

**Please cite the Published Version**

Heywood-Everett, Suzanne, Henderson, Rebecca, Webb, Claire and Bland, Amy R (2023) Psychosocial factors impacting community-based pressure ulcer prevention: a systematic review. *International Journal of Nursing Studies*, 146. 104561 ISSN 0020-7489

**DOI:** <https://doi.org/10.1016/j.ijnurstu.2023.104561>

**Publisher:** Elsevier

**Version:** Published Version

**Downloaded from:** <https://e-space.mmu.ac.uk/632911/>

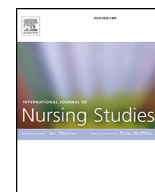
**Usage rights:**  [Creative Commons: Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

**Additional Information:** This is an open access article which originally appeared in *International Journal of Nursing Studies*, published by Elsevier

**Data Access Statement:** The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

**Enquiries:**

If you have questions about this document, contact [openresearch@mmu.ac.uk](mailto:openresearch@mmu.ac.uk). Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)



# Psychosocial factors impacting community-based pressure ulcer prevention: A systematic review

Suzanne Heywood-Everett<sup>a,\*,1</sup>, Rebecca Henderson<sup>b,1</sup>, Claire Webb<sup>a</sup>, Amy R. Bland<sup>b</sup>

<sup>a</sup> Primary Care Wellbeing Service, Bradford District Care NHS Foundation Trust, Shipley BD18 3LD, UK

<sup>b</sup> Department of Psychology, Manchester Metropolitan University, Manchester M15 6BH, UK

## ARTICLE INFO

### Article history:

Received 7 November 2022

Received in revised form 21 June 2023

Accepted 28 June 2023

### Keywords:

Pressure ulcers

Pressure ulcer prevention

Tissue viability

Capability

Opportunity

Motivation

Behaviour (COM-B)

Theoretical Domains Framework

Behaviour change

Adherence

Concordance

## ABSTRACT

**Background:** Pressure ulcers are a major health concern. They have a significant impact on the healthcare system and individuals, reducing quality of life across several domains. In community settings, self-management behaviours are central to their prevention. However, adherence with pressure ulcer prevention guidelines remains low, with little evidence guiding the relationship between patients and healthcare professionals to establish a concordant partnership. **Objective:** To synthesise evidence on factors contributing to community-based pressure ulcer prevention using the Theoretical Domains Framework and the Capability, Opportunity, Motivation, Behaviour (COM-B) model of behaviour. **Design:** Mixed methods systematic review and narrative synthesis.

**Method:** Systematic searches were conducted in the CINAHL, Cochrane, EMBASE, PsycINFO, PubMed, Scopus, and Web of Science databases on 14th December 2022. Studies were eligible if they contained data on the factors associated with adherence and concordance with pressure ulcer prevention guidelines in the community for patients, caregivers, and healthcare professionals. Methodological quality was assessed using the Hawker tool. Findings were synthesised using the Theoretical Domains Framework. The resulting themes were mapped onto the Capability, Opportunity, Motivation, Behaviour (COM-B) model.

**Results:** Thirty studies were included in the review, including quantitative, qualitative, and mixed methods research. The synthesis identified 12 of the 14 Theoretical Domains Framework domains, with knowledge, social influences, beliefs about consequences, and beliefs about capabilities the most prevalent. Although knowledge appears to be an important contributor to adherence with prevention guidelines, knowledge alone does not appear sufficient to achieve concordance. A concordant relationship was facilitated by healthcare professionals' knowledge, motivation to work alongside patients and their priorities, and interpersonal skills to build rapport and trust, whilst barriers included lack of healthcare professional skills to navigate sensitive issues, paternalistic views of patient compliance and organisational processes that impact building rapport.

**Conclusions:** Several psychosocial factors may affect the ability to achieve concordance between individuals, caregivers and healthcare professionals with pressure ulcer prevention guidelines in the community. However, data regarding the efficacy of behaviour change interventions targeting these constructs is limited, with further research required to guide intervention development in this area.

© 2023 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

## What is already known

- It is well established that many pressure ulcers are avoidable, yet research suggests concordance between patients and healthcare professionals with prevention strategies in the community is low.
- Self-management behaviours are central to pressure ulcer prevention in community care settings.
- A shift towards concordance and shared decision-making promotes self-management of health.

- Specifying the constructs influencing the target behaviours, using the Theoretical Domains Framework and the Capability, Opportunity, Motivation, Behaviour (COM-B) model, facilitates the development of behaviour change interventions.

## What this paper adds

- 12 of the 14 Theoretical Domains Framework domains were identified: knowledge, skills, social/professional role and identity, beliefs about capabilities, optimism, beliefs about consequences, goals, memory, attention and decision-making, environmental context and resources, social influences, emotion, and behavioural regulation but not reinforcement and intentions.

\* Corresponding author.

E-mail address: [suzanne.heywood-everett@bdct.nhs.uk](mailto:suzanne.heywood-everett@bdct.nhs.uk) (S. Heywood-Everett).

<sup>1</sup> Equal contributions.

- Knowledge was the most prevalent Theoretical Domains Framework domain which impacted adherence to pressure ulcer prevention guidelines whereas factors that were most important for concordance included the relationship between healthcare professionals and patients, healthcare professionals' problem solving and communication skills, perceived competence of healthcare professionals and healthcare professionals supporting the development of autonomous goals.
- Facilitators of pressure ulcer prevention concordance included healthcare professionals' knowledge, motivation to work alongside patients and their priorities, and interpersonal skills to build rapport and trust, whilst barriers included lack of healthcare professionals' skills to navigate sensitive issues, paternalistic views of patient compliance and organisational processes that impact building rapport.

## 1. Introduction

Pressure ulcers are caused by persistent, unrelieved pressure, and are defined as “localized damage to the skin and underlying soft tissue, usually over a bony prominence or related to a medical or other device” (Edsberg et al., 2016). Pressure ulcers are a major health concern, with more than 700,000 people affected in the UK each year, which is estimated to cost the National Health Service more than 3.8 million every day (Wood et al., 2019). Pressure ulcers are also associated with increased mortality, particularly amongst older adults (Song et al., 2019) and a recent meta-analysis found the prevalence of pressure ulcers amongst individuals with spinal cord injury is as high as 32 % (Shiferaw et al., 2020). Risk factors include reduced mobility, loss of sensation, nutritional deficiency, significant cognitive impairment, and a history of pressure ulcers (National Institute for Health and Care Excellence, 2014).

Pressure ulcers have a significant impact on both individuals and the healthcare system and pressure ulcers have been shown to significantly impact health-related quality of life across four domains: physical function, psychological state, social function, and somatic symptoms (Gorecki et al., 2012). For example, health-related quality of life in people with pressure ulcers may be impacted by pain (Girouard et al., 2008), reduced mobility leading to loss of independence (Fox, 2002), depression (Galhardo et al., 2010), and social isolation (Fox, 2002). The pain experienced by those living with pressure ulcers has been described as endless and restrictive, affecting social relationships and the ability to carry out daily activities (Hopkins et al., 2006). Further symptoms, specific to pressure ulcers, have also been found to impact health-related quality of life. For example, exudate and odour have been associated with social isolation and depression (Young et al., 2018) and changes to body image have been shown to affect psychological wellbeing (Gorecki et al., 2009).

### 1.1. Self-management and pressure ulcer prevention

It is well established that many pressure ulcers are avoidable (Black et al., 2011), with recommended prevention behaviours including skin assessment, frequent repositioning, the use of pressure redistributing devices, and barrier creams (National Institute for Health and Care Excellence, 2014). However, research suggests adherence to these prevention strategies is low in hospital settings (Khojastehfar et al., 2020; Vanderwee et al., 2011), long-term care facilities (Demarré et al., 2012), and in the community (Karadağ and Çakar, 2022). Although there is a large body of evidence that considers pressure ulcer prevention in acute and long-term care, with campaigns such as “Stop the Pressure” targeting healthcare professionals in these settings (NHS Improvement, 2018), less is known about pressure ulcer prevention in community-based healthcare settings (Hopkins and Worboys, 2014; Ledger et al., 2020). This is important, since prevention in acute healthcare settings largely depends upon healthcare professionals'

adherence to prevention guidelines, with patients taking a less active role in their care (Lavallée et al., 2018; McInnes et al., 2014) whereas in community settings, patients are typically required to self-manage pressure ulcer prevention risk, with the success of pressure ulcer prevention depending upon individual, caregiver, and healthcare professional concordance with prevention strategies (Taylor et al., 2021). In community settings, each pressure ulcer is estimated to cost £8720 annually (Guest et al., 2018) underscoring an urgent need to better understand the factors affecting non-concordance to improve pressure ulcer prevention in UK community settings.

Effective self-management of pressure ulcer risk typically requires patients to change their behaviour (Ledger et al., 2020). Prevention behaviours include monitoring the skin for early signs, repositioning, and the use of barrier creams and pressure-redistributing devices (National Institute for Health and Care Excellence, 2014). However, it is well established that successful self-management is a team effort, with healthcare professionals required to provide holistic support to facilitate behaviour change (Dineen-Griffin et al., 2019). Effective pressure ulcer prevention therefore relies on a concordant relationship and a shift towards “shared decision-making” to promote self-management. Thus, the relationship between patients and healthcare professionals are central to effective self-management, empowering patients to play an active role in prevention and supporting them to build the necessary skills to self-manage (Lawn et al., 2014). For instance, factors such as psychological comorbidities may require more support for the patient to engage in self-management. Indeed, the concept of concordance reflects this collaborative approach, acknowledging the important roles of both the patient and healthcare professional in shaping outcomes (Snowden and Marland, 2013). A concordant relationship is therefore a partnership to achieve the best health and wellbeing outcomes (Chapman, 2018). To achieve concordance, healthcare professionals must develop an understanding of the factors that influence self-management behaviours, with this knowledge integral to the development of an effective care plan and improved outcomes (Randall et al., 2016).

### 1.2. The Capability, Opportunity, Motivation, Behaviour (COM-B) model and Theoretical Domains Framework

Evidence suggests that behaviour change interventions are more effective when they are theory-based, with behaviour change techniques targeting specific theoretical constructs (Carey et al., 2019). Indeed, understanding the theoretical constructs that influence behaviour is a central concept in many frameworks for developing behaviour change interventions (Bartholomew-Eldredge et al., 2016; Michie et al., 2014). However, deciding which theory is best placed to inform intervention development is challenging, with 82 behaviour change theories identified (Davis et al., 2015), many of which have overlapping constructs (Michie et al., 2005). The Theoretical Domains Framework is an integrative framework developed to overcome these challenges, consolidating 128 constructs from 33 prominent behaviour change theories (Cane et al., 2012). The 14 Theoretical Domains Framework domains include: 1) knowledge (an awareness of the existence of something), 2) skills (an ability or proficiency acquired through practice), 3) social/professional role and identity (a coherent set of behaviours and displayed personal qualities of an individual in a social or work setting), 4) beliefs about capabilities (acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use), 5) optimism (the confidence that things will happen for the best, or that desired goals will be attained), 6) beliefs about consequences (acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation), 7) reinforcement (increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus), 8) intentions (a conscious decision to perform a behaviour or a resolve to act in a certain way), 9) goals (mental representation of outcomes or end states that an

individual wants to achieve), 10) memory, attention, and decision processes (the ability to retain information, focus selectively on aspects of the environment, and choose between two or more alternatives), 11) environment context and resources (any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour), 12) social influences (those interpersonal processes that can cause an individual to change their thoughts, feelings, or behaviours), 13) emotion (a complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event), and 14) behavioural regulation (anything aimed at managing or changing objectively observed or measured actions) (Cane et al., 2012).

The 14 Theoretical Domains Framework domains represent theoretical constructs and map onto the Capability, Opportunity, Motivation, Behaviour (COM-B) model of behaviour, which forms the basis of the Behaviour Change Wheel, a framework for developing and evaluating behaviour change interventions (Michie et al., 2014). According to the model, behaviour is part of an interacting system involving Capability, Opportunity, Motivation and Behaviour. Each component is divided into two types; Capability is divided into physical (having the physical skills, strength or stamina to perform the behaviour) and psychological (having the knowledge, psychological skills, strength or stamina to perform the behaviour). Opportunity is divided into physical (what the environment allows or facilitates in terms of time, triggers, resources, locations, physical barriers, etc.) or social (including interpersonal influences, social cues and cultural norms). Motivation is divided into reflective (involving self-conscious planning and evaluations (beliefs about what is good or bad)) or automatic (processes involving emotional reactions, desires, impulses and reflex responses) (Atkins and Michie, 2015).

Consequently, specifying the constructs influencing target behaviours using the Theoretical Domains Framework and Capability, Opportunity, Motivation, Behaviour (COM-B) model facilitates the development of complex interventions, using a rigorous, systematic approach (e.g. French et al., 2012). However, there are currently very few studies directly examining community-based pressure ulcer prevention through a theoretical lens and, subsequently, a lack of an evidence-base to support the development of interventions to increase concordance in community-based pressure ulcer prevention. The aim of this review is to utilise the Theoretical Domains Framework and Capability,

Opportunity, Motivation, Behaviour (COM-B) to summarise existing research on the psychosocial factors that may affect pressure ulcer prevention in community settings.

## 2. Method

The protocol is registered with the Open Science Framework (<https://doi.org/10.17605/OSF.IO/F2W3C>).

### 2.1. Eligibility criteria

Studies were eligible for inclusion if they met the criteria outlined in Table 1.

