Restraint use in residents with dementia living in residential aged care facilities: a scoping review

Running title: Restraint use in dementia residents

Lihui Pu PhD candidate1,2 (lihui.pu@griffithuni.edu.au)
Wendy Moyle Professor1,2 (w.moyle@griffith.edu.au)

1 School of Nursing and Midwifery, Griffith University, Australia
2 Menzies Health Institute Queensland, Griffith University, Australia

*Corresponding Author: Lihui Pu, Menzies Health Institute Queensland, Griffith University, N16, Room -1.10K, 170 Kessel Rd, Nathan, Brisbane, Queensland, 4111, Australia.
E-mail: lihui.pu@griffithuni.edu.au   Tel: +61 737353812
Restraint use in residents with dementia living in residential aged care facilities: a scoping review

Running title: Restraint use in dementia residents

Abstract

Aims and objectives: To provide an overview of restraint use in residents with dementia in the context of residential aged care facilities.

Background: Restraints are commonly used in people with dementia living in residential aged care facilities to manage behaviours and reduce injuries, but the concept of restraint use in people with dementia remains ambiguous, and current practices to reduce restraint use in long-term care residents with dementia remains unclear.

Design: A scoping review using the methodological frameworks of Arskey and O’Malley and colleagues.

Methods: Nine databases (CINAHL, MEDLINE, EMBASE, PubMed, Scopus, Web of Science, OVID, Cochrane Central Register of Controlled Trials, and ProQuest) were searched from 2005 to May 20, 2019. Articles were included if they were written in English, peer-reviewed and used any research method that described restraint use in residents with dementia living in residential care settings. The PRISMA-ScR checklist was used.

Results: From 1585 articles, 23 met the inclusion criteria. There is a lack of a clear definition of restraint use and the prevalence of restraint use varied from 30.7% to 64.8% depending on the different operational concepts. People with dementia were at a higher risk for restraint use and the decision-making process for restraint use were largely ignored in the literature. The effect of staff educational interventions to reduce restraint use was inconsistent due to varying delivery duration and content.

Conclusions: The prevalence of restraint use in people with dementia living in residential care settings remains high alongside the absence of a clear definition of restraint use. More research about the decision-making process involved in using restraint and development of...
effective interventions are needed.

**Relevance to clinical practice:** Better education about the decision-making regarding staff, conditions of residents and organisations for restraint use is needed to improve the care for people with dementia living in care settings.

**Keywords:** Dementia; Long term care; Restraint; Scoping review

**What does this paper contribute to the wider global clinical community?**
- The prevalence of restraint use in people with dementia living in residential aged care facilities remains high despite the absence of a clear definition of restraint use.
- Restraint use in people with dementia is a complex process, and the decision-making process and person-centred care need to be incorporated into the training of staff.
- The effectiveness of educational interventions to reduce restraint use remains unclear in particular the heterogeneity of duration, content/structure and staff involvement.

1. **Introduction**

There is an increasing number of people diagnosed with dementia, with over half of those living in residential aged care facilities (RACFs) cognitively impaired with high care needs (Dementia Australia, 2019). People with lower cognitive function and higher care dependency are more likely to be restrained (Freeman et al., 2017; Huang et al., 2014). A restraint is a device or medication that is used to restrict a person’s voluntary movement (Agens, 2010). Specifically, physical restraint has been internationally defined as “any action or procedure that prevents a person’s free body movement to a position of choice and/or normal access to his/her body by the use of any method, attached or adjacent to a person’s body that he/she cannot control or remove easily” (Bleijlevens et al., 2016, p. 2309). Whereas, chemical restraint is “the intentional sedation or control of an individual’s behaviour through the use of medicines (Peisah & Skladzien, 2014).

The prevalence of restraint use in people with dementia is around 31% in Europe (Hamers, 2017) and it ranges from 6% in Switzerland to 31% in Canada (Feng et al., 2009). Restraint use has been consistently associated with an increase in falls, injury and even death (Barnett et al., 2012; Karger et al., 2008; Rakhmatullina et al., 2013). Despite these negative consequences, restraint has been used as a “common practice” in RACFs under the premise of risk minimisation and prevention of harm to self or others (Wang & Moyle, 2005), in

This article is protected by copyright. All rights reserved
particular for people with dementia with challenging behaviours (Hamers, 2017). However, restraint removal did not lead to increased injuries in residents (Tilly & Reed, 2008). With the promotion of a ‘restraint-free’ model of residential aged-care (Australia Medical Association, 2015), the use of restraint is considered as an indicator of poor quality of care (Konetzka et al., 2014).

There is a growing number of review papers on staff educational interventions for restraint use in RACFs (Lan et al., 2017; Möhler et al., 2012), care staff perceptions towards restraint use (Kong et al., 2017), and restraint use in older adults in home care (Scheepmans et al., 2018). However, these reviews, apart from a review published in 2005 (Wang & Moyle, 2005) have ignored people with dementia living in RACFs, who are reported to experience a higher incidence of restraint use than those without dementia (Hofmann & Hahn, 2014). In the context of RACFs, the use of restraint is influenced by lack of education, safety concerns and characteristics of staff (Willemse et al., 2016) and residents (Hofmann & Hahn, 2014). The primary aim of this review was explicitly proposed to research restraint use in people with dementia living in RACFs since 2005. We aimed to report on the current knowledge, characteristics and concepts of restraint use. In this case, a scoping review was considered as the better choice of review method, in particular, to clarify definitions of restraint use.

2. Methods

This scoping review was conducted following the six-stage methodological framework described by Arksey and O'Malley (2005) and Levac and colleagues (Levac et al., 2010). We conducted a comprehensive search on the literature following the PRISMA guidelines (PRISMA Extension for Scoping Reviews, PRISMA- ScR, FileS1) (Tricco et al., 2018). The objective of the review was to map the available evidence to provide an overview of restraint use in residents with dementia in the context of RACFs.

