deprescribing (Naughton and Hayes 2017). Furthermore, the different roles of nurses in medication management and the expanded scope of practice of the advanced nurse practitioners can contribute to the clinical assessment of medication needs and burden, to shared decision making with regard to deprescribing, and to the implementation and follow-up of deprescribing interventions (McCann, McCauley, and Harkin 2024). As a lack of knowledge, attitudes, and skills on the part of various HCPs, including nurses, reportedly act as barriers to successful deprescribing (Farrell et al. 2023; Sun et al. 2021), the findings of this systematic review may provide different HCPs with more insight about the individual, social, and environmental factors that may influence patients' intention and/or behavior to engage in deprescribing.

5 | Conclusion

Deprescribing is an important aspect of care for older adults. Understanding the determinants that play a role in deprescribing intention and/or behavior is important both to promote deprescribing behavior and to better develop theory-based interventions. By systematically reviewing the literature, we were able to develop a hypothetical model with the most important HBT constructs. Future research should consider the optimal use of HBT, social, and environmental factors to

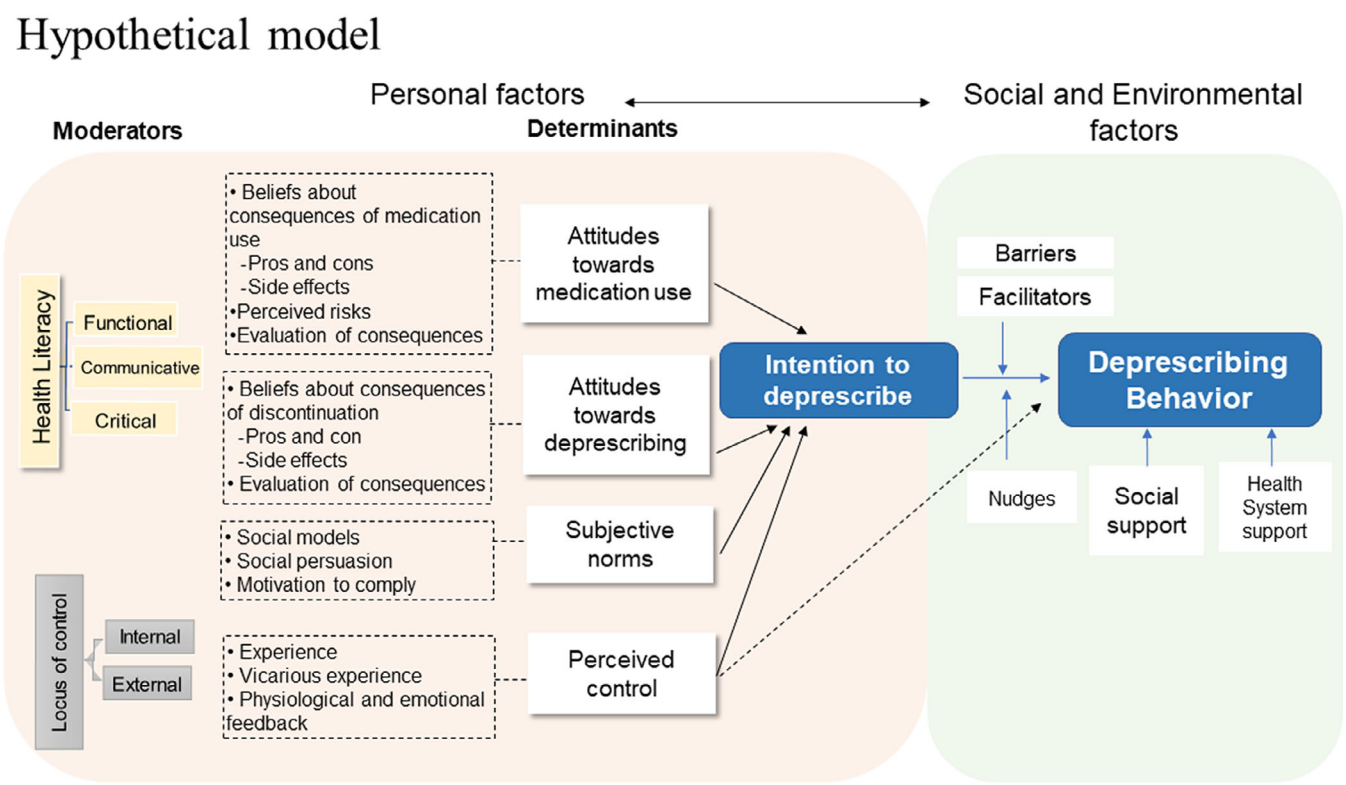

FIGURE 2 | Deprescribing hypothetical model. [Color figure can be viewed at wileyonlinelibrary.com]

complement individual determinants, and the population of informal caregiver population to address research gaps.

Author Contributions

S.J. imagine and wrote the study protocol, which was then discussed in a team meeting and amended by S.J., R.M., and S.V. Screening process and papers selection was performed independently by S.J. and R.M. Qualitative analyze of the data was performed independently by S.J. and R.M. S.V. was consulted in case of disagreements. Data extraction was performed by S.J. and R.M. checked data extraction. Data analysis was prepared by S.J., and interpretation was discussed with S.V. and R.M. S.J. wrote the manuscript first draft, which was then amended by S.J., S.V., and AS. The authors read and approved the final manuscript.

Ethics Statement

No ethics approval was required for this systematic review.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.