### 2.2. Information sources

Searches were conducted in the CINAHL, Cochrane, EMBASE, PsycINFO, PubMed, Scopus, and Web of Science databases. Citation searches of included studies and relevant systematic reviews identified additional studies not retrieved from the database searches.

### 2.3. Search strategy

The search strategy combined terms relating to the population (adults at risk of pressure ulcers), intervention (pressure ulcer prevention) and context (community settings). Terms related to the outcomes of interest were not included, as preliminary searches indicated these were not sensitive enough to retrieve studies previously identified for inclusion. Table 2 demonstrated the search strategy utilised in the PubMed database. This strategy was adapted for each database, combining Medical Subject Headings (MeSH) terms and subject headings with keyword searches of titles and abstracts. Filters were applied to limit results to those published in the English language and within the last ten years. This time period was chosen to ensure papers reflect adherence with current pressure ulcer prevention guidelines (National Institute for Health and Care Excellence, 2014).

### 2.4. Selection process

The searches were conducted on 14th December 2022, with the results exported into EndNote for duplicate screening. After duplicates were removed, the remaining studies were uploaded to Rayyan for title and abstract screening. Two reviewers independently screened the titles and abstracts against the eligibility criteria. Conflicts were resolved through discussion. The full texts of studies that remain

**Table 1**  
Eligibility criteria.

Component	Inclusion criteria	Exclusion criteria
Population	Adults at risk of developing pressure ulcers and their caregivers. Healthcare professionals providing care to people at risk of developing pressure ulcers in community settings.	People at risk of wounds other than pressure ulcers. Children and adolescents (under 18 years old) Healthcare professionals providing care in other settings.
Intervention	Pressure ulcer prevention	Management of existing pressure ulcers and prevention of other wound types
Context	Community settings	Primary, secondary and tertiary care and long-term care facilities (e.g., residential care homes)
Outcome	Psychosocial barriers and facilitators to pressure ulcer prevention behaviours recommended in current guidelines.	Barriers and facilitators to prevention strategies that do not require behavioural input. Studies evaluating the efficacy of pressure ulcer prevention strategies.
Study design	Any peer-reviewed studies reporting primary data, including quantitative, qualitative, and mixed methods research.	Study designs not reporting primary data, including reviews, editorials, and commentaries.
Date	Studies published within the last 10 years (2012–2022).	Studies published prior to 2012.
Language	Studies published in English	Non-English studies

**Table 2**  
PubMed search strategy.

Search	Search terms
S1 - Population	("Pressure Ulcer"[Mesh]) OR ("Pressure ulcer"[Title/Abstract] OR "pressure ulcers"[Title/Abstract] OR "bedsores"[Title/Abstract] OR "bed sore"[Title/Abstract] OR "bed sores"[Title/Abstract] OR "pressure sore"[Title/Abstract] OR "pressure sores"[Title/Abstract] OR "decubitus"[Title/Abstract] OR "pressure injury"[Title/Abstract] OR "pressure injuries"[Title/Abstract])
S2 - Intervention	("Tertiary Prevention"[Mesh] OR "Secondary Prevention"[Mesh] OR "Primary Prevention"[Mesh] OR "Risk Reduction Behavior"[Mesh] OR "Self-Management"[Mesh] OR "Evidence-Based Practice"[Mesh] OR "Implementation Science"[Mesh]) OR (prevent[Title/Abstract] OR self-manage[Title/Abstract] OR (reduc[Title/Abstract] AND "risk"[Title/Abstract]))
S3 - Context	("Community Health Services"[Mesh] OR "Nurses, Community Health"[Mesh] OR "Community Medicine"[Mesh] OR "Community Health Centers"[Mesh] OR "Home Care Services"[Mesh] OR "Home Nursing"[Mesh] OR "Home Health Aides"[Mesh]) OR (community[Title/Abstract] OR "home care"[Title/Abstract] OR "care at home"[Title/Abstract] OR "home-based care"[Title/Abstract])
S4	S1 AND S2 AND S3



following initial screening were retrieved and screened independently by two reviewers. Conflicts were resolved in discussion with a third reviewer. Citations of the included studies were examined to identify additional papers not retrieved by the initial searches.

### 2.5. Data extraction

Data were extracted for each study by one author using a data extraction tool created in Microsoft Excel, which captured key study characteristics (first author, year, title, purpose, location, design, sample size and participants, methods, and key findings) and data to support quality appraisal. Data on the factors affecting pressure ulcer prevention were extracted from the results sections of included studies and included participant quotations and statistical analyses, in addition to the authors' narrative descriptions of their findings.

### 2.6. Quality appraisal

The quality of included studies was appraised using the quality appraisal tool developed by Hawker et al. (2002). This tool is designed to appraise different types of evidence, in mixed reviews. The use of this tool facilitates an assessment of the risk of bias for quantitative research, whilst ensuring that the methodological rigour of qualitative research is assessed in accordance with the assumptions and philosophical frameworks that underpin qualitative methodologies. For example, the score attributed to sampling for quantitative research corresponds to the risk of selection bias, whilst for qualitative research it considers how the participants were selected and whether the sample was adequately described. A score was attributed to each item, ranging from four points (Good) to one point (Very Poor). A total score was calculated for each study, to quantify the quality of the research and to guide the interpretation of the findings. Studies accumulating 23 points or less were rated as low quality, between 24 and 30 points rated as medium quality, and above 30 points rated as high quality. Whilst providing an overall idea of the quality of a study, using a single summative numerical score does not provide information on what aspects of studies are problematic and whether criteria should be weighted or not (Viswanathan et al., 2012). Indeed, quantitative and qualitative studies have distinct research designs, methodologies, and reporting standards therefore using a single quality appraisal tool may not adequately capture the unique strengths and limitations of each study type (Boutron et al., 2022). In acknowledging this limitation, the sub-scores attributed to each item are provided in the Supplementary material.

### 2.7. Data synthesis

The findings of included studies were synthesised using the Theoretical Domains Framework. As recommended by Atkins et al. (2017), findings were synthesised using directed content analysis, with the results section for each of the included studies coded according to Theoretical Domains Framework domain definitions and constructs. The coded data from individual studies were then aggregated and synthesised into themes, capturing the barriers and facilitators to concordance. The resulting themes were mapped onto the Capability, Opportunity, Motivation, Behaviour (COM-B) model using the guide developed by Atkins et al. (2017; Fig. 3 Supplemental material).

## 3. Results

### 3.1. Study selection

Database searches retrieved 2983 studies for consideration, with 1497 identified as duplicates. Following title and abstract screening, 1385 studies were excluded with 101 studies sought for retrieval. Following full text screening, 27 studies were identified as eligible for inclusion, with 3 additional studies identified from citation searching.

The PRISMA flowchart, including reasons for exclusion, can be found in Fig. 1.

### 3.2. Study characteristics

In total, 30 studies were included in the review: 16 qualitative studies, 12 quantitative studies, one case report, and one mixed methods study. None of the studies were deemed to be high quality, with 21 rated as medium quality and 9 rated as low quality. The most common issues were a lack of bias or, in the qualitative studies, no consideration of the researcher's role in the research process, lack of rigour in the analysis, poorly described samples, and lack of transferability. Table 3 includes an overview of the included studies.

### 3.3. Synthesis results

Studies included behavioural determinants across 12 of the 14 Theoretical Domains Framework domains: knowledge, skills, social/professional role and identity, beliefs about capabilities, optimism, beliefs about consequences, goals, memory, attention and decision-making, environmental context and resources, social influences, emotion, and behavioural regulation, with several themes identified across these domains (Table 2). A Capability, Opportunity, Motivation, Behaviour (COM-B) model of the barriers and facilitators identified across the Theoretical Domains Framework domains, and the relationships between them, is depicted in Fig. 2.

### 3.4. Knowledge

Knowledge was the most prevalent domain, identified as a factor that may influence concordance in 86.6 % of the included studies (see Table 3). Three themes were identified: 1) Knowledge of pressure ulcer and prevention, 2) knowledge of body and health conditions, and 3) knowledge-behaviour gap.

#### 3.4.1. Knowledge of pressure ulcer and prevention

Patients demonstrating knowledge of pressure ulcers and their prevention appear more likely to adhere to the guidelines, perceiving this knowledge as useful (Hartigan et al., 2012; Zanini et al., 2020a; Hashim et al., 2021; Siddiqui et al., 2022). In contrast, knowledge gaps were observed amongst those exhibiting a greater degree of non-adherence to guidelines (Floríndez et al., 2020; Ghaisas et al., 2015; Hashim et al., 2021; Pilusa et al., 2021; Zanini et al., 2020a). Moreover, a lack of knowledge appeared to contribute to the development of medically serious pressure ulcers, with patients unknowingly acting in ways that increased risk. For example, by wearing shoes that impeded circulation or removing scabs from existing wounds or sitting on a defective seat cushion whilst driving a car (Floríndez et al., 2020; Pilusa et al., 2021; Van Gaal et al., 2022). Caregiver knowledge may also impact concordance, with primary caregivers' knowledge of pressure ulcer prevention identified as an important predictor of pressure ulcers amongst patients receiving home care (Tsai et al., 2012). Caregivers of at-risk adults reported a lack of awareness of the importance of pressure ulcer prevention for their relative (McKeown et al., 2022) with the majority of caregivers for palliative care patients found to have poor or average knowledge of prevention guidelines (Antony and Thelly, 2022). Nurses working in community settings identified caregivers' knowledge deficits as a factor that impedes the reporting of skin changes and the correct use of pressure-relieving devices (McGraw, 2019).

There were some indications that knowledge may vary dependent upon the health condition or predisposing risk factors. For example, on the whole participants with spinal cord injury reported good knowledge of pressure ulcers and the need for prevention (e.g. Burkhart et al., 2021; Van Gaal et al., 2022), but older adults appeared less knowledgeable — 32 % of participants in one study did not know what a pressure ulcer was or what it may look like (Hartigan et al., 2012).

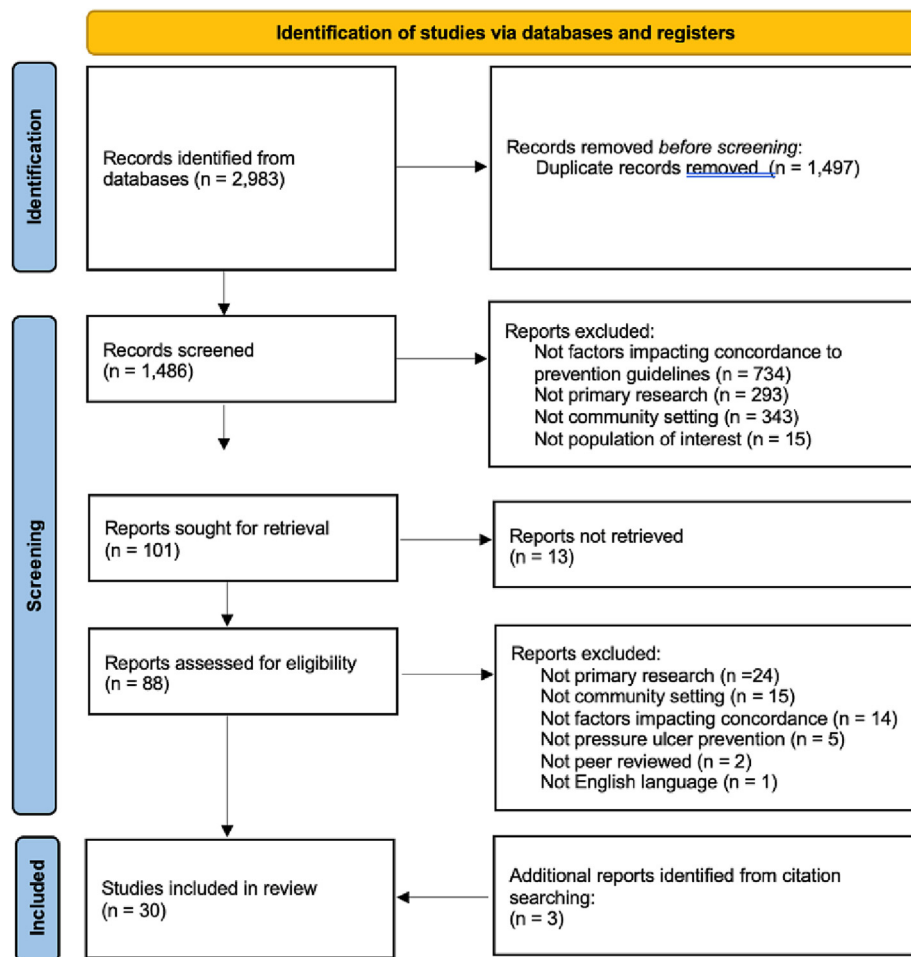


Fig. 1. PRISMA flow diagram.

Interestingly, in their triangulation of patient and healthcare professional perspectives of pressure ulcer prevention in those with spinal cord injury, [Burkhart et al. \(2022\)](#) identified divergent views on patient knowledge of pressure ulcer prevention. Healthcare professionals emphasised the importance of education and addressing knowledge gaps, which they perceived as crucial to prevent pressure ulcers. In contrast, patients perceived themselves as knowledgeable about pressure ulcer prevention and highlighted other factors as central to adherence. Thus, it is possible that patients underestimate gaps in their knowledge, or that providers assume patients lack knowledge when there are other factors reducing adherence with their recommendations. This points towards knowledge being a central factor in non-concordance between the patient and healthcare professional.