2.1 Identifying the research question

The research questions guiding this scoping review included: (1) What is the definition, prevalence, type, frequency of restraint use? (2) What is the reason, risk factors, decision-making process and adverse events for restraint use? (3) What interventions were used to reduce restraint use in residents with dementia living in RACFs?

2.2 Identifying relevant studies

The literature search strategy and keywords were developed with assistance from the University Health Librarian. Both the medical subject headings (MeSH) and text words related to PCC elements (Population, Concept and Context) (Peters et al., 2017) were used to form the search terms. The databases included CINAHL, MEDLINE, EMBASE, PubMed,
Scopus, Web of Science, OVID (Psych Info), Cochrane Central Register of Controlled Trials (CENTRAL) and ProQuest. The search terms were tailored to each database to address the differences in thesaurus terminology and indexing (Table 1). Further searches were performed on reference lists of included studies and relevant systematic reviews. The literature search was limited to the English language; published as a full-text article in a peer-reviewed journal; primary research using any research method and published from 2005 up to May 20, 2019, were selected. The 2005 date was chosen because a similar review paper was published in 2005 (Wang & Moyle, 2005). The search history is presented in Appendix S1.

2.3 Study selection

Two authors independently screened the title and abstract of searched citations to discard any irrelevant articles before assessing the eligibility of full-text studies. Regular monthly meetings occurred between the research team for solving disagreements to ensure rigour within the study selection process. As scoping reviews have a broader “scope” with correspondingly less restrictive inclusion criteria (Peters et al., 2017), the following inclusion criteria were based upon the Population, Concept and Context (PCC) elements. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines were employed to promote consistency, accountability, integrity, and transparency in the conduct of this review (Tricco et al., 2018) (Appendix S2).

2.3.1 Population

Study participants were older adults (≥ 65 years of age) with dementia. Studies not exclusively focused on residents with dementia but with separate data reporting on restraint use in people with dementia were included.

2.3.2 Concept

Any empirical research on restraint use of any study design was included. These studies may report a definition of restraint, data on prevalence, types of restraint use, frequency, reasons, risk factors, the decision-making process for use, and adverse events of restraint use as well as interventions to reduce restraint use in people with dementia.

2.3.3 Context

The context of this review was RACFs, where people with dementia live, including nursing homes, long-term care facilities, residential homes/facilities were included while other settings such as hospitals or homes, were excluded.

2.4 Data charting and item extraction

After removal of duplicates and discussion between authors, the key findings were focused on results relevant to the study objectives. A standardised data extraction form was developed.
collect following details of included studies: study record (year of publication, study location), research design, study population, study aim, study method, outcome measures and findings (Appendix S3). The data was initially extracted by one author (LP) before being reviewed and independently interrogated by another author (WM). A final check was performed by both authors to maintain rigour and authenticity.

2.5 Collating, summarising and reporting the results

Results were reported as a narrative summary focusing on the objective that guided this scoping review. Included articles were grouped by study design including qualitative studies, observational studies, quasi-experimental studies and randomised controlled trials. The different outcomes on restraint use guided the reporting of the results, including (a) definition; (b) prevalence; (c) type; (d) frequency; (e) reason; (f) risk factors, (g) decision-making process; (h) adverse events; and (i) interventions to reduce restraint use in residents with dementia living in RACFs.

2.6 Consulting with stakeholders

Stakeholder consultation is an optional stage, and this was not conducted in this scoping review.

3. Results

3.1 Results of the search

Overall, 591 references were identified from nine databases after removing duplicates including six articles retrieved from reference lists of the included studies and relevant systematic reviews. After title and abstract screening, 45 articles were left for full-text reading. Furthermore, 22 articles were excluded due to there being people without dementia (n=15) and outcomes without restraint use (n=7). Finally, 23 articles were included in this scoping review. The PRISMA flowchart of study selection is presented in Figure 1.

3.2 Description of included studies

Table 2 outlines the characteristics of the included studies and participants. Among 23 included studies, we identified one qualitative study, 12 observational studies, three quasi-experimental studies and seven randomised controlled trials (RCTs). These studies were conducted in different countries, including the USA (n=6), Norway (n=5), the Netherlands (n=4), Germany (n=2), Canada (n=2), Singapore (n=1), Taiwan (n=1), Sweden (n=1) and one study were conducted from multiple European countries. Included studies were published between the years 2005 and 2017. Eighteen studies included residents with mild to severe cognitive impairment and five studies (Allen et al., 2005; Cassie & Cassie, 2013; Freeman et al., 2017; Mamun & Lim, 2005; Selbaek et al., 2016) reported separate data on restraint use.
in residents with dementia. Moreover, fifteen studies documented the presence of behavioural and psychological symptoms of dementia (BPSD) in participants. Table 3 presents a descriptive summary of included studies that align with the objective of the scoping review.

3.2.1 The definition, prevalence, type and frequency of restraint use
The definition of restraint varied across studies but was usually defined in terms of doing something to limit movement. Outcomes from all studies included physical restraint (n=23) of any device to limit residents’ mobility (e.g., bed rail, belt, deep chair, trunk/limb restraints, etc) while six studies also included electronic surveillance, such as infrared systems, as an indicator of restraint. The prevalence of restraint use in people with dementia living in RACFs varied from 30.7% (Selbaek et al., 2016) to 64.8% (Mamun & Lim, 2005). Different types of restraint use were recorded and the most commonly used was the use of chairs (Luo et al., 2010) or bedrails (Kuske et al., 2009). Only one study reported the frequency of restraint use with a mean of 1.59 times a day (Huizing et al., 2006).

