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## The patterns in psychotropic drug prescriptions among older people with dementia

Du, Jiamin

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# **Chapter 1**

## **General Introduction**

## **Epidemiology of dementia**

Dementia is a syndrome relating to impaired abilities to remember, think, or make decisions that interfere with performing daily activities.<sup>1-4</sup> There are many subtypes of dementia with Alzheimer's disease (50%-75%) being the most frequent one, followed by vascular dementia (up to 20%), Lewy body dementia (10%-15%), frontotemporal dementia (2%), mixed dementia, and other subtypes.<sup>2,5</sup> In this thesis, however, these subtypes will not be distinguished. The focus will be on late-onset dementia because the majority of cases arise at high age (80+), and the disease progression and care demand differ between young-onset dementia and late-onset dementia.<sup>6</sup>

Age is the main risk factor for dementia. The prevalence of dementia was 2% in people aged 60 to 69 years, 5% in people aged 70 to 79 years, 15% in people aged 80 to 89 years, and 35% in people aged 90 to 99 years.<sup>7</sup> Despite age, geography also influences prevalence of dementia. The prevalence rate is 11% in Europe and North America, higher than that in South America (6%), Asia (5%), and Africa (2%).<sup>7</sup> Research has suggested that the prevalence and incidence of dementia remained stable or decreased over the past decades.<sup>8,9</sup> However, due to population aging, the total number of people with dementia remains increasing. In 2019, about 57 million people lived with dementia globally, and this number is projected to increase to 153 million in 2050.<sup>10</sup> Dementia is currently the seventh leading cause of death among all diseases and one of the major causes of disability and dependency among older people globally.<sup>11</sup> In the Netherlands, about 0.29 million persons have dementia. The number will explode to 0.52 million in 2040.<sup>12</sup> In 2017, the prevalence of dementia in different age groups (65 to 74, 75 to 84, 85 and older) were 14%, 36%, and 42%, respectively.<sup>13</sup> The expected high prevalence of dementia will make it the leading cause of death in the Netherlands, and put the greatest financial burden on society.<sup>12</sup>

In general, people with dementia have higher mortality rate than those without dementia, with a hazard ratio of 5.9.<sup>14</sup> The survival time since diagnosis of dementia is in average 4.8 years.<sup>14</sup> A Dutch study reported that the median survival time for community-dwelling people from diagnosis of dementia was 5.0 years.<sup>15</sup> The aetiology of dementia is essentially unknown, and important determinants such as age and family history of dementia are not amenable to intervention. Since not all dementia will be preventable, timely diagnosis and sufficient support are essential to slow down the deterioration of dementia.

## **Common symptoms of dementia**

### **Cognitive impairment**

Cognitive impairment is a sign of dementia. Patients with cognitive impairment may suffer from memory loss, concentration problems, difficulty in handling daily activities, and mood

and personality changes. Levels of cognitive functioning are used to assess the severity of dementia in many instruments, such as the Global Deterioration Scale, the Cognitive Performance Scale, and the Clinical Dementia Rating.<sup>16-18</sup>

## Neuropsychiatric symptoms

During the course of dementia, over 90% people will experience neuropsychiatric symptoms (NPSs).<sup>19</sup> NPSs are non-cognitive disturbances, which are also known as behavioural and psychological symptoms of dementia.<sup>19</sup> One of the widely used assessment instruments is the Neuropsychiatric Inventory (NPI), which evaluates 12 neuropsychiatric disturbances common in dementia: delusions, hallucinations, agitation, dysphoria, anxiety, apathy, irritability, euphoria, disinhibition, aberrant motor behaviour, sleep and night-time behaviour change, and appetite and eating change.<sup>20</sup> The first ten disorders are behavioural symptoms, and the last two are neurovegetative symptoms. These symptoms can appear individually and simultaneously. There are four suggested symptom groups: affective symptoms (depression and anxiety), psychosis (delusion and hallucination), hyperactivity (irritability and aggression), and euphoria.<sup>21</sup> Other NPSs did not show consistent results.<sup>21</sup> About 20% of people already have severe NPSs (NPI total  $\geq 36$ ) at the diagnosis of dementia.<sup>22</sup> During a five-year follow-up since diagnosis of dementia onwards, all patients experienced NPSs and half of them had severe NPSs.<sup>22</sup> A recently published Spanish study reported the overall prevalence of NPSs is 95%.<sup>23</sup> For nursing home residents with dementia, the prevalence of having at least one NPS is 82%.<sup>24</sup> Apathy is the most prevalent NPS.<sup>23,24</sup> For community-dwelling older people with dementia, the prevalence of NPSs is over 90%.<sup>22,25</sup> In addition to high prevalence, another characteristic of NPSs is that they fluctuate over time at the individual level.<sup>22,26</sup> Therefore, it is important to monitor NPSs and adjust the treatments accordingly.