Findings also suggest that knowledge of pressure ulcer prevention guidelines may impact adherence amongst healthcare professionals working in the community, with one study reporting that almost 69.3 % of questions related to pressure ulcer prevention were answered incorrectly by community nurses ([Sari et al., 2021](#)). In a qualitative exploration of perceived barriers and enablers to the implementation of evidence-based pressure ulcer prevention, [Taylor et al. \(2021\)](#) found that knowledge varied by role whereby nurses were more confident in their pressure ulcer knowledge, compared to allied healthcare professionals (allied health professionals; e.g. occupational therapists and physiotherapists). In some studies, patients with spinal cord injury indicated that healthcare professional knowledge may be insufficient to prevent pressure ulcers ([Burkhart et al., 2021](#); [Van Gaal et al., 2022](#); [Zanini et al., 2020b](#)). Participants with spinal cord injury described instances where healthcare professionals did not follow pressure ulcer

prevention protocols, although it is not clear whether this arose due to knowledge gaps or other factors, since healthcare professionals were not interviewed ([Burkhart et al., 2021](#); [Van Gaal et al., 2022](#); [Zanini et al., 2020b](#)). However, in their triangulation of veteran and healthcare professional perspectives, [Burkhart et al. \(2022\)](#) report that both groups recognise the importance of interprofessional collaboration and specialist knowledge of pressure ulcer prevention in spinal cord injury to provide the best care. Participants interviewed by [Zanini et al. \(2020b\)](#) reported similar findings, indicating that specialist services can improve the quality of care by providing training to healthcare professionals providing care in the community.

The source of knowledge also appeared to be important, with both patients and healthcare professionals acquiring knowledge about pressure ulcers and prevention from different sources. For example, [Hashim et al. \(2021\)](#) found that patients may develop their knowledge using alternative sources of information, such as the Internet or their peers, therefore it is plausible that knowledge developed from alternative sources may not result in behaviour in line with the guidance. Similar challenges were observed amongst healthcare professionals, with [Taylor et al. \(2021\)](#) highlighting that many healthcare professionals interviewed had not engaged directly with pressure ulcer prevention guidelines, preferring to seek advice from colleagues.

#### 3.4.2. Knowledge of their body and health conditions

Another type of knowledge cited as an important factor in pressure ulcer prevention was patients' knowledge of their body and health conditions. This knowledge enabled participants to recognise physical symptoms, such as irritation, heat, muscle spasms, or numbness, which

**Table 3**  
Overview of included studies.

Author(s) (year)	Purpose	Design	Participants	Location	Quality
Antony and Thelley (2022)	To assess caregivers' knowledge of pressure ulcer prevention for palliative care patients.	Quantitative, cross-sectional survey	20 caregivers of palliative care patients.	India	Low
Burkhardt et al. (2021)	To understand factors associated with pressure ulcer prevention amongst veterans living with spinal cord injury	Qualitative study using photovoice and guided tours	30 veterans with spinal cord injury	USA	Medium
Burkhardt et al. (2022)	To describe how provider and veteran perspectives of pressure ulcer prevention converge and diverge.	Triangulation of previous qualitative findings	30 healthcare providers and 30 veterans living with spinal cord injury	USA	Low
Chong and Lee (2017)	To determine the effectiveness of a home-based pressure ulcer education programme for caregivers of elderly patients	Quantitative, pre-test and post-test	24 caregivers for elderly people at risk of pressure ulcers	Hong Kong	Medium
de Laat et al. (2017)	To describe associations between health activation, prevention behaviour and patient characteristics	Quantitative, cross-sectional survey	162 adults with paraplegia.	Netherlands	Medium
Floríndez et al. (2020)	To identify circumstances leading to pressure ulcers in medically underserved adults with spinal cord injury	Qualitative, case analysis of treatment notes	25 medically underserved adults with spinal cord injury	USA	Medium
Fogelberg et al. (2016)	To describe the relationship between habits and pressure ulcer risk.	Qualitative, secondary analysis of ethnographic data	5 adults with spinal cord injury	USA	Medium
Ghaisas et al. (2015)	To explore the relationship between lifestyle changes and pressure ulcers	Qualitative, secondary cross-case analysis	47 adults with spinal cord injury	USA	Low
Ghajarzadeh and Saberi (2018)	To evaluate the association between depression and chronic complications in spinal cord injury	Quantitative, cross-sectional survey	830 outpatients with spinal cord injury	Iran	Medium
Hartigan et al. (2012)	To test an education leaflet and evaluate older adults' knowledge of pressure ulcers and prevention	Quantitative, uncontrolled pre-test, post-test	75 adults aged 65 or older who live in their own homes and have recently been discharged from hospital	Ireland	Low
Hashim et al. (2021)	To explore factors affecting adherence to behaviours to prevent pressure ulcers	Qualitative, focus group	30 adults with spinal cord injury	Malaysia	Medium
Hug et al. (2018)	To investigate whether self-efficacy is associated with performance of skin-care behaviours	Quantitative, cross-sectional survey	456 patients with spinal cord injury	Switzerland	Medium
Ip and Dicianno (2015)	To present a case of severe pressure ulcer in a patient with spinal cord injury	Case report	One community-dwelling adult with spinal cord injury, depression, and bipolar disorder	USA	Low
Kim and Cho (2017)	To evaluate the effects of a self-efficacy enhancement programme on pressure ulcer prevention behaviour, knowledge and self-efficacy	Quantitative, multicentre randomised controlled trial.	47 adults with spinal cord injury	South Korea	Medium
Kohta et al. (2017)	To investigate the current level of knowledge and practice regarding pressure ulcer prevention amongst community care managers	Quantitative, cross-sectional survey	48 healthcare professionals providing care to adults in the community	Japan	Low
McGraw (2019)	To explore how the context of care influences the development of pressure ulcers	Qualitative, interview study	19 registered community nurses	United Kingdom	Medium
McKeown et al. (2022)	To evaluate a smartphone app designed to educate carers about pressure ulcer prevention.	Mixed methods pilot study	32 adults providing informal care to people at risk of pressure ulcers	United Kingdom	Medium
Pilusa et al. (2021)	To explore factors associated with preventing secondary health conditions in people with spinal cord injury	Qualitative interview study	17 adults with spinal cord injury	South Africa	Medium
Sari et al. (2021)	To examine community nurses' knowledge and attitudes concerning pressure ulcer prevention	Quantitative, cross-sectional survey	235 community nurses	Indonesia	Low
Shanley et al. (2022)	To explore the impact of an intervention to improve older individuals' knowledge, attitudes and behaviours towards pressure ulcer prevention	Quantitative, multicentre randomised controlled trial	64 adults aged 65 years and older, at risk of pressure ulcers due to reduced mobility	Ireland	Medium
Shirai et al. (2022)	To explore the experiences of a mobile app to prevent and manage pressure ulcers	Qualitative interview study	9 adults with spinal cord injury	Canada	Medium
Siddiqui et al. (2022)	To understand provider perspectives of the factors associated with pressure ulcers	Qualitative interview study	30 healthcare professionals for veterans with spinal cord injury	USA	Low
Sleight et al. (2019)	To identify factors that may protect against pressure ulcers in socioeconomically disadvantaged adults with spinal cord injury	Qualitative design using treatment notes	50 disadvantaged adults with spinal cord injury who did not develop pressure ulcers during a 12-month pressure ulcer prevention intervention.	USA	Low
Suttipong and Sindhu (2012)	To describe the contributing factors for pressure ulcer development in older stroke patients	Quantitative, cross-sectional survey	168 stroke patients aged 60 years or older	Thailand	Medium
Taylor et al. (2021)	To identify healthcare professionals' perceived barriers and enablers to the implementation of PI prevention in the community	Qualitative interview study	Nine registered nurses and four allied healthcare professionals providing care in the community	United Kingdom	Medium
Tsai et al. (2012)	To understand factors associated with the development of pressure ulcers in new home care recipients	Quantitative, cross-sectional survey	220 pairs of caregivers and care recipients recently enrolled with home care services	Taiwan	Medium
Van Gaal et al. (2022)	To explore how participants with spinal cord injury self-manage the prevention and treatment of pressure ulcers	Qualitative interview study	14 adults with spinal cord injury	Netherlands	Medium
Zanini et al. (2019)	To identify challenges to building and maintaining partnership in pressure ulcer prevention perceived by healthcare professionals	Qualitative interview study	26 healthcare professionals caring for people with spinal cord injury	Switzerland	Medium
Zanini et al. (2020a)	To identify styles of pressure ulcer prevention adopted by patients with spinal cord injury	Qualitative interview study	20 adults living with spinal cord injury for at least five years	Switzerland	Medium
Zanini et al. (2020b)	To examine the experiences of patients with spinal cord injury, family caregivers and health professionals with the early treatment and prevention of pressure ulcers	Qualitative interview study	20 adults with spinal cord injury, 5 family caregivers and 22 healthcare professionals	Switzerland	Medium

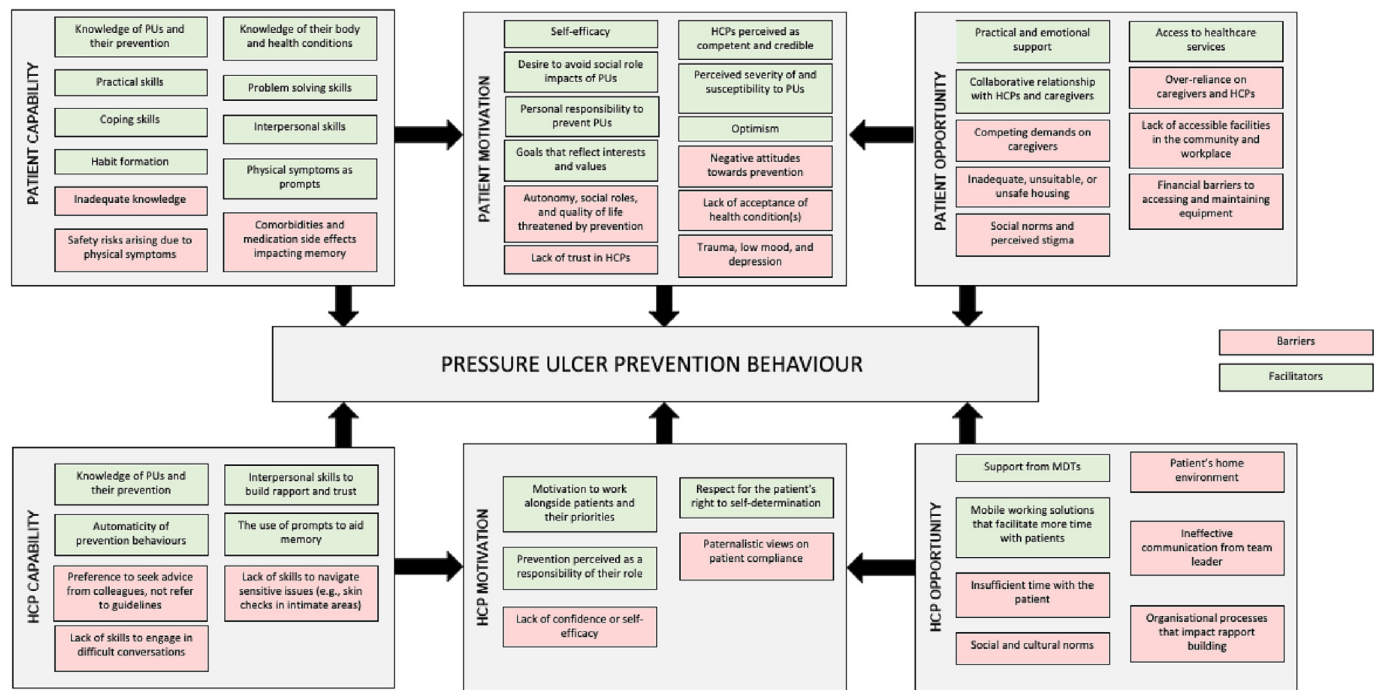


Fig. 2. Capability, Opportunity, Motivation, Behaviour (COM-B) analysis of the barriers and facilitators to pressure ulcer prevention.

indicate pressure relief is required (Burkhart et al., 2021; Fogelberg et al., 2016). Additionally, stroke patients who may experience difficulties recognising their bodies' signs and symptoms due to decreased sensory perception appear significantly more likely to develop pressure ulcers (Suttipong and Sindhu, 2012). These findings suggest that healthcare professionals may increase concordance with pressure ulcer prevention guidelines by assisting the patient to develop an understanding of bodily sensations and pressure symptoms. However, Burkhart et al. (2022) found that, in contrast to veterans with spinal cord injury, healthcare professionals did not acknowledge the degree to which individuals with spinal cord injury know their own body and are able to use their knowledge to adapt their preventative care. This finding suggests that supporting patients to develop their knowledge of their own signs and symptoms may be an opportunity missed by healthcare professionals to improve concordance.

### 3.4.3. The knowledge-behaviour gap

Several studies evaluating educational interventions found that knowledge of pressure ulcers and prevention can be significantly improved (Chong and Lee, 2017; Hartigan et al., 2012; McKeown et al., 2022; Sari et al., 2021; Shanley et al., 2022). However, it is less clear how this improved knowledge affects behavioural adherence or concordance. In some studies, increased knowledge did appear to improve adherence (Chong and Lee, 2017; McKeown et al., 2022; Shanley et al., 2022; Tsai et al., 2012), and some participants identified education as crucial for individuals demonstrating knowledge deficits (McGraw, 2019).

However, several studies indicate that knowledge alone may not be sufficient to increase prevention behaviours in those currently not following prevention guidelines. For example, some studies specifically reported participants were aware of the daily activities necessary to prevent pressure ulcers but did not always act upon this knowledge (de Laat et al., 2017; Ghaisas et al., 2015; McGraw, 2019; Van Gaal et al., 2022). Additionally, Kim and Cho (2017) found that an intervention targeting both knowledge and self-efficacy significantly increased engagement with prevention behaviours, compared to an educational leaflet that targeted knowledge alone.