3.2.2 The reason, risk factors, decision-making process and adverse events of restraint use
The reason for restraint use was poorly reported. Only one study mentioned that residents were restrained to prevent dislodgement of feeding tubes, to prevent falls and restrained for agitation (Mamun & Lim, 2005). Black residents (Cassie & Cassie, 2013), residents with antipsychotic medication (Foebel et al., 2016), residents with high activities of daily living (ADL) dependency (Te Boekhorst et al., 2013) and dementia (Freeman et al., 2017; Luo et al., 2011; Mamun & Lim, 2005) were more likely to be physically restrained. Furthermore, Konetzka et al. (2014) found that an increase in antipsychotic use (chemical restraint) was related to a decline in physical restraint use. Residents with dementia living in special care units (SCU) were less likely to have bed rails than those in regular units without an SCU (Luo et al., 2010). Ethnographic observations of 5–10 hours/day in three nursing homes indicated that decisions about the use of restraint were related to residents’ characteristics such as agitation, aggressiveness and wandering as well as organisational factors, such as resident mix, staff culture, location and human resources (Øye et al., 2017). Reported adverse events related to restraint use included ADL decline (Foebel et al., 2016), cognitive decline (Foebel et al., 2016; Freeman et al., 2017; Te Boekhorst et al., 2013), higher occurrence of agitated behaviours (Lin et al., 2009), higher risks for falls and fractures (Luo et al., 2011), mortality risk (Allen et al., 2005; Selbaek et al., 2016), and restraint increased the odds of delirium by 464% (Voyer et al., 2011).

3.2.3 The interventions and outcomes for restraint use
Three types of interventions were reported to reduce restraint use in people with dementia

This article is protected by copyright. All rights reserved
living in RACFs: (i) Nonpharmacological recreation therapy (n=1): A positive effect on restraint reduction was found for a pre-post study of the Closing Group project, which was an interdisciplinary small group therapeutic activity to decrease restraint use in 16 long-term care residents with severe dementia (Putman & Wang, 2007); (ii) Facility environment design (n=2): Significantly fewer physical restraints were used in people living in group living homes (te Boekhorst et al., 2009) or small-scale living facilities (Verbeek et al., 2014) compared with traditional wards; and (iii) Staff educational interventions (n=7): Five RCTs found staff educational interventions significantly reduced restraint use in the intervention group compared to the control group (Koczy et al., 2011; Kuske et al., 2009; Testad et al., 2005; Testad et al., 2010). One study reported no significant differences were found in two studies (Huizing et al., 2006) and another study reported a higher reduction of restraint use in the control group (Testad et al., 2016).

The duration of interventions varied from two to seven months. The content of the education aimed to improve the knowledge of staff regarding dementia care, the reasons, adverse effects, and alternatives towards restraint use. Four studies included the decision-making process of restraint use (Huizing et al., 2006; Koczy et al., 2011; Testad et al., 2005; Testad et al., 2016). Only one study incorporated person-centred care in staff training (Testad et al., 2016). Four studies provided educational interventions for all care staff (Kuske et al., 2009; Testad et al., 2005; Testad et al., 2010; Testad et al., 2016) while three studies primarily focused on nursing staff (Huizing et al., 2006; Koczy et al., 2011; Pellfolk et al., 2010). Two studies provided education followed by monthly sessions of guidance to reinforce skills of staff (Testad et al., 2005; Testad et al., 2010), and two studies provided education in combination of either consultation of a nurse specialist (Huizing et al., 2006) or case consultations (Koczy et al., 2011).

4. Discussion

This scoping review provides an overview of the available evidence of restraint use in residents with dementia living in RACFs. There is a lack of a clear definition of restraint use in the available literature, making it difficult to compare the results of different types of restraint or to suggest alternatives. The prevalence of restraint use varied from 30.7% to 64.8% depending on the different operational concepts of restraint use and this suggests there is a notable gap in evidence-based practice in the reduction or alternatives to restraint use. The use of chairs and bedrails was reported to be the most common types of restraint use, but the reason and decision-making process for these types of restraints were largely ignored in the literature. Once again suggesting that although restraint is commonly used, nursing practices...
have not translated into practice using person-centred approaches where people with dementia display behavioural problems. People with dementia were reported as being more likely to be physically restrained (Hofmann & Hahn, 2014), which may lead to further functional and cognitive decline (Freeman et al., 2017), delirium (Voyer et al., 2011) and even death (Selbaek et al., 2016).

Interventions using relaxation and environment modification may have the potential to reduce restraint use, but the available evidence was based on quasi-experimental studies rather than RCTs, and this may have prevented their use in practice. The effect of educational interventions to reduce restraint use in people with dementia living in RACFs was inconsistent due to the varying delivery duration, content/structure and the requirements for staff, meaning that where there is limited staff, it is likely that restraint will be used.

4.1 Relevance to research, clinical practice and policy

Definitions of restraint use in residential aged care vary widely, ranging from very narrow definitions that incorporate a few physical methods, such as belts or chairs with fixed tables to hinder movement, to broader definitions that include a wide range of physical, pharmacological (e.g., the use of antipsychotic medications) and/or environmental restraint (e.g., the use of surveillance systems) (Peisah & Skladzien, 2014). Consensus recommendations on the definition of restraint use may add value to the practice by making the measurement of restraint use more applicable for care staff and help to guide the practice and policy of restraint use in RACFs.