## Impact of cognitive impairment and neuropsychiatric symptoms

Cognitive impairment and NPSs have a negative impact on patients and their caregivers. Studies report that cognitive impairment and more frequent/severe NPSs are associated with decreased daily functioning.<sup>27-29</sup> NPSs and dependence on daily activities may lead to a decline in patients' quality of life and increase caregiver burden.<sup>27,30-33</sup> A longitudinal study showed that caregivers who receive no home services, such as domestic assistance, community nursing, dementia-specific centre-based day care, and social support, experience an increasing burden over time.<sup>33,34</sup> The caregiver burden worsens the caregiver-patient relationship, which increases the frequency and severity of NPSs.<sup>35</sup> Patients with NPSs have greater use of healthcare resources, such as hospitalizations and consultations.<sup>32</sup> Patients' cognitive impairment, NPSs, and poor daily functioning, and caregiver burden are risk factors of nursing home admission.<sup>36</sup> Thus, it is essential to treat these symptoms and support caregivers timely and sufficiently.

## **Treatments of cognitive impairment and neuropsychiatric symptoms**

An individualised treatment plan is preferred, especially for NPSs because the causes of NPSs are complex and vary from person to person. The occurrence of NPSs is related to three categories of impact factors, namely, patients' factors, caregivers' factors, and environmental factors.<sup>26</sup> The patients' factors include neurobiological underpinnings, acute medical conditions (like pain, undiagnosed illnesses, and side effects of drugs or drug-drug interactions), unmet needs, pre-existing personality and psychiatric illnesses.<sup>26</sup> Caregivers' related factors are high psychological distress, low physical health, negative communication styles and lack of coping abilities and strategies.<sup>26</sup> Environmental factors are external stressors, such as changes in the physical and social environment, changes in daily routines, inappropriate stimuli, and demands that exceed patients' functional ability.<sup>26</sup> A thorough assessment of patient's symptoms and the causes is essential before formulating a treatment plan. Non-pharmacologic treatments are recommended as first-line therapy for NPSs by numerous guidelines and medical organizations.<sup>37-41</sup> Psychotropic drugs should only be used after non-pharmacological therapies failed to reduce the symptoms, or if the symptom is severe or harmful to others.<sup>37-41</sup>

### **Non-pharmacological treatments**

Non-pharmacological interventions are used to increase patients' cognition, independence and wellbeing, address their NPSs, and support caregivers with coping strategies. The interventions include cognitive stimulation therapy, reminiscence therapy, exercises and physical activities, occupational therapy, functional analysis-based interventions, music therapy, psychoeducational interventions for caregivers, the development of dementia-friendly environment, case managements, amongst others.<sup>39,40,42,43</sup> Despite the potential advantages of non-pharmacological treatments, the current evidences on their efficacy are of low quality and hold inconclusive results.<sup>38,41,44-46</sup> Additionally, there are barriers to the utilisation of non-pharmacological treatments, such as lack of medical staff and resources, and low self-efficacy of general practitioners (GPs).<sup>47,48</sup> As a result, GPs may tend to prioritise pharmacological treatments over non-pharmacological treatments.

### **Pharmacological treatments**

There are five subgroups of psychotropic drugs frequently prescribed in people with dementia, namely, antipsychotics, anxiolytics, hypnotics/sedatives, antidepressants, and anti-dementia drugs. The first four subgroups of psychotropic drugs are used to manage NPSs. Anti-dementia drugs aim to slow down cognitive deterioration.