The knowledge-behaviour gap also appears pertinent to healthcare professionals, with Kohta et al. (2017) reporting overall knowledge of

pressure ulcer prevention as moderate, with a mean score of 78 % and several items known by all participants. However, practice of pressure ulcer prevention behaviours was rated low, demonstrating a gap between knowledge and behaviour. These findings suggest that knowledge development may be most effective when combined with other strategies to change behaviour.

### 3.5. Skills

Skills appeared to influence adherence with pressure ulcer prevention guidelines across 36.6 % of the included studies (see Table 3). Four themes were identified: 1) Problem solving skills, 2) coping skills, 3) practical skills, and 4) interpersonal skills.

#### 3.5.1. Problem solving skills

Problem-solving skills appeared to facilitate pressure ulcer prevention, helping patients overcome challenges and barriers, and develop motivations to carry out prevention behaviours (Burkhart et al., 2021; Hashim et al., 2021). For example, problem solving skills helped participants with spinal cord injury adapt prevention behaviours according to their individual circumstances and were found to be useful in increasing self-efficacy and promoting the application of prevention behaviours (Hashim et al., 2021). However, these skills were often not developed alongside support from healthcare professionals, which meant the resulting behaviours were not always in line with healthcare professional recommendations and pressure ulcer prevention guidelines. This finding highlights the importance of integrating the development of problem-solving skills into the prevention pathway, to ensure the resulting behaviours align with guidance and, consequently, increase pressure ulcer prevention. Problem solving skills were also identified as important to healthcare professionals, with participants interviewed by Siddiqui et al. (2022) describing this skill as central to their role, enabling them to identify the "missing puzzle pieces" — the barriers impacting patients' prevention behaviours — to provide effective support. Therefore, these findings suggest that shared problem solving between the patient and healthcare professional is an important factor for concordance with pressure ulcer prevention.



### 3.5.2. Coping skills

Coping skills may also affect individuals' ability to carry out prevention behaviours, manage pain, and reduce emotional distress (Burkhart et al., 2021; Sleight et al., 2019). Helpful coping strategies included keeping a positive mindset, accepting limitations and help, participating in hobbies and social activities, and religious practices. However, Burkhart et al. (2022) noted healthcare professionals were silent about the importance of these skills, suggesting patients may not always be supported to develop these skills.

### 3.5.3. Practical skills

Practical skills development was also cited as important for increasing pressure ulcer prevention. For example, participants who were able to perform transfers, correctly use mobility devices, inspect their skin, and perform pressure relief activities were more likely to follow guidance (Sleight et al., 2019; Zanini et al., 2020a). However, practical skills development may be challenging in some patient groups. For example, those who are clinically frail may lack the capacity to perform some prevention behaviours due to loss of strength (McGraw, 2019). This underscores the need for healthcare professionals and patients to work collaboratively to achieve concordance with the guidelines.

### 3.5.4. Interpersonal skills

The interpersonal skills of healthcare professionals and patients also appear to impact the quality of the patient-provider relationship and may impact concordance with pressure ulcer prevention guidelines (e.g. Sleight et al., 2019). Patients' ability to self-advocate, communicate needs and concerns, be assertive, and navigate healthcare challenges appeared to influence the likelihood of acquiring a pressure ulcer, with these skills identified as an important contributor to concordance (Sleight et al., 2019; Van Gaal et al., 2022; Zanini et al., 2020b).

Healthcare professionals also recognised the importance of their interpersonal skills in shaping concordance with pressure ulcer prevention guidelines (McGraw, 2019; Taylor et al., 2021). For example, participants described their reluctance to engage in difficult conversations and lack of confidence navigating sensitive issues (e.g. undertaking skin checks in intimate areas) as factors that may impact concordance. Healthcare professionals interviewed by Zanini et al. (2019) highlighted the negotiation of priorities and goals as a frequent challenge, particularly when prevention impacts patients' perceived freedom. Healthcare professionals described the need to convince patients that such limitations on their freedom are required and, if the patient does not agree to change their behaviour, a compromise must be negotiated that minimises adverse outcomes whilst protecting the patient's quality of life. Healthcare professionals also acknowledged the impact of building mutual trust and respect on concordance. Healthcare professionals indicated that trust was an essential component of care, with patients who trust healthcare professionals more likely to openly discuss their concordance with guidance and work to find solutions. The strategies employed respected the patients' right to self-determination, accepting that their decisions may not always align with self-management guidelines, treating the patient without judgement, and clear, transparent communication. Healthcare professionals underscored the importance of listening to patients, recognising them as experts in their own care, communicating clearly, and respecting confidentiality. Interpersonal skills were also identified as crucial for healthcare professionals providing care for people with dementia, with strong interpersonal skills necessary to provide the required care without increasing distress (McGraw, 2019).

## 3.6. Social and professional role and identity

Social and professional role and identity were cited as an important factor by some studies (see Table 3). Two themes were identified: 1)

Divergent perspectives on social roles and 2) healthcare professionals' professional role.

### 3.6.1. Divergent perspectives on social roles

Findings on the impact of social roles on patients' pressure ulcer prevention were mixed, with some studies reporting that prevention behaviours often compete with other commitments, particularly those relating to work and family (Fogelberg et al., 2016; McGraw, 2019; Siddiqui et al., 2022; Zanini et al., 2020a). For example, parenting responsibilities and other family roles may be prioritised over healthcare professionals' recommendations (McGraw, 2019; Siddiqui et al., 2022; Zanini et al., 2020a) and commitments to work or studying may mean that individuals are seated for long periods without pressure relief (Fogelberg et al., 2016; Siddiqui et al., 2022). There is evidence that individuals strongly identified these social and professional roles, prioritising them over prevention behaviours (McGraw, 2019; Siddiqui et al., 2022).

On the other hand, social roles were also found to facilitate pressure ulcer prevention in some contexts (Fogelberg et al., 2016; Hashim et al., 2021; Siddiqui et al., 2022). For example, patients who discussed their social roles often reported that their desire to fulfil familial duties motivated participants to engage with preventative behaviours. In other words, maintaining their health and preventing pressure ulcers were important, in order to avoid the impact a pressure ulcer would have on their family role and relationships (Hashim et al., 2021). Some participants described how their identity within the family (e.g. as a homemaker) encouraged them to build habits that prevented pressure ulcers (Fogelberg et al., 2016). However, it is possible that habits associated with social roles may threaten pressure ulcer prevention when there is a change in circumstances. For example, one participant interviewed by Fogelberg et al. (2016) described how his habits changed when he lost his job and no longer identified as a worker. Consequently, healthcare professionals helping individuals to prioritise prevention guidelines without compromising their social roles may increase concordance, with the potential for social roles to act as a motivator. However, healthcare professionals should additionally be aware of any tensions between social roles and prevention behaviours, as well as changing circumstances that could threaten pressure ulcer prevention in order to increase concordance.

### 3.6.2. Healthcare professionals' professional role

Healthcare professionals' professional role may also impact pressure ulcer prevention (McGraw, 2019; Taylor et al., 2021; Zanini et al., 2020b). Community healthcare professionals often identified pressure ulcer prevention as part of their role (Taylor et al., 2021; Zanini et al., 2020b). However, Taylor et al. (2021) found the extent of healthcare professionals' perceived role in prevention varied, with nurses likely to undertake a more comprehensive list of prevention activities compared to allied healthcare professionals. Some of the allied health professionals indicated that such activities were not traditionally considered part of their role, but that the role has expanded to include them. Consequently, the extent to which healthcare professionals perceive their role as responsible for pressure ulcer prevention may influence their degree of adherence with prevention guidelines. Additionally, some healthcare professionals identified tensions associated with their professional role when providing care in the home, describing how they adopted the role of the 'guest' and often found it challenging to initiate difficult conversations or skin checks in sensitive areas (McGraw, 2019).

## 3.7. Beliefs about capabilities

Evidence on the importance of beliefs about capabilities in pressure ulcer prevention is mixed, but the domain was identified in 46.7% of the included studies (see Table 3). Two themes were developed: 1) Self-efficacy, and 2) perceived competence of healthcare professionals.

### 3.7.1. Self-efficacy

Many findings suggest that individuals who were confident in their ability to proactively recognise symptoms and react appropriately, preventing adverse outcomes, were more likely to adhere to pressure ulcer prevention guidelines (Burkhart et al., 2022; Hashim et al., 2021; Sleight et al., 2019; Zanini et al., 2020a). However, in some individuals, self-efficacy was also associated with behaviour that contradicted healthcare professional recommendations (Hashim et al., 2021; Zanini et al., 2020a). In a cross-sectional survey of people with spinal cord injury, higher levels of self-efficacy were not associated with the performance of pressure ulcer prevention behaviours (Hug et al., 2018). However, the study utilised a scale that assessed general self-efficacy, i.e., the ability of an individual to respond to universally stressful situations. Another study found that health activation, which included an assessment of confidence alongside knowledge and skills, was not associated with the incidence of pressure ulcers (de Laat et al., 2017). Self-efficacy may also be a factor that influences pressure ulcer prevention amongst informal caregivers (McKeown et al., 2022; Tsai et al., 2012).

Studies evaluating interventions suggest that self-efficacy may be a promising target to improve pressure ulcer prevention (Kim and Cho, 2017; McKeown et al., 2022; Shanley et al., 2022). Kim and Cho (2017) evaluated the impact of an 8-week self-efficacy enhancement programme on prevention behaviours, knowledge and self-efficacy amongst patients with spinal cord injury in South Korea. The intervention included education, skills training, demonstrations, performance of the prevention behaviours, feedback on performance, social support, and encouraged self-monitoring of prevention behaviours, which are all recognised behaviour change techniques according to the taxonomy presented by Michie et al. (2013). The intervention group demonstrated significantly greater improvements in knowledge, self-efficacy and prevention behaviours compared to the control group. However, it is unclear whether the improved adherence with prevention guidelines

arose due to increases in knowledge and self-efficacy, since many of the behaviour change techniques employed target additional constructs. For example, Kim and Cho (2017) note that the intervention may have impacted patients' motivation and health beliefs (e.g., increasing the perceived benefit of prevention behaviours). It is also possible that the intensive nature of the intervention could have improved salience, which has found to be associated with health beliefs in prior research (e.g., Rutten and Iannotti, 2003). Nevertheless, the findings are promising and suggest that targeting self-efficacy through increased knowledge and skills practice may be beneficial. Additionally, Sleight et al. (2019) found that spirituality (encouragement and support from church communities) may increase self-efficacy, strengthening the assumption that social support may increase self-efficacy.

### 3.7.2. Perceived competence of healthcare professionals

Several studies found that patients preferred to receive support from healthcare professionals with expertise relevant to their health conditions, with credibility, expertise and trustworthiness deemed important healthcare professional characteristics (e.g., Burkhart et al., 2021; Zanini et al., 2020a, 2020b; Hashim et al., 2021). Some participants indicated that a perceived lack of expertise would encourage them to find their own solutions, rather than seeking advice from healthcare professionals (Zanini et al., 2020a). Additionally, participants' perceptions of healthcare professional competence may impact knowledge development, leading to a poor understanding of the risks of pressure ulcer prevention and reduced concordance amongst those who perceive their healthcare professionals as incompetent (Hashim et al., 2021). In particular, patients with spinal cord injury perceived community healthcare professionals as lacking the competence required to provide effective care (Zanini et al., 2020b). Indeed, healthcare professionals themselves may even differ in terms of their perceived competence, with a lack of professional confidence potentially reducing concordance (Taylor et al., 2021) (Table 4).

**Table 4**  
Theoretical Domains Framework domains identified.

	Knowledge	Skills	Social/prof. role or identity	Beliefs about capabilities	Optimism	Beliefs about consequences	Goals	Memory, attention and decision	Env. context and resources	Social influences	Emotion	Behavioural regulation
Antony and Thelley (2022)	X											
Burkhart et al. (2021)	X	X	X	X			X		X	X	X	
Burkhart et al. (2022)	X	X		X			X		X	X		
Chong and Lee (2017)	X											
de Laat et al. (2017)	X	X		X		X						
Floríndez et al. (2020)	X				X	X	X	X	X	X	X	
Fogelberg et al. (2016)	X		X				X			X		X
Ghaisas et al. (2015)	X				X	X	X	X	X	X	X	X
Ghajarzadeh and Saberi (2018)											X	
Hartigan et al. (2012)	X											
Hashim et al. (2021)	X	X	X	X	X	X	X		X	X	X	X
Hug et al. (2018)				X								
Ip and Dicianno (2015)											X	
Kim and Cho (2017)				X						X		
Kohta et al. (2017)	X											
McGraw (2019)	X	X	X	X		X	X	X	X	X	X	
McKeown et al. (2022)	X			X		X				X		
Pilusa et al. (2021)	X					X		X	X	X		X
Sari et al. (2021)	X					X						
Shanley et al. (2022)	X			X		X						
Shirai et al. (2022)						X					X	
Siddiqui et al. (2022)	X	X	X			X	X		X	X		X
Sleight et al. (2019)	X	X		X	X	X	X		X	X		
Suttipong and Sindhu (2012)	X									X	X	
Taylor et al. (2021)	X	X	X	X	X	X	X	X	X	X		X
Tsai et al. (2012)	X			X						X		
Van Gaal et al. (2022)	X	X					X		X	X		
Zanini et al. (2019)	X	X	X			X	X			X	X	
Zanini et al. (2020a)	X	X	X	X	X	X				X		X
Zanini et al. (2020b)	X	X	X	X					X	X		

### 3.8. Optimism

Optimism was identified as a factor that may influence pressure ulcer prevention in 20 % of the included studies (see Table 3). For example, both Zanini et al. (2020a) and Hashim et al. (2021) found that participants who were optimistic about their future and maintained a positive outlook were more likely to engage in prevention behaviours. Sleight et al. (2019) also found that participants who were perceived as optimistic by healthcare professionals were also more likely to act in adherence with pressure ulcer prevention guidelines, with those who focused on the positive aspects of their life more likely to demonstrate high levels of motivation to prevent pressure ulcers. In contrast, Floríndez et al. (2020) and Ghaisas et al. (2015) found that participants who were described as passive or uninterested were less likely to engage in the recommended self-care behaviours. Similarly, Hashim et al. (2021) found that individuals who exhibited negative attitudes or apathy towards prevention were less likely to act in adherence with pressure ulcer prevention guidelines.