People with dementia living in RACFs are more likely to be restrained due to their display of aggressive behaviours and staff may use restraint during care activities, such as showering or bathing to protect themselves from being hurt by the resident (Øye et al., 2017). However, this may further agitate the resident and increase the risk of injuries. Significant evidence has demonstrated that ensuring an adequate number of registered nurses relative to the number of unregulated care assistants may reduce restraint use in RACFs (Wagner et al., 2013) and offer improvement in the general quality of aged care (Henderson et al., 2017). Additionally, evidence shows that residents living in dementia special care units with specialised practice nurses may experience less restraint (te Boekhorst et al., 2009; Verbeek et al., 2014). Frequently, if staff used a person-centred approach where they learnt the resident’s needs and responded to those needs, it is likely that there would also be less use of restraint. Therefore, an adequate staff ratio and sound knowledge and respectable attitudes towards restraint use are essential to improve the practice of restraint use in people with dementia living in RACFs.
Care staff often find it difficult to decide whether it is ethical and appropriate to restrain residents with challenging behaviours (Kong et al., 2017). Decision-making is a complex trajectory which depends on resident characteristics, staff-related factors and contextual factors (Goethals et al., 2012). Therefore, facilities should build guidelines for restraint use to promote alternative approaches to manage challenging behaviours of dementia. The use of restraint should only occur in extremely limited circumstances and the reasons for restraint use should be clearly documented, including duration of use, regular monitoring of the outcome of restraint use and any adverse events (Bellenger et al., 2019). A guideline-based multicomponent intervention was reported to significantly reduce physical restraint use in nursing homes (Kopke et al., 2012) but its effect on residents with dementia was unclear. Additionally, the implementation of risk management practices, a formal method of balancing the probable consequences of decisions, and validating clinical decision-making processes (Clarke & Mantle, 2016), is also essential to promote person-centred dementia care. Furthermore, care staff must be trained and instructed in this process to balance ethical and safety values.

The issue of restraint has been attended to in many countries by introducing regulatory approaches to the use of restraints, especially where a person lacks the capacity to give informed consent. For example, in Australia the Quality of Care Principles (Australia Government, 2019) require care providers to ensure assessment is carried out of by approved persons and alternative approaches are tried and documented before physical or chemical restraint is used. In Norway, the use of restraint can only be used as a last resort (Jacobsen et al. 2009). However, despite such regulations, restraint continues to be used often because staff are not aware of alternatives (Testad et al., 2016).

Most of the interventions to reduce restraint have focused on staff education. However, it is argued that many of these education interventions do not work as they are not person-centred, do not build confidence in alternatives to restraint (Testad et al., 2016), and the importance of the facilitator's role has not been understood and integrated into the education intervention (Hardiman & Dewing, 2014; van Lieshout & Cardiff, 2015). In terms of future research interventions, an RCT design is necessary so that effects can be compared. Also, studies should seek to collect, and report outcomes of restraint use from residents, staff and families as we need to understand the implications of its use for all participants involved directly and indirectly. Further research exploring the environment and staff factors that can impact on the use of restraints may help to understand and reduce the use of restraint.

The development of interventions for people with dementia who are at high risk of...
being restrained is essential to reduce unnecessary restraint. However, fluctuations in the 
condition of older people with dementia do not make assessment and reduction of restraint 
easy. A careful, comprehensive assessment by skilled staff that addresses individual need is 
necessary to develop alternative interventions. To encourage enthusiastic and responsive staff, 
they need to be trained to be flexible as fluctuations in the conditions of dementia mean the 
same intervention may not work on every occasion.

Importantly, a focus on leadership and its role in the promotion of person-centred care 
may assist in the reduction of restraint. Strong leadership, especially where the leadership 
facilitates positive interventions, is important (Jacobsen, et al., 2017). Furthermore, to 
achieve this, it is essential to incorporate a decision-making process alongside person-centred 
care (Jacobsen et al., 2017) into educational programs. A restraint-free philosophy and 
cooperation among a multidisciplinary team to ensure optimal communications are critical to 
reducing restraint use in care settings (Bellenger et al., 2019).

4.2 Strengths and limitations
The scoping review strength is its focus on people with dementia. To our knowledge, no 
other review has had this focus. However, this scoping review has some limitations. The 
scoping review methodology does not conduct a formal appraisal of study quality. As a result, 
this may introduce possible sources of bias from the evidence used. However, the scoping 
review allowed us to provide an overview of all studies on restraint use in people with 
dementia living in RACFs, within the period selected. We also were challenged to summarise 
results from the included studies given the mixed study designs. Moreover, some intervention 
studies did not focus exclusively on residents with dementia and this may limit the 
generalisation of results. We only included studies which involved residents with dementia, 
excluding studies focused on the perspectives of health professionals, which may have 
reduced valuable information resources. A further limitation is an inclusion only of English 
literature.

5. Conclusions
There exists a large variability in the definition of restraint use in people with dementia living 
in RACFs. Despite the adverse events of restraint use, the evidence to reduce restraint use is 
still scarce and inconsistent. The limited evidence also highlights the complexity of restraint 
use in people with dementia living in residential care. More research about the decision-
making process and development of effective interventions are needed, in particular for 
people with dementia.
Acknowledgements
Special thanks are extended to Ms Katrina Henderson, Health Librarian at Griffith University, for her invaluable help and advice during the development of the literature search strategy.

Conflicts of interest
The author(s) declare that they have no conflict of interests.

Funding sources
No external funding.

Author Contributions
WM conceived and designed the study, LP and WM undertook data analysis and/or interpretation and prepared a first draft of the manuscript. All listed authors approved the final version of the manuscript.

ORCID
Lihui Pu https://orcid.org/0000-0003-0136-0940
Wendy Moyle https://orcid.org/0000-0003-3004-9019

References


This article is protected by copyright. All rights reserved


Hamers, J. (2017). The prevention and reduction of physical restraint use in long-term care. In *Dementia in nursing homes* (pp. 219-228). Springer International Publishing. https://doi.org/10.1007/978-3-319-49832-4_16

This article is protected by copyright. All rights reserved


This article is protected by copyright. All rights reserved


This article is protected by copyright. All rights reserved


Table 1 Medical subject headings (MeSH) and keywords used in searches.