Antipsychotics are used to treat severe agitation, aggression and psychotic behaviour (delusions and hallucinations). The British National Institute for Health and Care Excellence (NICE) dementia guideline advises to commence antipsychotic medication at the minimum

effective dose for the shortest conceivable duration.<sup>40</sup> It is essential to perform regular evaluations of the patient's symptoms, every six weeks, with the aim of assessing the feasibility of tapering the antipsychotics.<sup>40</sup> The Dutch guideline suggests to taper off the dose of antipsychotics no later than 3 months.<sup>49</sup> Antidepressants are prescribed to treat depression in dementia. But the effectiveness of antidepressants in dementia is not proven.<sup>50</sup> The Dutch guideline suggests selective serotonin reuptake inhibitors as the first choice.<sup>62</sup> If regular assessment shows that there is no or insufficient effect after six weeks, GPs should switch to another types of antidepressant drug.<sup>62</sup> Three months is the maximum prescription period for antidepressants as well.<sup>49,50</sup> Anxious behaviour is an indication for anxiolytics. Sleep disturbances and night time behaviour disorders are indications for hypnotics and sedatives. Anxiolytics and hypnotics should not be used for more than two to four weeks.<sup>49</sup>

Cognitive enhancer drugs include acetylcholinesterase inhibitors (rivastigmine, galantamine, donepezil) and memantine. The NICE dementia guideline recommends cholinesterase inhibitors for the treatment of mild to moderate Alzheimer's disease and memantine for the treatment of moderate to severe Alzheimer's disease.<sup>40</sup> Anti-dementia drugs should not be prescribed to people with frontotemporal dementia.<sup>40</sup> Furthermore, the Dutch Association of General Practitioners' guideline on dementia concludes that anti-dementia drugs have limited effectiveness and therefore does not advocate for their prescriptions by GPs.<sup>51</sup> Clinical guidelines did not have a consistent conclusion about when anti-dementia drugs should be stopped.<sup>52</sup>

The efficacy of psychotropic drugs for NPSs is slightly or negligible.<sup>53-55</sup> In the meantime, psychotropic drugs have many side effects. For example, antipsychotics may increase extrapyramidal symptoms, the risk of cerebrovascular events and mortality, while antidepressants are associated with the risks of falls and fractures.<sup>50,56</sup> In 2008, the US FDA issued that both conventional and atypical antipsychotics were associated with higher risk of mortality in older people with dementia.<sup>57</sup> Benzodiazepines are associated with accelerated cognitive deterioration<sup>58</sup>. There is evidence that anti-dementia drugs have a protective effect against cognitive decline and mortality, but they may cause adverse events like gastrointestinal symptoms, psychiatric symptoms, and dizziness.<sup>59,60</sup> So psychotropic drugs should be prescribed cautiously and monitored closely.<sup>40,61</sup>

## Principles of prescribing psychotropic drugs

According to guidelines such as the NICE dementia guideline from the UK, the Verenso 'problem behaviour in people with dementia' guideline from the Netherlands, there are several principles for the prescription of psychotropic drugs.<sup>38,40-42,49,62,63</sup> First, psychotropic drugs should only be considered when the non-pharmacological treatments turned out to be ineffective in controlling cognitive function or NPSs, or the symptoms are severe and cause distress to themselves or caregivers. Second, the initial prescription should start from the lowest dose and last for the shortest period. Third, regular assessment of the patient's symptoms is necessary, to monitor the

effectiveness and side effects of the drug. Forth, discontinuation should be considered when there is no benefits or harms over benefit. Fifth, continuously providing non-pharmacological support to patients whether they are taking psychotropic drugs or after the withdrawal of the psychotropic drugs. Furthermore, physicians are encouraged to involve patients and their informal caregivers in decision-making on the use of psychotropic drugs.

### **Attitudes of medical staff and informal caregivers towards psychotropic drugs**

Older people with dementia reside in either a community, a residential care home, or a nursing home, and are reliant on others for assistance with daily activities. In communities, informal caregivers are often the primary care providers. They can get support from healthcare professionals, social workers, case managers, and various services, such as day centres, and respite care.<sup>64-67</sup> Conversely, in residential care home and nursing homes, formal caregivers and healthcare professionals are responsible for the care of residents, with the possibility of involvement from family members or other relatives.<sup>68</sup> In the context of prescribing psychotropic drugs for older people with dementia, it is common practice for GPs and elderly care physicians to seek input from patients or their caregivers regarding their willingness to utilise such medication.<sup>40,69</sup> As many patients with dementia may lack decision-making capacity, the attitudes of caregivers and the opinions of medical staff are paramount in determining the initiation and cessation of psychotropic drug use.