### 3.9. Beliefs about consequences

Beliefs about consequences were identified as a factor influencing pressure ulcer prevention in 50 % of included studies (see Table 3). Three themes were identified in this domain: 1) Perceived severity and susceptibility, 2) perceived importance of prevention, and 3) attitudes towards life with a long-term condition.

#### 3.9.1. Perceived severity and susceptibility

The extent to which individuals perceive pressure ulcers as a risk to their health – viewing pressure ulcers as a severe health complication and viewing themselves as susceptible – may influence pressure ulcer prevention (Ghaisas et al., 2015; Hashim et al., 2021; Floríndez et al., 2020; McGraw, 2019; Zanini et al., 2020a). For example, Zanini et al. (2020a) found that individuals with spinal cord injury who perceive pressure ulcers as a serious health condition ('perceived severity') and believe they are at risk of developing a pressure ulcer ('perceived susceptibility') are more likely to prioritise prevention behaviours. Participants who have prior experience of pressure ulcer may be more likely to adhere to prevention guidelines, with the experience of a pressure ulcer likely to increase perceived susceptibility (de Laat et al., 2017; Pilusa et al., 2021). In contrast, those who did not appear to be concerned about their susceptibility to pressure ulcers or consider pressure ulcers to be a serious health condition were less likely to prioritise prevention (Floríndez et al., 2020; McGraw, 2019; Pilusa et al., 2021; Shirai et al., 2022; Zanini et al., 2020a). Additionally, the perceived costs of behaviour change were a barrier for some, who prioritised quality of life over adherence to all pressure ulcer prevention guidelines (Zanini et al., 2020a). Although the majority of the studies focused on patients' perceived severity and susceptibility, these factors may also contribute to adherence amongst informal caregivers (McKeown et al., 2022) and healthcare professionals (Sari et al., 2021).

#### 3.9.2. Perceived importance of pressure ulcer prevention

The extent to which participants perceived pressure ulcer prevention behaviours as important to reduce the risk of pressure ulcers appears to affect adherence (de Laat et al., 2017; Hashim et al., 2021; McKeown et al., 2022; Pilusa et al., 2021; Siddiqui et al., 2022). For example, Hashim et al. (2021) found that individuals who did not perceive preventative behaviours as beneficial in the prevention of pressure ulcers were less likely to adhere to the guidelines. This finding was complemented by several studies that described attitudes as important influences on adherence and concordance. These included attitudes towards personal responsibility for pressure ulcers, with those perceiving themselves responsible, or co-responsible, for outcomes more likely to adhere to the guidelines and perceiving the outcomes of their behaviour as relevant to prevention (Taylor et al., 2021; Zanini

et al., 2020a; Zanini et al., 2019). In contrast, those who do not view themselves as personally responsible for the development of pressure ulcers may take a more passive role in their care and be less likely to adhere to recommendations, not perceiving the consequences of their behaviour as relevant to prevention (Zanini et al., 2020a) or denying the progression of pressure ulcers (Floríndez et al., 2020). Healthcare professionals interviewed by Zanini et al. (2019) highlighted a lack of personal responsibility as a challenge in developing and maintaining partnership between healthcare professionals and their patients. Healthcare professionals hypothesised several reasons for a lack of personal responsibility, including unresolved trauma, patients' right to self-determination, and a lack of acceptance of spinal cord injury. In the study conducted by Shanley et al. (2022), 34 % of participants did not perceive pressure ulcer as necessary and 41 % did not feel that they needed to concern themselves with pressure ulcer prevention. Following an educational intervention, 93 % viewed pressure ulcer as necessary, indicating that participants' beliefs about the importance of prevention may be a potential target for concordance and interventions.

#### 3.9.3. Attitudes towards living with a long-term condition

Attitudes towards living with long-term health conditions, including beliefs about the outcome of their behaviour, may also impact pressure ulcer prevention amongst patient groups. For example, individuals who communicated proactive attitudes towards healthcare issues were more likely to engage in prevention behaviours and take swift action when issues arise, understanding they were able to influence outcomes by changing their behaviour (Sleight et al., 2019; Zanini et al., 2020a). In contrast, passive attitudes towards health behaviours were associated with a greater reliance on caregivers (Zanini et al., 2020a). Additionally, individuals with newly acquired spinal cord injuries may not have accepted their injuries, and consequently their attitudes towards living with a spinal cord injury – and the associated emotional responses – may reduce pressure ulcer prevention (Shirai et al., 2022).

### 3.10. Goals

The goals domain was identified in 40 % of the included studies (see Table 3). The following themes were developed to represent findings within this domain: 1) Autonomous goals facilitate pressure ulcer prevention, and 2) healthcare professionals' approach to goal setting.

#### 3.10.1. Autonomous goals facilitate pressure ulcer prevention

Autonomous goals are defined as goals that reflect an individual's interests and values, whilst controlled goals refer to those perceived as imposed by external or internal pressures (Koestner et al., 2008). Individuals were more likely to adhere to prevention guidelines when they were motivated by an internal drive to remain pressure ulcer-free to engage in meaningful activities (Burkhart et al., 2021; Fogelberg et al., 2016; Hashim et al., 2021; Sleight et al., 2019; Siddiqui et al., 2022; Van Gaal et al., 2022). Meaningful activities included fulfilling perceived duties towards their families (Hashim et al., 2021; Siddiqui et al., 2022), maintaining independence (Burkhart et al., 2021), maximising physical health (Burkhart et al., 2021; Fogelberg et al., 2016; Van Gaal et al., 2022), participating in hobbies and social activities (Burkhart et al., 2021; Sleight et al., 2019; Siddiqui et al., 2022), education (Fogelberg et al., 2016) and religious practices (Burkhart et al., 2021; Sleight et al., 2019). These findings suggest that autonomous goals were more effective in supporting pressure ulcer prevention, whereas participants who perceived prevention behaviours as a threat to autonomy (controlled goals) were less likely to engage in prevention behaviours (Ghaisas et al., 2015; Zanini et al., 2019). The development of internalised motivations to engage in meaningful activities during a pressure ulcer prevention intervention was also reported to increase adherence amongst some participants, suggesting this may be a viable target for psychological interventions to increase pressure ulcer prevention (Sleight et al., 2019).

Some participants were also motivated to perform prevention behaviours so that they could prevent negative health outcomes (Burkhart et al., 2021; Sleight et al., 2019). For example, the fear of acquiring a pressure ulcer, hospitalisation, surgery, or amputation was found to protect against the development of pressure ulcers. Motivation may also be an important factor influencing adherence in healthcare professionals, with high levels of motivation found to increase adherence to the best practice of pressure ulcer prevention (Taylor et al., 2021).

### 3.10.2. Healthcare professionals' approach to goal setting

Findings also indicate that the way in which healthcare professionals approach goal setting may impact concordance. Healthcare professionals interviewed by Zanini et al. (2019) emphasised the importance of understanding the motivations behind a patient's behaviour, which helped the healthcare professional to find common ground and set goals that improve outcomes whilst honouring the patient's priorities and protecting their quality of life. In other words, recognising that patients may have different goals, and supporting them to develop autonomous goals to prevent pressure ulcers may increase concordance. These findings were supported by Floríndez et al. (2020) and Van Gaal et al. (2022), with both studies suggesting that goals heavily influenced by healthcare professionals and not developed alongside patients' goals were less likely to increase concordance, with healthcare professionals not fully understanding the impact of recommendations on patients (Floríndez et al., 2020; Burkhart et al., 2022). For example, patients prescribed bed rest may ignore this advice to alleviate boredom or depression. Healthcare professionals providing care to patients at the end of life reported similar views, describing the tension between preventing pressure ulcers and maintaining comfort, since turning a palliative care patient in bed may exacerbate pain. In these instances, the importance of patient autonomy during goal setting was seen as important (McGraw, 2019). Consequently, it is crucial for healthcare professionals to consider the impact of recommendations and work with patients to set goals and develop action plans that do not compromise patients' autonomous priorities.

### 3.11. Memory, attention and decision processes

A small number of studies (16.6 %) discussed memory, attention or decision-making as factors that may influence pressure ulcer prevention (see Table 3). For patients, comorbidities, cognitive deficits, and medication may interfere with individuals' capacity to remember to engage in pressure ulcer prevention behaviours (Ghaisas et al., 2015; Floríndez et al., 2020; McGraw, 2019; Pilusa et al., 2021). Allied health professionals who did not report prevention behaviour as automatic reported prompts as useful to aid their memory (Taylor et al., 2021). This underscores the need for concordance to manage these factors.

### 3.12. Environmental context and resources

Environmental context and resources were discussed across 40 % of included studies (see Table 3). The following themes were identified: 1) Home environment, 2) access to healthcare, and 3) accessibility of the wider environment.

#### 3.12.1. Home environment

Several studies reported challenges associated with housing and living conditions that may impact pressure ulcer prevention (see Table 3). Factors associated with reduced pressure ulcer prevention included homelessness and unstable housing, the presence of clutter, lack of cleanliness, limited space to manoeuvre equipment and perform skin checks, and lack of accessibility within the home (e.g. narrow hallways).

#### 3.12.2. Access to healthcare

Access to healthcare and resources were frequently cited as a factor impacting an individual's ability to engage in pressure ulcer prevention

behaviours (Burkhart et al., 2021, 2022; Floríndez et al., 2020; McGraw, 2019; Pilusa et al., 2021; Taylor et al., 2021; Siddiqui et al., 2022; Sleight et al., 2019; Zanini et al., 2020b). These challenges typically centred on equipment, such as seating surfaces, suitable wheelchairs, specialty mattresses, and equipment to aid with skin inspection (Burkhart et al., 2021; Taylor et al., 2021; Sleight et al., 2019). The ease at which equipment could be acquired, difficulties using the equipment, or poorly maintained equipment, impact adherence with prevention guidelines. Floríndez et al. (2020) found that the high cost of equipment impeded adherence amongst medically underserved adults taking part in the pressure ulcer prevention trial. For example, one participant obtained a pressure ulcer that required surgical intervention when he was unable to replace or repair a broken bath bench. Financial barriers were not limited to countries without universal healthcare, with patients in England experiencing barriers to care due to means tested and local authority caps on home visits, with some patients unable to fund additional care (McGraw, 2019). In these settings, inadequate funding reduces pressure ulcer prevention for people who require additional support to perform prevention behaviours. These barriers are likely to be particularly important for patients who require care throughout the night (McGraw, 2019; Siddiqui et al., 2022). Healthcare professionals also reported time as an important resource impacting adherence with pressure ulcer prevention guidelines (Taylor et al., 2021). Participants described heavy workloads that reduced the time available to spend on prevention. Access to healthcare services was also reported as a factor that may impact pressure ulcer prevention, particularly in the USA (Burkhart et al., 2021; Sleight et al., 2019). Such access may be dependent upon financial resources, geographical location or, in those with spinal cord injury, the nature of the initial injury. For example, some veterans interviewed by Burkhart et al. (2021) were able to access additional services because their injury occurred whilst undertaking military services.

#### 3.12.3. Accessibility of the wider environment

The accessibility and suitability of wider environments, such as the workplace and local community, may also facilitate or hinder pressure ulcer prevention (Burkhart et al., 2021; Hashim et al., 2021; Siddiqui et al., 2022; Sleight et al., 2019; Van Gaal et al., 2022). These factors included a lack of facilities in the workplace, poorly maintained facilities, lack of opportunity to engage in prevention behaviours, living in high-crime neighbourhoods, and unpredictable situations (e.g. travel delays, waiting for transportation).

### 3.13. Social influences

Social factors affecting pressure ulcer prevention were identified in 63.3 % of the included studies (see Table 3). The identified themes were: 1) Divergent perspectives on social support, 2) the relationship between patients and healthcare professionals, 3) social norms and stigma, and 4) support for healthcare professionals.

#### 3.13.1. Divergent perspectives on social support

Social support may have a positive or negative impact on pressure ulcer prevention. Informal support provided by family members, friends, or the wider community may increase pressure ulcer prevention by providing practical assistance, reminding individuals to carry out prevention behaviours, being an additional source of knowledge, increasing self-efficacy, communicating with healthcare professionals, and providing practical, logistical and emotional support (Burkhart et al., 2021, 2022; Ghaisas et al., 2015; Hashim et al., 2021; McKeown et al., 2022; Pilusa et al., 2021; Taylor et al., 2021; Tsai et al., 2012; Siddiqui et al., 2022; Sleight et al., 2019; Van Gaal et al., 2022). Low social support was identified as a risk factor for the development of pressure ulcers (Suttipong and Sindhu, 2012).