<table>
<thead>
<tr>
<th>Search strategy</th>
<th>MeSH terms</th>
<th>Key words</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>Dementia OR &quot;Alzheimer Disease&quot;</td>
<td>Dementia OR “cognitive impairment” OR Alzheimer* OR “cognitive decline” OR “Cognition Disorders”</td>
</tr>
<tr>
<td><strong>Concept</strong></td>
<td>MEDLINE &quot;Restraint, Physical&quot; OR &quot;Immobilization&quot;</td>
<td>restraint* OR “physical restraint*” OR “mechanical restraint*” OR “pharmacological restraint*” OR “medical restraint*” OR “chemical restraint*” OR “environment* restraint*” OR surveillance OR immobilisation OR “trunk restraint*” or bedrail* OR “bed rail*” OR “side rail*” OR belt* OR “containment measure” OR “cot side” OR “building design” OR belt* OR “posey belt*” OR “roll belt*” OR shackles OR “cloth bands” OR “wrist restraint*” OR straps OR vests OR “geriatric table*” OR “lean back chair*”</td>
</tr>
<tr>
<td></td>
<td>CINAHL “Restraint, chemical” OR “Restraint, physical” OR Immobilization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMBASE “Physical restraint” OR “Mechanical restraint”</td>
<td></td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>MEDLINE &quot;Nursing Homes&quot; OR &quot;Residential Facilities&quot; OR “Assisted living facility”</td>
<td>“aged care” OR “assisted living” OR “nursing home” OR “long-term care” OR RACF OR “Residential Facilities” OR “care homes”</td>
</tr>
<tr>
<td></td>
<td>CINAHL “Residential Facilities” OR &quot;Nursing Homes&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMBASE “Residential home” OR “Nursing home” OR “Assisted living facility”</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Study type</td>
<td>Sample size (people with dementia)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>(Allen et al., 2005)</td>
<td>Prospective observational study</td>
<td>32 residents (87.34 ± 7.29 years)</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td>who died were compared with 32 residents (84 ± 6.96 years) who did not die during the clinical trial.</td>
</tr>
<tr>
<td>(Cassie &amp; Cassie, 2013)</td>
<td>Cross-sectional study</td>
<td>13,507 residents from 1,174 nursing homes</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Foebel et al., 2016)</td>
<td>Retrospective cohort study</td>
<td>532 residents with dementia from 57 nursing homes</td>
</tr>
<tr>
<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Freeman et al., 2017)</td>
<td>Longitudinal secondary data analysis</td>
<td>111,052 residents from 635 LTCFs between 2005 and 2011</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This article is protected by copyright. All rights reserved
<table>
<thead>
<tr>
<th>Source</th>
<th>Study type</th>
<th>Sample size (people with dementia)</th>
<th>Dementia type/severity</th>
<th>Behavioural and psychological symptoms of dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Huizing et al., 2006)</td>
<td>Cluster-randomised controlled trial</td>
<td>167 residents with dementia</td>
<td>Moderate-severe cognitive impairment (CPS=3–6): 52.7%</td>
<td>NA</td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Koczy et al., 2011)</td>
<td>Cluster-randomised controlled trial</td>
<td>333 restrained residents with cognitive impairment</td>
<td></td>
<td>CMAI (median, range) Agitated and inappropriate behaviours: 15.0 (10–41) vs 15 (10–43) Verbally agitated behaviours: 10 (6–28) vs 11 (6–34) Aggressive behaviours: 7 (7–31) vs 7 (7–32)</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Konetzka et al., 2014)</td>
<td>Retrospective study</td>
<td>Observations (N = 3.9 million) on 809,645 residents with severe cognitive impairment in 4,258 NHs in six states.</td>
<td>Cognitive impairment (CPS = 5 or 6): severe cognitive impairment</td>
<td>NA</td>
</tr>
<tr>
<td>USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Study type</td>
<td>Sample size (people with dementia)</td>
<td>Dementia type/severity</td>
<td>Behavioural and psychological symptoms of dementia</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>------------------------------------</td>
<td>------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>(Kuske et al., 2009) Germany</td>
<td>Cluster-randomised controlled trial</td>
<td>321 residents from six NHs</td>
<td>Cognitive impairment: CDR score ≥ 1 (mild to severe dementia)</td>
<td>NA</td>
</tr>
<tr>
<td>(Lin et al., 2009) Taiwan</td>
<td>Cross-sectional study</td>
<td>375 residents with dementia living in eight dementia special care units</td>
<td>Cognitive impairment: Agitated: MMSE 6.02 ± 6.36 Not agitated: MMSE 8.78 ± 7.05</td>
<td>CMAI score &gt; 35 was found in 163 (43.5%) subjects, who were classified as having agitated behaviour.</td>
</tr>
<tr>
<td>(Luo et al., 2010) USA</td>
<td>Cross-sectional study</td>
<td>6,234 residents aged 65 years or older and with a diagnosis of AD or other dementia</td>
<td>AD or other dementia</td>
<td>NA</td>
</tr>
<tr>
<td>(Luo et al., 2011) USA</td>
<td>Cross-sectional study</td>
<td>6,576 Residents with AD or dementia and 6,759 residents without AD or dementia</td>
<td>AD or other dementia</td>
<td>NA</td>
</tr>
<tr>
<td>(Mamun &amp; Lim, 2005) Singapore</td>
<td>Cross-sectional study</td>
<td>390 residents aged &gt;65 years from 3 nursing homes</td>
<td>187 residents had dementia</td>
<td>93 residents had behavioural problems: Wandering 22 (23.7%) Shouting 34 (36.6%) Injury to self 29 (31.2%) Injury to others 8 (8.6%)</td>
</tr>
<tr>
<td>(Oye et al., 2017) Norway</td>
<td>Observations and interviews</td>
<td>Ethnographic investigation with residents with dementia and staff in 3 NHs</td>
<td>Residents living with dementia in nursing homes</td>
<td>NA</td>
</tr>
<tr>
<td>Source</td>
<td>Study type</td>
<td>Sample size (people with dementia)</td>
<td>Dementia type/severity</td>
<td>Behavioural and psychological symptoms of dementia</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------</td>
<td>------------------------------------</td>
<td>------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
</tbody>
</table>
| (Pellfolk et al., 2010) Sweden  | Cluster-randomised controlled trial | 355 residents with dementia from 40 care units | Cognitive impairment (The Gottfries cognitive scale, range 0–27): Intervention: 10.4±7.1  
Control: 10.0±7.4 | Behavioral index (range 0–75):  
Intervention: 10.4±7.3  
Control: 10.6±7.6 |
| (Putman & Wang, 2007) USA      | Quasi-experimental study  | 16 long-term care residents with dementia | A MMSE score of 10-25 and a GDS score of severe cognitive impairment. | Participants had a score of at least 1 and a severity of 5 on the CMAI |
| (Selbaek et al., 2016) Norway   | Longitudinal study       | 1,163 nursing home patients in 4 Norwegian counties | Dementia (CDR ≥1) was present in 932 (80.4%) patients. | NPI-NH:  
Psychosis subsyndrome: 2.8±5.1  
Agitation subsyndrome: 5.8±8.0  
Affective subsyndrome: 3.5±5.3  
Apathy: 2.2±3.7 |
| (Te Boekhorst et al., 2009) Netherlands | Quasi-experimental study  | 67 residents with dementia in 19 group living homes and 97 residents with dementia in seven traditional nursing homes | MMSE:  
Group living homes: 15.4 (13.5–17.3)  
Traditional nursing homes: 10.3 (8.3–12.3) | NPI-Q:  
Group living homes: 12.1 (10.5–13.8)  
Traditional nursing homes: 11.7 (10.9–12.8) |
| (Te Boekhorst et al., 2013) Netherlands | Longitudinal study       | 192 residents with surveillance technology (n=170) or physical restraints (n=22). | GDS:  
Physical restraints: 6±0.6  
Surveillance technology: 5±1.1 | NPI-Q:  
Physical restraints: 11.9±6.4  
Surveillance technology: 11.9±7.4 |
<table>
<thead>
<tr>
<th>Source</th>
<th>Study type</th>
<th>Sample size (people with dementia)</th>
<th>Dementia type/severity</th>
<th>Behavioural and psychological symptoms of dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Testad et al., 2005) Norway</td>
<td>Randomised controlled trial</td>
<td>151 residents with dementia in in four public nursing and residential homes</td>
<td>CDR stage: Intervention: 2.0±1.0 Control: 2.2±0.9</td>
<td>BARS: Intervention: 16.8 (10–42) Control: 17.3 (10–40)</td>
</tr>
<tr>
<td>(Testad et al., 2010) Norway</td>
<td>Randomised controlled trial</td>
<td>145 nursing home residents with dementia</td>
<td>FAST stage: Intervention: 6 ±1.0 Control: 6±3.25</td>
<td>CMAI: Intervention: 38±17 Control: 33±14.5</td>
</tr>
<tr>
<td>(Testad et al., 2016) Norway</td>
<td>Cluster-randomised controlled trial</td>
<td>274 residents with dementia from 24 care homes</td>
<td>CDR sum of box score: Intervention: 12.2±4.8 Control: 12.6±4.2</td>
<td>CMAI: Intervention: 40.2±11.7 Control: 45.3±14.3</td>
</tr>
<tr>
<td>(Verbeek et al., 2014) Netherlands</td>
<td>Quasi-experimental study</td>
<td>259 residents with dementia from small-scale living facilities (n=124) and traditional psychogeriatric wards (n=135)</td>
<td>MMSE: Smalls-scale: 11.1±7 Traditional wards: 10.5±6.6</td>
<td>CMAI: Non-aggressive behaviour: 10.75±5.72 vs 10.50±5.85 Aggressive behaviour: 10.47±4.93 vs 11.53±5.54 Verbally agitated behaviour: 7.90±5.23 vs 7.28±3.92</td>
</tr>
<tr>
<td>(Voyer et al., 2011) Canada</td>
<td>Cross-sectional study</td>
<td>155 long-term-care residents with dementia</td>
<td>Severity of dementia: Mild: 5 (3.2%) Moderate: 113 (72.9%) Severe: 37 (23.9%)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Abbreviations: NA, Not Available; AD, Alzheimer’s Disease; MMSE, Mini-Mental State Examination; CPS, Cognitive Performance Scale; LTCFs, Long-term Care Facilities; DSS, Dementia Screening Scale; CMAI, Cohen-Mansfield Agitation Inventory; NHs, Nursing Homes; CDR, Clinical Dementia Rating; GDS, Global Deterioration Scale;
CDR, Clinical Dementia Rating scale; NPI-NH, the Neuropsychiatric Inventory-Nursing Home Version; NPI-Q, the Neuropsychiatric Inventory-Questionnaire; BARS, Brief Agitation Rating Scale; FAST, Functional Assessment Staging.
Table 3 Characteristics and outcomes of included studies (n=23)