Prior studies revealed that physicians, nurses, and informal caregivers may have positive attitudes towards psychotropic drugs effectiveness, and rely on psychotropic drugs to treat NPSs.<sup>48,70-78</sup> First of all, physicians endorse both non-pharmacological and pharmacological treatments.<sup>48,70,71</sup> Moreover, GPs and physicians reported feeling pressured by nurses and informal caregivers to prescribe psychotropic drugs.<sup>48,70,71</sup> Secondly, prior studies showed physicians, nurses and informal caregivers focus more on the benefit of antipsychotics or psychotropic drugs than their adverse effects.<sup>48,70,72-75</sup> Besides, medical staff also consider the effect of antipsychotics on reducing staff distress, workloads, and psychological burdens in care homes.<sup>74,75</sup> As for informal caregivers, a British study reported that 76% of family members of nursing home residents felt they were not involved throughout in antipsychotic initiation, and 83% of them felt not sufficiently informed about the side effects and benefits.<sup>76</sup> A Dutch study revealed 56% of informal caregivers feel not sufficiently informed about the side effects.<sup>70</sup> Third, physicians, nurses, and informal caregivers are often hesitant to discontinue psychotropic drugs.<sup>48,75,77,78</sup>

Their positive attitudes towards psychotropics drugs may be due to inadequate knowledge, a lack of access to non-pharmacological interventions, a poor nurse-to-patient ratio, high workloads in nursing homes, and insufficient collaboration among medical staff and communication with informal caregivers.<sup>47,48,70,71,79</sup> However, the emphasis on fewer and

short-term psychotropic drug prescription from national and local policies, guidelines, and dementia associations may change people's attitudes and physicians' prescription practices gradually.<sup>45–47,49</sup>

## Psychotropic drug prescriptions in practice

### The prevalence of psychotropic drug prescriptions

The guidelines are not adequately adhered to in clinical practice. For example, an American study reported that among patients with dementia and agitation, just 37.8% of nursing home residents and 21.3% of community-dwelling people had non-pharmacological treatments before the initiation of antipsychotics.<sup>80</sup> Additionally, psychotropic drug prescriptions are highly prevalent among older people with dementia, either residing in nursing homes or communities. In European nursing home residents, the prevalence of antipsychotic prescriptions varied from 12% to 59%, and antidepressant prescriptions from 19% to 68%.<sup>81</sup> According to a study conducted in France, community-dwelling older people utilised a lower quantity of antipsychotics (14%), anxiolytics (35%), and hypnotics (16%) in comparison to those residing in nursing homes.<sup>82</sup> However, the consumption of antidepressants (69%) was comparable between the two groups, while anti-dementia drugs (62%) were used in higher proportions by community-dwelling seniors.<sup>82</sup> For American community-dwelling older people, the prevalence of prescriptions for antipsychotics ranges from 10.9% to 21.6%, for antidepressants from 23.5% to 49.8%, for anxiolytics 26.8%, and for hypnotics/sedatives 19.5%.<sup>83,84</sup> The prevalence of psychotropic drug prescriptions in European community-dwelling older people with incident dementia was as follow, antipsychotics ranging from 9% to 17%, antidepressants from 17% to 22%, anxiolytics from 5% to 21%, hypnotics 10%, and anti-dementia drugs 15%.<sup>85–87</sup> Furthermore, long-term use and polypharmacy are common in psychotropic drugs.<sup>86,88,89</sup>

### The patterns in psychotropic drug prescriptions

The study designs related to the patterns in psychotropic drug prescriptions can be categorized into three primary types: those that examine patterns in individuals with prevalent dementia, those that investigate patterns in individuals with incident dementia, and those that analyse patterns from the diagnosis of dementia onward.