However, for some patients, social support can be counterintuitive. Some studies found that the patients with the greatest degree of non-



adherence tended to delegate prevention behaviours to others, taking a passive role in their care. Their over-reliance on caregivers, healthcare professionals, and assistive devices negatively impacted adherence with prevention guidelines and interfered with the development of practical skills to manage their own care (Floríndez et al., 2020; Fogelberg et al., 2016; Ghaisas et al., 2015; Zanini et al., 2020a). Additionally, overreliance on caregivers may reduce adherence when caregivers are not able to provide the level of care required due to their own health deteriorating or lack of availability to meet the patient's needs (Siddiqui et al., 2022), or when caregivers provide poor prevention care or have low self-efficacy for prevention care (Tsai et al., 2012).

Healthcare professionals also recognised patients' family members as potential barriers or enablers to pressure ulcer prevention, signifying informal caregivers and family members as an important part of the therapeutic alliance. For example, family members may be a barrier to pressure ulcer prevention when they are not engaged in prevention or when they perceived a lack of confidence in their ability to assist with prevention activities (Taylor et al., 2021).

### 3.13.2. Relationship between patients and healthcare professionals

The relationship between healthcare professionals and patients was frequently cited as an important factor influencing concordance across the literature, with participants at low risk of pressure ulcers more likely to follow healthcare professional recommendations (Siddiqui et al., 2022). Several studies highlighted the approach to prevention adopted by healthcare professionals as a key consideration (e.g., Burkhart et al., 2021; Taylor et al., 2021; Zanini et al., 2019). Some healthcare professionals appeared to subscribe to paternalistic models of care, describing patient non-compliance as problematic (Taylor et al., 2021), with such models challenged by patients, who viewed paternalistic approaches as detrimental to the patient-provider relationship, eroding trust (Burkhart et al., 2021). In contrast, many patients expressed the importance of collaboration with healthcare professionals in shaping outcomes, with teamwork perceived as central to the pressure ulcer prevention (Burkhart et al., 2021; Hashim et al., 2021). This collaboration appeared to be facilitated by trust and an empathetic approach, with healthcare professionals taking time to understand patients' challenges, barriers and motivations, without judgement, providing emotional support as well as practical support (Burkhart et al., 2021; Hashim et al., 2021; McGraw, 2019; Siddiqui et al., 2022; Zanini et al., 2019; Van Gaal et al., 2022). Patients and healthcare professionals may also perceive the nature of their relationship differently, as highlighted when Burkhart et al. (2022) triangulated the findings of two studies investigating veteran and healthcare professional perspectives. In these studies, healthcare professionals adopted a more paternalistic style of care, stating that patients should follow the recommendations provided. However, the veterans interviewed wanted a more collaborative relationship, with a perceived lack of collaboration reducing concordance due to mistrust and damaged rapport. A collaborative approach that respects patients' boundaries was seen as particularly crucial in the home environment, given nurses may be interrupting patients' time with their families (e.g. arriving at meal times), often requiring skin checks in intimate areas (McGraw, 2019). It was also important for patients to perceive healthcare professionals as credible and competent (Hashim et al., 2021; Zanini et al., 2020b). However, patients who did not work in collaboration with healthcare professionals, and communicating their needs ineffectively, were less likely to engage in pressure ulcer prevention behaviours (Floríndez et al., 2020). These findings suggest that a shift towards models of concordance and teamwork, instead of paternalistic models of compliance, may improve outcomes.

In terms of organisational culture, some healthcare professionals indicated that measures to increase efficiency negatively impacted their ability to build rapport with participants (Taylor et al., 2021), for example, the provision of iPads to complete assessment documentation in patients' homes, which were intended to maximise the time available

to spend with patients in the community. However, others suggested that mobile working solutions facilitated concordance, as they enabled healthcare professionals to spend more time with patients. The lack of continuity of care was also perceived as harmful to the relationship between patients and healthcare professionals, reducing concordance (Zanini et al., 2020b).

### 3.13.3. Social norms and stigma

Social norms were found to impact pressure ulcer prevention amongst both patients and healthcare professionals across a variety of settings, including in the home, at work, and in the community. Healthcare professionals reported that social norms sometimes prohibited them from checking skin in intimate areas, particularly when they interacted with cultural norms (McGraw, 2019; Taylor et al., 2021). For example, one male participant described how it would not be appropriate for him to ask to check the intimate areas of an older Muslim woman. This finding highlights the important role of cultural sensitivity in minimising inequalities in pressure ulcer prevention behaviours amongst healthcare professionals.

Amongst patients, social norms may negatively impact individuals' ability to carry out prevention behaviours in public places, particularly when they result in scenarios perceived as humiliating, such as flatulence or incontinence management (Burkhart et al., 2021; Hashim et al., 2021; Pilusa et al., 2021; Siddiqui et al., 2022). In the workplace, individuals reported concern that the performance of prevention behaviours may lead colleagues to perceive them as ineffective, inefficient, or less credible (Hashim et al., 2021; Van Gaal et al., 2022).

### 3.13.4. Social support for healthcare professionals

Social support was found to be an important factor in healthcare professional adherence, with support from multi-disciplinary teams highlighted as important for achieving the best patient outcomes (Taylor et al., 2021). However, ineffective communication from team leaders may reduce healthcare professionals' adherence, particularly concerning sensitive issues such as the need to perform skin checks in intimate areas (Taylor et al., 2021). Kim and Cho (2017) highlight the importance of social support to improve self-efficacy regarding pressure ulcer prevention, noting the telephone counselling component of their self-efficacy intervention as crucial in increasing participants' confidence to prevent pressure ulcers, as it provided an opportunity to have their concerns and questions addressed.

## 3.14. Emotion

Emotion was identified as a factor impacting pressure ulcer prevention in 33.3 % of the included studies (see Table 3). Low mood and depression may impact adherence with pressure ulcer guidelines (Burkhart et al., 2021; Floríndez et al., 2020; Ghaisas et al., 2015; Ghajarzadeh and Saberi, 2018; Hashim et al., 2021; Suttipong and Sindhu, 2012). Hashim et al. (2021) found that individuals with spinal cord injury experiencing low mood were less motivated to perform preventative behaviours or to learn about the importance of preventative behaviours, whilst Burkhart et al. (2021) found that veterans who reported feeling depressed, discouraged, or angry because of their spinal cord injury found it more difficult to engage in pressure ulcer prevention. For example, one participant reported little motivation to do anything other than stay in bed. These findings are supported by a case report, which described the case of a severe pressure ulcer in an adult with spinal cord injury. In this case, the pressure ulcer appeared to develop following a period of depression, during which the patient did not adhere to pressure ulcer prevention guidelines, spending most of their time in bed (Ip and Dicianno, 2015). Similarly, Floríndez et al. (2020) found that mental health problems reduced adherence with prevention guidelines through their impact on psychological or cognitive processes, which consequently reduced participants' capacity to remember, implement, or sustain preventative behaviours.

Both healthcare professionals (Zanini et al., 2019) and patients (Shirai et al., 2022) identified trauma and a lack of acceptance as a potential reason for patients with spinal cord injury not developing a sense of personal responsibility towards pressure ulcer prevention. Finally, motivation may also be impacted by mood (Floríndez et al., 2020; Hashim et al., 2021). For example, Floríndez et al. (2020) found that participants often did not follow guidance regarding bed rest, engaging in activities that reduced adherence to alleviate boredom or improve low mood.

### 3.15. Behavioural regulation

The final domain, behavioural regulation, was identified in 23.3 % of included studies (see Table 3). The associated themes are: 1) The role of habit, and 2) self-monitoring.

#### 3.15.1. The role of habit

Several studies report the importance of habit in pressure ulcer prevention (Fogelberg et al., 2016; Ghaisas et al., 2015; Pilusa et al., 2021; Siddiqui et al., 2022; Taylor et al., 2021; Zanini et al., 2020a). For example, when prevention behaviours were considered automated, individuals with spinal cord injury were more likely to engage in those behaviours (Zanini et al., 2020a). However, undertaking prevention behaviours was recognised as a difficult, effortful process, especially initially, prior to habit formation. In patients with spinal cord injury, habits established prior to acquiring the injury may also impact adherence. For example, patients who prioritised their health prior to sustaining their spinal cord injury appeared more likely to adhere to the guidelines, developing habits to maximise prevention (Fogelberg et al., 2016). However, Fogelberg et al. (2016) also report that, when habits are linked to the environment, they may become disrupted when the environment changes (e.g. if an individual loses their job or changes their routine).

Habits have also been found to impact the care provided by healthcare professionals, with Taylor et al. (2021) reporting that several nurses expressed the automaticity of pressure ulcer prevention in their practice, particularly amongst those who routinely see a high volume of at-risk patients. In contrast, some of the healthcare professionals interviewed noted that behaviour was not automatic and required conscious deliberation. In these healthcare professionals, prompts could increase adherence. In summary, these findings suggest that dual processing models and interventions focused on building habits may be useful for improving pressure ulcer prevention behaviours.

#### 3.15.2. Self-monitoring

Self-monitoring of symptoms was found to be a barrier or enabler to pressure ulcer prevention, dependent upon the context. For example, physiological symptoms that arise when performing preventative behaviours may be a barrier to pressure ulcer prevention, with individuals prioritising safety or avoiding further medical complications. For example, truncal spasm, which may occur when individuals with spinal cord injury engage in pressure ulcer prevention behaviours, can increase the risk of falls (Hashim et al., 2021). However, in some participants, physiological symptoms (e.g., spasms) may increase adherence when they serve as a reminder or prompt to perform prevention activities (Fogelberg et al., 2016; Hashim et al., 2021). Hashim et al. (2021) report that pain prompted some patients to undertake prevention activities, serving as a reminder to perform the behaviours. However, such an approach may paradoxically reduce adherence with pressure ulcer prevention guidelines, dependent upon the frequency of physiological symptoms. Pain may also decrease adherence in some individuals.

## 4. Discussion

This systematic review synthesised research on the psychosocial factors influencing pressure ulcer prevention in community settings.

Factors that were identified as most important for concordance between healthcare professionals and patients included (a) the development of healthcare professional problem-solving skills to help patients overcome challenges and barriers in order to align behaviour with pressure ulcer prevention guidance, (b) interpersonal skills of both the healthcare professional (regarding reluctance to engage in difficult conversations and lack of confidence navigating sensitive issues) and patient (regarding patients' ability to self-advocate, communicate needs and concerns, be assertive, and navigate healthcare challenges), (c) patients' perceived lack of healthcare professionals' expertise as well as healthcare professionals' lack of professional confidence, (d) a lack of personal responsibility and overreliance on caregivers posing a challenge in developing and maintaining partnership between healthcare professionals and their patients, (e) healthcare professional supporting the patient to develop autonomous goals, understanding the motivations behind a patient's behaviour and finding common ground to improve outcomes whilst honouring the patient's priorities and social roles, (f) a collaborative relationship between the patient and healthcare professional with healthcare professionals taking time to understand patients' challenges, barriers and motivations, without judgement and avoiding a paternalistic style of care, (g) the social and cultural issues involving checks in intimate areas which may form a barrier between the patient and healthcare professional and (h) patients' low mood which may have knock-on effects on building shared goals and rapport with healthcare professionals. Together these provide important targets for interventions seeking to increase concordance for effective pressure ulcer prevention.

### 4.1. Limitations

Although the present findings highlight wide-ranging psychosocial constructs that may impact pressure ulcer prevention, there are a number of limitations of this review. Firstly, our review included only English-language studies, which may not represent all of the available evidence (Morrison et al., 2012). Second, we did not conduct a quantitative synthesis of the results and are not able to draw conclusions about the magnitude of psychosocial factors on adherence. Additionally, the included studies tended to focus on pressure ulcer prevention as a whole, so it is difficult to infer which specific prevention behaviours participants have the most difficulty with. Intervention developers should seek to first clarify the target behaviours, as recommended by Michie et al. (2014). Finally, a single author conducted the data extraction which has the potential to introduce errors.

### 4.2. Recommendations for future research

The majority of the studies included in the review examined the factors that influence pressure ulcer prevention amongst adults with spinal cord injury. Further research is therefore required to confirm these findings in other populations prior to intervention development. For instance, specific groups of people also appear more likely to acquire pressure ulcers, including older adults, those with high or low body weights, people who have experienced trauma or adverse childhood events (ACEs), those who are bed bound, minoritised ethnicities, and people with learning disabilities (Harms et al., 2014; Jaul et al., 2018; Ness et al., 2018; Ostadabbas et al., 2011; Woodward, 1999). The present research did not consider the factors affecting pressure ulcer prevention amongst these groups, thus further research is required to ensure that interventions to increase concordance meet the needs of those most at risk.

There is also a lack of evidence concerning the impact of mental health comorbidities and other vulnerabilities such as neurodiversity and trauma on pressure ulcer prevention. For example, depression is associated with a higher likelihood of pressure ulcers in people with spinal cord injury and older stroke patients (Cao et al., 2022; Suttipong and Sindhu, 2012), although the mechanisms underpinning this association

are not fully understood. Krueger et al. (2013) proposed a model for understanding the relationship between depression and secondary health complications in spinal cord injury. The model posits that depression impacts adherence to self-management behaviours through several mechanisms, including personal factors (e.g. beliefs, attitudes and knowledge), physical capacity to engage in self-management behaviours, participation (e.g. use of assistive devices and accessing healthcare), and substance abuse. Future research should seek to elaborate on these findings, and examine the impact of mental health comorbidities, including trauma and adverse childhood events on community-based pressure ulcer prevention behaviours. Similarly, findings of this review suggest that trauma may be a barrier to adherence amongst patients with spinal cord injury and are supported by evidence suggesting that longstanding trauma can interfere with the exercise of self-management (Fallot and Harris, 2002). Therefore, future research may examine the application of approaches such as acceptance and commitment therapy to pressure ulcer prevention.