<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Allen et al., 2005)</td>
<td>To examine group differences in bed restraint among agitated nursing home residents who died during a 6-month clinical trial compared with residents who did not die during the trial.</td>
<td>physical restraint</td>
<td>Residents who died displayed almost twice as much time restrained in bed during observation time in comparison with residents who did not die during the clinical trial.</td>
</tr>
<tr>
<td>(Cassie &amp; Cassie, 2013)</td>
<td>To determine if black residents were more susceptible to the use of physical restraints.</td>
<td>bed rails, side rails, trunk restraints</td>
<td>Black residents are more likely to be physically restrained than white residents after controlling for characteristics such as dementia.</td>
</tr>
</tbody>
</table>
| (Foebel et al., 2016)   | To explore antipsychotic (AP) medications and physical restraint use and their effects on physical function and cognition in older nursing home residents with dementia. | bed rails, chair restraints, trunk restraints | • 169 (31.8%) were physically restrained;  
• 45% were restrained with trunk restraints and 55% by chair restraints;  
• The rate of AP medication use was strongly correlated to physical restraint use;  
• ADL decline was highest in the group receiving both AP medications and physical restraints;  
• The group restrained with both physical restraints and AP medications had the highest frequency of cognitive decline. |
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Freeman et al., 2017) Canada | To examine the role of physical restraint use, use of antipsychotic medications and engagement in social activities to affect change in cognitive status and drive cognitive decline among residents stratified based on the presence/absence of diagnosis of dementia. | • trunk restraint  
• limb restraint  
• chair prevents rising  
• Use of full bed rails and side rails were not included | • Residents with dementia were more likely to have one or more physical restraint;  
• More than one in five residents with a diagnosis of dementia who were restrained showed cognitive decline compared with who were not physically restrained;  
• Residents with dementia showed an increased risk for cognitive decline if they had one or more physical restraints. |
| (Huizing et al., 2006) Netherlands | To investigate the short-term effects of the intervention of education and consultation with a nurse specialist on the use of physical restraints.  
• Duration: 2 months  
• Content: the decision-making process towards restraint use, the effects and consequences of restraint use, strategies to analyse risk behaviour of residents and alternatives for restraints.  
• Staff: nurses | Any devices with limitation on an individual’s freedom of movement:  
• bilateral bed rail  
• sleep suit  
• belt in bed  
• belt in chair  
• chair with a table  
• chair with a board  
• special sheet  
• safe seat  
• vest with belt  
• bedroom door locked  
• deep or overturned chair  
• infrared system | • Physical restraints were used with 85 (59%) residents at baseline.  
• The most frequently used restraints were bilateral bed rails (57%);  
• Residents (n = 145) were restrained once (17%), twice (9%), three (6%) or four times (27%) a day, with a mean of 1.59 a day;  
• Restraints were used most often at night (57%) compared to restraint use in the morning (32%), afternoon (32%) and evening (39%);  
• Restraint use did not change significantly over time in the experimental group compared to significant increased use in the control group. |
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Koczy et al., 2011) Germany | To evaluate the effectiveness of a multifactorial intervention with case consultation to reduce the use of physical restraints | - use of belts tied to a chair or bed  
- chairs with fixed tables  
- bed rails were not included | - Nearly 70% of the 333 restrained residents;  
- The probability of being free of restraints was more than twice as high in the IG as in the CG;  
- A reduction of restraint use of at least 75%, 50%, or 25% was also achieved approximately twice as often in the IG as in the CG. |
| (Konetzka et al., 2014) USA   | To assess whether reductions in physical restraint use associated with quality reporting may have had the unintended consequence of increasing antipsychotic use. | - daily use of physical restraints in the previous 7 days | In residents with severe cognitive impairment, a marked increase in antipsychotic use accompanied the decline in physical restraint use. |
| (Kuske et al., 2009) Germany  | To examine the effectiveness of the training intervention to improve the interaction between caregivers and residents | Any kind of physical restraint:  
- bed rails  
- belts in bed  
- belts in chairs | - The most frequently used restraint type were bedrails;  
- There was a significant difference in use of physical restraints between the IG and the CG and between the IG and the RG. |