The effectiveness of interventions to improve pressure ulcer prevention is likely further complicated by multimorbidity and neurodiversity, which have not been adequately considered in the included studies. For example, Guest et al. (2018) found those presenting with pressure ulcers in UK community settings have an average of 5.8 comorbidities. Autism often presents with repetitive stimming behaviours, such as rocking, which people may use to self-regulate (Charlton et al., 2021). These repetitive movements may increase the risk of pressure ulcers, with continual pressure on the same areas of the body.

#### 4.3. Potential implications

The Theoretical Domains Framework and Capability, Opportunity, Motivation, Behaviour (COM-B) model form part of the behaviour change wheel approach to intervention development, with the present findings contributing to stage 4, the identification of what needs to change. The present findings therefore provide a starting point, contributing to healthcare professionals' understanding of the factors that may contribute to more effective pressure ulcer prevention and assisting with the design of effective interventions to increase concordance between patients and healthcare professionals with pressure ulcer prevention guidelines in community settings.

Clinical and health psychologists may be particularly well placed to provide knowledge in understanding pressure ulcer prevention concordance in the community due to their extensive training in the understanding of human behaviour, communication, engagement, collaboration, and research. A collaborative approach has the potential to develop effective behaviour change interventions and provide training to healthcare professionals, particularly Tissue Viability Nurses, enabling them to deliver behaviour change techniques targeting the identified domains, such as motivational interviewing (Emmons and Rollnick, 2001). Clinical psychologists may also offer individual or systemic formulation to patients and have a key role in treating the mental health problems found to reduce adherence, such as depression and trauma which should be taken into consideration by healthcare professionals when building a concordant relationship. Guest et al. (2018) found that that 37 % of those presenting with pressure ulcers in UK community settings had psychiatric comorbidities, although further research is required to determine whether such interventions would increase concordance.

#### 5. Conclusion

It is clear that there is no 'one size fits all' approach to pressure ulcer prevention in the community, with outcomes influenced by biological, psychological, and social factors. The present findings advocate an approach to prevention focused on collaboration between the patient and provider and a shift towards "shared decision-making" to promote self-management in order to achieve the best health and wellbeing

outcomes. This review highlights important targets for intervention to improve pressure ulcer prevention adherence, and most importantly, concordance between patients and healthcare professionals in the community.

#### Funding

No external funding.

#### CRediT authorship contribution statement

**Suzanne Heywood-Everett:** Writing – review & editing, Methodology, Conceptualization. **Rebecca Henderson:** Writing – original draft, Validation, Formal analysis. **Claire Webb:** Methodology, Conceptualization. **Amy R. Bland:** Writing – review & editing, Visualization, Supervision, Resources, Project administration.

#### Data availability

The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnurstu.2023.104561>.

#### References

- Antony, L., Thelly, A.S., 2022. Knowledge on prevention of pressure ulcers among caregivers of patients receiving home-based palliative care. *Indian J. Palliat. Care* 28 (1), 75.
- Atkins, L., Michie, S., 2015. Designing interventions to change eating behaviours. *Proc. Nutr. Soc.* 74 (2), 164–170. <https://doi.org/10.1017/S0029665115000075>.
- Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., Foy, R., Duncan, E. M., Colquhoun, H., Grimshaw, J.M., Lawton, R., Michie, S., 2017. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implement. Sci.* 12 (1), 77. <https://doi.org/10.1186/s13012-017-0605-9>.
- Bartholomew-Eldredge, L.K., Markham, C.M., Ruiter, R.A.C., Fernández, M.E., Kok, G., Parcel, G.S., 2016. *Planning Health Promotion Programs: An Intervention Mapping Approach*. John Wiley & Sons.
- Black, J.M., Edsberg, L.E., Baharestani, M.M., Langemo, D., Goldberg, M., McNichol, L., Cuddigan, J., 2011. Pressure Ulcers: Avoidable or Unavoidable? Results of the National Pressure Ulcer Advisory Panel Consensus Conference. p. 15.
- Boutron, L., Page, M.J., JPT, Higgins, Altan, D.G., Lundh, A., Hróbjartsson, A., 2022. Chapter 7: considering bias and conflicts of interest among the included studies. In: JPT, Higgins, Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M.J., Welch, V.A. (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions Version 6.3*. Cochrane (updated February 2022).
- Burkhart, L., Skemp, L., Siddiqui, S., 2021. Veteran model of preventing community-acquired pressure injuries associated with spinal cord injury: a qualitative descriptive study. *J. Spinal Cord Med.* 0 (0), 1–15. <https://doi.org/10.1080/10790268.2021.1982177>.
- Burkhart, L., Skemp, L., Siddiqui, S., 2022. Triangulation of veteran and provider models of preventing community-acquired pressure injuries in spinal cord injury to reveal convergence and divergence of perspectives. *J. Spinal Cord Med.* 1–10.
- Cane, J., O'Connor, D., Michie, S., 2012. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement. Sci.* 7 (1), 37. <https://doi.org/10.1186/1748-5908-7-37>.
- Cao, Y., DiPiro, N.D., Krause, J.S., 2022. Staying pressure injury free: the role of modifiable behaviors. *Arch. Phys. Med. Rehabil.* <https://doi.org/10.1016/j.apmr.2022.02.007>.
- Carey, R.N., Connell, L.E., Johnston, M., Rothman, A.J., de Bruin, M., Kelly, M.P., Michie, S., 2019. Behavior change techniques and their mechanisms of action: a synthesis of links described in published intervention literature. *Ann. Behav. Med.* 53 (8), 693–707. <https://doi.org/10.1093/abm/kay078>.
- Chapman, H., 2018. Nursing theories 4: adherence and concordance. *Nurs. Times* 114 (2), 50 (online).



- Charlton, R.A., Entecott, T., Belova, E., Nwaord, G., 2021. "It feels like holding back something you need to say": autistic and non-autistic adults accounts of sensory experiences and stimulating. *Res. Autism Spectr. Disord.* 89, 101864. <https://doi.org/10.1016/j.rasd.2021.101864>.
- Chong, K.W., Lee, S.W., 2017. A home-based education programme in pressure injury prevention and management for caregivers of elderly patients: a pilot study. *Asian J. Gerontol. Geriatr.* 12, 53–59.
- Davis, R., Campbell, R., Hildon, Z., Hobbs, L., Michie, S., 2015. Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health Psychol. Rev.* 9 (3), 323–344. <https://doi.org/10.1080/17437199.2014.941722>.
- de Laat, H.E.W., De Munter, A.C., Van der Burg, M.J., Ulrich, D.J.O., Kloeters, O., 2017. A cross-sectional study on self-management of pressure ulcer prevention in paraplegic patients. *J. Tissue Viability* 26 (1), 69–74.
- Demarré, L., Vanderwee, K., Defloor, T., Verhaeghe, S., Schoonhoven, L., Beeckman, D., 2012. Pressure ulcers: knowledge and attitude of nurses and nursing assistants in Belgian nursing homes. *J. Clin. Nurs.* 21 (9–10), 1425–1434. <https://doi.org/10.1111/j.1365-2702.2011.03878.x>.
- Dineen-Griffin, S., Garcia-Cardenas, V., Williams, K., Benrimoj, S.I., 2019. Helping patients help themselves: a systematic review of self-management support strategies in primary health care practice. *PLoS One* 14 (8), e0220116. <https://doi.org/10.1371/journal.pone.0220116>.
- Edsberg, L.E., Black, J.M., Goldberg, M., McNichol, L., Moore, L., Sieggreen, M., 2016. Revised National Pressure Ulcer Advisory Panel pressure injury staging system: revised pressure injury staging system. *J. Wound Ostomy Continence Nurs.* 43 (6). <https://doi.org/10.1097/WON.0000000000000281>.
- Emmons, K.M., Rollnick, S., 2001. Motivational interviewing in health care settings: opportunities and limitations. *Am. J. Prev. Med.* 20 (1), 68–74. [https://doi.org/10.1016/S0749-3797\(00\)00254-3](https://doi.org/10.1016/S0749-3797(00)00254-3).
- Fallot, R.D., Harris, M., 2002. The trauma recovery and empowerment model (TREM): conceptual and practical issues in a group intervention for women. *Community Ment. Health J.* 38 (6), 475–485. <https://doi.org/10.1023/A:1020880101769>.
- Florindez, L.I., Carlson, M.E., Pyatak, E., Blanchard, J., Cogan, A.M., Sleight, A.G., Hill, V., Diaz, J., Blanche, E., Garber, S.L., Clark, F.A., 2020. A qualitative analysis of pressure injury development among medically underserved adults with spinal cord injury. *Disabil. Rehabil.* 42 (15), 2093–2099. <https://doi.org/10.1080/09638288.2018.1552328>.
- Fogelberg, D.J., Powell, J.M., Clark, F.A., 2016. The role of habit in recurrent pressure ulcers following spinal cord injury. *Scand. J. Occup. Ther.* 23 (6), 467–476.
- Fox, C., 2002. Living with a pressure ulcer: a descriptive study of patients' experiences. *Br. J. Commun. Nurs.* 7 (Supl 1), 10–22. <https://doi.org/10.12968/bjcn.2002.7.Supl.1.12954>.
- French, S.D., Green, S.E., O'Connor, D.A., McKenzie, J.E., Francis, J.J., Michie, S., Buchbinder, R., Schattner, P., Spike, N., Grimshaw, J.M., 2012. Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. *Implement. Sci.* 7 (1), 38. <https://doi.org/10.1186/1748-5908-7-38>.
- Galhardo, V.A.C., Garroni Magalhaes, M., Blanes, L., Juliano, Y., Masako Ferreira, L., 2010. Health-related quality of life and depression in older patients with pressure ulcers. *Wounds Compend. Clin. Res. Pract.* 22 (1), 20–26.
- Ghaisas, S., Pyatak, E.A., Blanche, E., Blanchard, J., Clark, F., PUPS II Study Group, 2015. Lifestyle changes and pressure ulcer prevention in adults with spinal cord injury in the pressure ulcer prevention study lifestyle intervention. *Am. J. Occup. Ther.* 69 (1), 6901290020p1-6901290020p10.
- Ghajarzadeh, M., Saberi, H., 2018. Association between depression and chronic complications in clients with traumatic spinal cord injury. *Acta Med. Iran.* 704–709.
- Girouard, K., Harrison, M.B., VanDenKerkhof, E., 2008. The symptom of pain with pressure ulcers: a review of the literature. *Ostomy Wound Manage* 54 (5), 30–40, 42.
- Gorecki, C., Brown, J.M., Nelson, E.A., Briggs, M., Schoonhoven, L., Dealey, C., Defloor, T., Nixon, J., Group, E. Q. of L. P. U. P., 2009. Impact of pressure ulcers on quality of life in older patients: a systematic review. *J. Am. Geriatr. Soc.* 57 (7), 1175–1183. <https://doi.org/10.1111/j.1532-5415.2009.02307.x>.
- Gorecki, C., Nixon, J., Madill, A., Firth, J., Brown, J.M., 2012. What influences the impact of pressure ulcers on health-related quality of life? A qualitative patient-focused exploration of contributory factors. *J. Tissue Viability* 21 (1), 3–12. <https://doi.org/10.1016/j.jtv.2011.11.001>.
- Guest, J.F., Fuller, G.W., Vowden, P., Vowden, K.R., 2018. Cohort study evaluating pressure ulcer management in clinical practice in the UK following initial presentation in the community: costs and outcomes. *BMJ Open* 8 (7), e021769. <https://doi.org/10.1136/bmjopen-2018-021769>.
- Harms, S., Bliss, D.Z., Garrard, J., Cunanan, K., Savik, K., Gurvich, O., Mueller, C., Wyman, J.F., Eberly, L., Virnig, B., 2014. Prevalence of pressure ulcers by race and ethnicity for older people admitted to nursing homes. *J. Gerontol. Nurs.* 40 (3), 20–26. <https://doi.org/10.3928/0089134-20131028-04>.
- Hartigan, I., Murphy, S., Hickey, M., 2012. Older adults' knowledge of pressure ulcer prevention: a prospective quasi-experimental study. *Int. J. Older People Nursing* 7 (3), 208–218.
- Hashim, M.N., Yusof, A.N.M., Engkasan, J.P., Hasnan, N., 2021. Factors affecting adherence to behaviours appropriate for the prevention of pressure injuries in people with spinal cord injury from Malaysia: a qualitative study. *Spinal Cord* 59 (7), 777–786. <https://doi.org/10.1038/s41393-020-00586-1>.
- Hawker, S., Payne, S., Kerr, C., Hardey, M., Powell, J., 2002. Appraising the evidence: reviewing disparate data systematically. *Qual. Health Res.* 12 (9), 1284–1299. <https://doi.org/10.1177/1049732302238251>.
- Hopkins, A., Worboys, F., 2014. Establishing community wound prevalence within an inner London borough: exploring the complexities. *J. Tissue Viability* 23 (4), 121–128. <https://doi.org/10.1016/j.jtv.2014.10.002>.
- Hopkins, A., Dealey, C., Bale, S., Defloor, T., Worboys, F., 2006. Patient stories of living with a pressure ulcer. *J. Adv. Nurs.* 56 (4), 345–353. <https://doi.org/10.1111/j.1365-2648.2006.04007.x>.
- Hug, K., Stumm, C., Debecker, I., Fellinghauer, C.S., Peter, C., Hund-Georgiadis, M., 2018. Self-efficacy and pressure ulcer prevention after spinal cord injury—results from a nationwide community survey in Switzerland (SwiSCI). *PM&R* 10 (6), 573–586. <https://doi.org/10.1016/j.pmrj.2017.11.017>.
- Ip, A., Dicianno, B.E., 2015. Severe pressure ulcer following an acute depressive episode in a patient with spinal cord injury. *Univ. Tor. Med. J.* 92 (3), 61–65.
- Jaul, E., Barron, J., Rosenzweig, J.P., Menczel, J., 2018. An overview of co-morbidities and the development of pressure ulcers among older adults. *BMC Geriatr.* 18 (1), 305. <https://doi.org/10.1186/s12877-018-0997-7>.
- Karadağ, A., Çakar, V., 2022. Evidence-based prevention and management of pressure injuries in home care: a scoping review. *Adv. Skin Wound Care* 35 (3), 172–179. <https://doi.org/10.1097/01.ASW.0000815484.50141.5d>.
- Khojastehfar, S., Najafi Ghezleh, T., Haghani, S., 2020. Factors related to knowledge, attitude, and practice of nurses in intensive care unit in the area of pressure ulcer prevention: a multicenter study. *J. Tissue Viability* 29 (2), 76–81. <https://doi.org/10.1016/j.jtv.2020.02.002>.
- Kim, J.Y., Cho, E., 2017. Evaluation of a self-efficacy enhancement program to prevent pressure ulcers in patients with a spinal cord injury. *Jpn. J. Nurs. Sci.* 14 (1), 76–86. <https://doi.org/10.1111/jjns.12136>.
- Koestner, R., Otis, N., Powers, T.A., Pelletier, L., Gagnon, H., 2008. Autonomous motivation, controlled motivation, and goal progress. *J. Pers.* 76 (5), 1201–1230. <https://doi.org/10.1111/j.1467-6494.2008.00519.x>.
- Kohta, M., Kameda, Y., Morita, S., 2017. Knowledge and practice for pressure injury prevention among care managers in a home care setting: a cross-sectional study. *Chronic Wound Care Manag. Res.* 4, 99–105.
- Krueger, H., Noonan, V.K., Williams, D., Trenaman, L.M., Rivers, C.S., 2013. The influence of depression on physical complications in spinal cord injury: behavioral mechanisms and health-care implications. *Spinal Cord* 51 (4), Article 4. <https://doi.org/10.1038/sc.2013.3>.
- Lavallée, J.F., Gray, T.A., Dumville, J., Cullum, N., 2018. Barriers and facilitators to preventing pressure ulcers in nursing home residents: a qualitative analysis informed by the Theoretical Domains Framework. *Int. J. Nurs. Stud.* 82, 79–89. <https://doi.org/10.1016/j.ijnurstu.2017.12.015>.
- Lawn, S., Delany, T., Sweet, L., Battersby, M., Skinner, T.C., 2014. Control in chronic condition self-care management: how it occurs in the health worker-client relationship and implications for client empowerment. *J. Adv. Nurs.* 70 (2), 383–394. <https://doi.org/10.1111/jan.12203>.
- Ledger, L., Worsley, P., Hope, J., Schoonhoven, L., 2020. Patient involvement in pressure ulcer prevention and adherence to prevention strategies: an integrative review. *Int. J. Nurs. Stud.* 101, 103449. <https://doi.org/10.1016/j.ijnurstu.2019.103449>.
- McGraw, C.A., 2019. Nurses' perceptions of the root causes of community-acquired pressure ulcers: application of the Model for Examining Safety and Quality Concerns in Home Healthcare. *J. Clin. Nurs.* 28 (3–4), 575–588.
- McInnes, E., Chaboyer, W., Murray, E., Allen, T., Jones, P., 2014. The role of patients in pressure injury prevention: a survey of acute care patients. *BMC Nurs.* 13 (1), 41. <https://doi.org/10.1186/s12912-014-0041-y>.
- McKeown, E., McGraw, C., Holder, P., Shand, J., Hirani, S.P., 2022. Acceptability and impact of an educational app (iCare) for informal carers looking after people at risk of pressure ulceration: mixed methods pilot study. *JMIR Form. Res.* 6 (9), e36517.
- Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., Walker, A., 2005. Making psychological theory useful for implementing evidence based practice: a consensus approach. *BMJ Qual. Saf.* 14 (1), 26–33. <https://doi.org/10.1136/qshc.2004.011155>.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M., P., Cane, J., Wood, C.E., 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann. Behav. Med.* 46 (1), 81–95. <https://doi.org/10.1007/s12160-013-9486-6>.
- Michie, S., Atkins, L., West, R., 2014. *The Behaviour Change Wheel: A Guide to Designing Interventions*. Silverback.
- Morrison, A., Polisena, J., Huserau, D., Moulton, K., Clark, M., Fiander, M., ... Rabb, D., 2012. The effect of English-language restriction on systematic review-based meta-analyses: a systematic review of empirical studies. *Int. J. Technol. Assess. Health Care* 28 (2), 138–144. <https://doi.org/10.1017/S0266462312000086>.
- National Institute for Health and Care Excellence, 2014. Pressure Ulcers: Prevention and Management (Clinical Guideline CG179), p. 32. <https://www.nice.org.uk/guidance/cg179>.
- Ness, S.J., Hocking, D.F., Bell, J.J., Collins, P.F., 2018. The pressures of obesity: the relationship between obesity, malnutrition and pressure injuries in hospital inpatients. *Clin. Nutr.* 37 (5), 1569–1574. <https://doi.org/10.1016/j.clnu.2017.08.014>.
- NHS Improvement, 2018. Pressure ulcer core curriculum. <https://www.nationalwoundcarestrategy.net/wp-content/uploads/2021/06/Pressure-ulcer-core-curriculum.pdf>.
- Ostadabbas, S., Yousefi, R., Faezipour, M., Nourani, M., Pompeo, M., 2011. Pressure ulcer prevention: an efficient turning schedule for bed-bound patients. 2011 IEEE/NIH Life Science Systems and Applications Workshop (LiSSA), pp. 159–162. <https://doi.org/10.1109/LISSA.2011.5754183>.
- Pilusa, S., Myezwa, H., Potterton, J., 2021. 'I forget to do pressure relief': personal factors influencing the prevention of secondary health conditions in people with spinal cord injury, South Africa. *S. Afr. J. Physiother.* 77 (1), 1493.
- Randall, S., Neubeck, L., Randall, S., Neubeck, L., 2016. What's in a name? Concordance is better than adherence for promoting partnership and self-management of chronic disease. *Aust. J. Prim. Health* 22 (3), 181–184. <https://doi.org/10.1071/PY15140>.



- Rutten, L.J.F., Iannotti, R.J., 2003. Health beliefs, salience of breast cancer family history, and involvement with breast cancer issues: adherence to annual mammography screening recommendations. *Cancer Detect. Prev.* 27 (5), 353–359. [https://doi.org/10.1016/S0361-090X\(03\)00133-8](https://doi.org/10.1016/S0361-090X(03)00133-8).
- Sari, S.P., Everink, I.H., Amir, Y., Lohrmann, C., Halfens, R.J., Moore, Z., Beeckman, D., Schols, J.M., 2021. Knowledge and attitude of community nurses on pressure injury prevention: a cross-sectional study in an Indonesian City. *Int. Wound J.* 18 (4), 422–431.
- Shanley, E., Patton, D., Avsar, P., O'Connor, T., Nugent, L., Moore, Z., 2022. The impact of the Shanley Pressure Ulcer Prevention Programme on older persons' knowledge of, and attitudes and behaviours towards, pressure ulcer prevention. *Int. Wound J.* 19 (4), 754–764.
- Shiferaw, W.S., Akalu, T.Y., Mulugeta, H., Aynalem, Y.A., 2020. The global burden of pressure ulcers among patients with spinal cord injury: a systematic review and meta-analysis. *BMC Musculoskelet. Disord.* 21 (1), 334. <https://doi.org/10.1186/s12891-020-03369-0>.
- Shirai, T., Bulandres, P., Choi, J.A., D'Ortenzio, D., Moon, N., Musselman, K., Gabison, S., 2022. The use of a mobile educational tool on pressure injury education for individuals living with spinal cord injury/disease: a qualitative research study. *Disabil. Rehabil.* 44 (3), 468–477.
- Siddiqui, S., Skemp, L., Burkhart, L., 2022. Provider perspectives of community-acquired pressure injury prevention in veterans with spinal cord injury. *J. Spinal Cord Med.* 1–13.
- Sleight, A.G., Cogan, A.M., Hill, V.A., Pyatak, E.A., Díaz, J., Floríndez, L.I., Blanchard, J., Vigen, C., Garber, S.L., Clark, F.A., 2019. Factors protecting against pressure injuries in medically underserved adults with spinal cord injury: a qualitative study. *Top. Spinal Cord Inj. Rehab.* 25 (1), 31–40. <https://doi.org/10.1310/sci2501-31>.
- Snowden, A., Marland, G., 2013. No decision about me without me: concordance operationalised. *J. Clin. Nurs.* 22 (9–10), 1353–1360. <https://doi.org/10.1111/j.1365-2702.2012.04337.x>.
- Song, Y.-P., Shen, H.-W., Cai, J.-Y., Zha, M.-L., Chen, H.-L., 2019. The relationship between pressure injury complication and mortality risk of older patients in follow-up: a systematic review and meta-analysis. *Int. Wound J.* 16 (6), 1533–1544. <https://doi.org/10.1111/iwj.13243>.
- Suttipong, C., Sindhu, S., 2012. Predicting factors of pressure ulcers in older Thai stroke patients living in urban communities. *J. Clin. Nurs.* 21 (3–4), 372–379. <https://doi.org/10.1111/j.1365-2702.2011.03889.x>.
- Taylor, C., Mulligan, K., McGraw, C., 2021. Barriers and enablers to the implementation of evidence-based practice in pressure ulcer prevention and management in an integrated community care setting: a qualitative study informed by the theoretical domains framework. *Health Soc. Care Commun.* 29 (3), 766–779. <https://doi.org/10.1111/hsc.13322>.
- Tsai, Y.C., Lin, S.Y., Liu, Y., Wang, R.H., 2012. Factors related to the development of pressure ulcers among new recipients of home care services in Taiwan: a questionnaire study. *Int. J. Nurs. Stud.* 49 (11), 1383–1390.
- Van Gaal, B.G., Engelen, M.M., Adriaansen, M.J., Vermeulen, H., Laat, E.D., Dulmen, S.V., 2022. Lessons learned from patients with spinal cord injury in managing pressure ulcers: a qualitative study. *J. Tissue Viability* 31 (4), 794–799.
- Vanderwee, K., Defloor, T., Beeckman, D., Demarré, L., Verhaeghe, S., Durme, T.V., Gobert, M., 2011. Assessing the adequacy of pressure ulcer prevention in hospitals: a nationwide prevalence survey. *BMJ Qual. Saf.* 20 (3), 260–267. <https://doi.org/10.1136/bmjqs.2010.043125>.
- Viswanathan, M., Ansari, M.T., Berkman, N.D., Chang, S., Hartling, L., McPheeters, M., Treadwell, J.R., 2012. Assessing the risk of bias of individual studies in systematic reviews of health care interventions. Agency for healthcare research and quality methods guide for comparative effectiveness reviews. *AHRQ Methods for Effective Health Care*.
- Wood, J., Brown, B., Bartley, A., Margarida Batista Custódio Cavaco, A., Roberts, A.P., Santon, K., Cook, S., 2019. Reducing pressure ulcers across multiple care settings using a collaborative approach. *BMJ Open Qual.* 8 (3), e000409. <https://doi.org/10.1136/bmjopen-2018-000409>.
- Woodward, M., 1999. Risk Factors for Pressure Ulcers – Can They Withstand the Pressure? p. 9.
- Young, T., Furtado, K., Alves, P., 2018. Health Related Quality of Life (HRQOL) implications for people with pressure ulcers. In: Romanelli, M., Clark, M., Gefen, A., Ciprandi, G. (Eds.), *Science and Practice of Pressure Ulcer Management*. Springer, pp. 79–87. [https://doi.org/10.1007/978-1-4471-7413-4\\_6](https://doi.org/10.1007/978-1-4471-7413-4_6).
- Zanini, C., Rubinelli, S., Lustenberger, N., Koch, H.G., Scheel-Sailer, A., Brach, M., 2019. Challenges to building and maintaining partnership in the prevention and treatment of pressure injuries in spinal cord injury: a qualitative study of health professionals' views. *Swiss Med. Wkly.* 25. <https://doi.org/10.4414/sm.w.2019.20086>.
- Zanini, C., Brach, M., Lustenberger, N., Scheel-Sailer, A., Koch, H.G., Stucki, G., Rubinelli, S., 2020a. Engaging in the prevention of pressure injuries in spinal cord injury: a qualitative study of community-dwelling individuals' different styles of prevention in Switzerland. *J. Spinal Cord Med.* 43 (2), 247–256. <https://doi.org/10.1080/10790268.2018.1543094>.
- Zanini, C., Lustenberger, N., Essig, S., Gemperli, A., Brach, M., Stucki, G., ... Scheel-Sailer, A., 2020b. Outpatient and community care for preventing pressure injuries in spinal cord injury. A qualitative study of service users' and providers' experience. *Spinal Cord* 58 (8), 882–891.