This article is protected by copyright. All rights reserved
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Lin et al., 2009) Taiwan | To investigate whether the interaction effect between restraint and functional ability and single ability during activities of daily living can predict agitation | • being restrained  
• restraint time                                                                                                          | Subjects being restrained had a higher occurrence of agitated behaviours.                                                                          |
| (Luo et al., 2010) USA | To compare the rates of specialized care for residents with dementia in SCUs and other NH units and examine the associations of SCU residents with the process of care (e.g., physical restraints). | • trunk restraints  
• limb restraints  
• chairs that prevent rising  
• bed rails  
• side rails                                                                                                           | • There was little difference in using trunk/limb restraints;  
• SCU residents were more likely to have chair restraints;  
• SCU residents were less likely to have bed rails than those in regular units and those in NHs without an SCU.  |
| (Luo et al., 2011) USA | To estimate the use of different types of physical restraints and assess their associations to falls and injuries among residents with and without AD or dementia in US nursing | • trunk restraints  
• limb restraints  
• chairs that prevent rising  
• bed rails  
• side rails                                                                                                           | • Residents with dementia were more likely to be physically restrained;  
• Residents with dementia are less likely to have either full bed rails or side rails with an overall lower rate of either type of bed rail;  
• The use of trunk restraints in dementia residents was associated with                                   |
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Mamun & Lim, 2005) Singapore | To assess the indication, use and complications related to physical restraints in Singapore nursing homes. | Types of restraints • One upper extremity • Both upper extremity • Body • Mitten | a higher risk of falls and the use of full bed rails was associated with a lower risk of falls;  
• The use of trunk restraints in dementia residents was associated with a higher risk of fractures.  
• Out of 91 dementia residents, 59 (64.8%) were on physical restraints;  
• Diagnosis of dementia is a risk factor that may predict the use of restraints in nursing home residents;  
• 20 (22%) residents were restrained to prevent dislodgement of the feeding tube, 17 (18.7%) were restrained to prevent falls and 8 (8.8%) were restrained for agitation.                                                                                                                                                  |
| (Øye et al., 2017) Norway     | To examine contextual factors in relation to the education intervention and use of restraint. | The frequency of use of restraints assessed by a standardised interview of 25 items:  
• physical restraint  
• electronic surveillance  
• force or pressure in medical examination or treatment  
• any force or pressure in ADL | • Interactional restraint was the most frequently used restraint;  
• The use of restraint related to the characteristics of individual residents and organisational conditions.                                                                                                                                                                                                                       |
### Source

<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Pellfolk et al., 2010) Sweden | To evaluate the effects of a restraint minimisation education program on staff knowledge and attitudes and use of physical restraints.  
  • Duration: 6 months  
  • Contents: dementia, delirium, falls, physical restraints, complications of dementia and caring for people with dementia  
  • Staff: nursing staff | Any technical device that inhibits a person’s free physical movement, excluding bedrails. | • Residents in the intervention group were less likely to be physically restrained at follow-up. |
| (Putman & Wang, 2007) USA | The Closing Group intervention (recreation activity) was developed to decrease restraint use and antipsychotic drug use. | Not clearly defined | • Nearly half of the mean-days did not require restraints - shown a positive effect on restraint reduction. |
| (Selbaek et al., 2016) Norway | To assess the long-term mortality risk associated with antipsychotic drug (AP) use in nursing homes with 5 assessments over a 75-month follow-up period.  
  • mechanical  
  • nonmechanical  
  • electronic surveillance  
  • force or pressure in medical examination or treatment  
  • force or pressure in the performance of activities of daily living | - mechanical  
- nonmechanical  
- electronic surveillance  
- force or pressure in medical examination or treatment  
- force or pressure in the performance of activities of daily living | • 357 (30.7%) residents were restrained;  
• The use of restraints was associated with mortality risk. |
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>(te Boekhorst et al., 2009)</td>
<td>To investigate the effects of group living homes on quality of life and functioning of people with dementia.</td>
<td>• Nursing home physicians or psychologists measured whether residents prescribed one or more physical restraints.</td>
<td>• A significant difference was found in the use of physical restraints (10% vs 50%).</td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Te Boekhorst et al., 2013)</td>
<td>To explore whether nursing-home residents with dementia subjected to surveillance technology had a better quality of life scores for mood, behavioural and societal dimensions than residents with physical restraints.</td>
<td>• deep chairs • chairs with a tabletop • chairs placed against a table and fixation in bed • chairs with belts • restraining blankets</td>
<td>• Surveillance technology was predominantly used in residents with medium ADL dependency while physical restraints were predominantly used in residents with high ADL dependency.</td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Testad et al., 2005)</td>
<td>To reduce problem behaviours and the use of restraint in demented patients using a staff training program as an intervention</td>
<td>The frequency of use of restraints assessed by a standardised interview of 25 items: • physical restraint • electronic surveillance • force or pressure in medical examination or treatment • any force or pressure in ADL</td>
<td>• The use of restraint was significantly lower in the intervention group compared to the control group.</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Aim</td>
<td>Definition (a)</td>
<td>Key findings that relate to objectives</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(Testad et al., 2010) Norway</td>
<td>To determine whether an education and supervision intervention could reduce the use of restraints</td>
<td>The frequency of use of restraints assessed by a standardised interview of 25 items: physical restraint, electronic surveillance, force or pressure in medical examination or treatment, any force or pressure in ADL</td>
<td>• The change in the interaction restraint use over time differed significantly between two groups, but the beneficial effect was not sustained at the 12-month assessment.</td>
</tr>
<tr>
<td>(Testad et al., 2016) Norway</td>
<td>To evaluate the effectiveness of a tailored 7-month training intervention in reducing use of restraint</td>
<td>The frequency of use of restraints assessed by a standardised interview of 25 items: physical restraint, electronic surveillance, force or pressure in medical examination or treatment, any force or pressure in ADL</td>
<td>• The most frequent form of restraint was the use of force in showering or bathing situations;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Use of restraint was significantly reduced in both the intervention group and the control group despite unexpected low baseline, with a tendency to a greater reduction in the control group.</td>
</tr>
</tbody>
</table>

This article is protected by copyright. All rights reserved
<table>
<thead>
<tr>
<th>Source</th>
<th>Aim</th>
<th>Definition (a)</th>
<th>Key findings that relate to objectives</th>
</tr>
</thead>
</table>
| (Verbeek et al., 2014)      | To explore the effects of small-scale living facilities on the behaviour of residents with dementia and the use of physical restraints and psychotropic drugs. | Five types of physical restraints:  
  - belts (in bed and/or chair),  
  - (wheel) chair with a locked table  
  - chair on board, deep or overturned/reclined  
  - (wheel)chair (i.e. chair preventing from raising), sleep suits  
  - bilateral, fully enclosed bedrails | • Significantly fewer physical restraints and psychotropic drugs were used in small-scale living facilities compared with traditional wards. |
| (Voyer et al., 2011)        | To investigate precipitating factors associated with delirium.       | • abdominal belt  
  • fixed tray table  
  • rails on both sides of bed  
  • any other type of mechanical means applied to limit a resident's mobility | • 79 (51.3%) residents were restrained;  
  • Use of physical restraints was the factor most associated with delirium that increases the odds of being delirious by 464%. |

Abbreviations: LTCFs, long-term care facilities; MMSE, Mini-Mental State Examination; AP, antipsychotic; SCU, special care unit; AD, Alzheimer’s disease; NH, nursing home; ADL, activities of daily living; IG, intervention group; CG, control group; RG, relaxation group; CI, confidence interval; Outcomes related to the objectives: (a) definition; (b) prevalence; (c) type; (d) frequency; (e) reason; (f) risk factor; (g) decision process; (h) adverse events; and (i) interventions to reduce restraint use (* indicates favourable effects for intervention group)
FIGURE 1 PRISMA flow diagram

Screening

- Title and abstracts screened (n=591)

Eligibility

- Full-text articles assessed for eligibility (n=45)
  - Records excluded (n=22)
    - No separate data on participants with dementia (n=15)
    - Outcomes not on restraint use (n=7)

Included

- Studies included in the scoping review (n=23)

Identification

- Database searches (n=1585)
  - CINAHL (n=169)
  - EMBASE (n=273)
  - Medline (n=186)
  - Cochrane Library (n=44)
  - ProQuest (n=65)
  - Web of science (n=241)
  - Scopus (n=324)
  - PubMed (n=188)
  - PsycINFO (n=95)

- Reference tracking (n=6)

Records after duplicates removed (n=591)

Records excluded (n=546)