The majority of studies exploring patterns in psychotropic drug prescriptions in people with prevalent dementia have focused on either the national population or nursing home residents.<sup>90–95</sup> Among national population with prevalent dementia, the prescription of antipsychotics declines, while antidepressants rise.<sup>90–92</sup> However, the patterns in anxiolytics and hypnotics/sedatives are inconsistent.<sup>90–92</sup> In the French national population, a reduction in antipsychotics was observed between 2003 to 2011.<sup>90</sup> However, during the same period,



there were increases in antidepressants and benzodiazepines.<sup>90</sup> Similarly, in Danish residents, a decrease in antipsychotics and an increase in antidepressants were reported between 2000 and 2012, alongside declines in anxiolytics and hypnotics/sedatives.<sup>91</sup> Furthermore, in England, there were decreases in antipsychotics and hypnotics/sedatives from 2005 to 2015, while there were increases in antidepressants and anti-dementia drugs, and anxiolytics stabilised.<sup>92</sup> Similarly, for nursing home residents with prevalent dementia, the prescription of antipsychotics decreases, while other psychotropic drugs do not have consistent patterns.<sup>93–95</sup>

Studies about the patterns in psychotropic drugs among people with incident dementia or during the progression of dementia have predominantly been conducted within the overall population or community-dwelling people. A Spanish study indicated that the consumption of anti-dementia drugs (acetylcholinesterase inhibitors, AChEIs) at the diagnosis of dementia increased from 2007 to 2014, rising from 45% to 63%.<sup>96</sup> Over the course of a seven-year follow-up period after the diagnosis of dementia, there was a decline in the utilisation of AChEIs, while there was an initial increase followed by a subsequent decrease in the utilisation of memantine and the combined use of AChEIs and memantine.<sup>96</sup> A French study showed that in general practice, prescriptions of anti-dementia drugs and antidepressants strongly declined during a ten-year follow-up after the diagnosis of Alzheimer's disease, while antipsychotics increased.<sup>97</sup> A study conducted in the UK identified a shift in the patterns in psychotropic drugs prescribed by GPs at the time of dementia diagnosis between 1995 and 2011. Specifically, the prescription of antipsychotics decreased from 20% to 7%, while the hypnotics decreased from 13% to 8%. Furthermore, the prescription of anxiolytics increased from 3% to 4%, and antidepressants rose from 11% to 26%.<sup>85</sup> Additionally, the utilisation or prescription of antipsychotics and antidepressants increases steadily from the diagnosis of dementia onwards.<sup>85–87</sup>

In summary, studies on prevalent dementia suggest a decline in antipsychotic prescriptions over time, sometimes accompanied by a compensatory increase in other psychotropic drugs. However, the patterns in other psychotropic drug prescriptions are inconclusive. Additionally, psychotropic drug prescriptions may increase from the diagnosis of dementia onward due to the deterioration of dementia and the emergence of NPSs.

### **The patterns in psychotropic drug prescriptions matter**

Examining the longitudinal patterns in psychotropic drug prescriptions is vital as it provides insights into both the prevalence and fluctuations in prevalence, which may reflect the impact of issued warnings, updated guidelines, policy changes, and exceptional periods such as pandemics. The unanticipated patterns could prompt medical staff and policy makers to take measures to improve treatments, while the expected patterns serve as confirmation of progress in the right direction. In Germany, the prevalence of antipsychotics in a national population remained stable at around 33% from 2004 to 2009 despite the warnings against

antipsychotics.<sup>98</sup> Differently, the prescription of antipsychotics in France declined between 2004 and 2008, but it was not associated with the warnings issued by the French drug agency in 2004 and 2005, because the decrease occurred prior to the warnings.<sup>90</sup> Similarly as the pattern in France, the antipsychotic prescriptions in Dutch general practice decreased from 13% to 11% before the European Medicines Agency warning in August 2009, and continuously decreased to 8% after the warning, mainly contributed by the decrease in conventional antipsychotics.<sup>99,100</sup> After anti-dementia drugs were removed from the reimbursement list in France in 2018, only 19.5% of patients discontinued anti-dementia drugs.<sup>101</sup> Patients who stopped anti-dementia drugs used more antidepressants, antipsychotics, and anxiolytics than patients who continued.<sup>101</sup> In conclusion, previous studies revealed that the impact of safety warnings and reimbursement policies on psychotropic drug prescriptions was found to be limited, and the patterns in psychotropic drug use varied among different countries, lacking a definitive conclusion.

Additionally, the coronavirus disease 2019 (COVID-19) pandemic broke out in the beginning of 2020, leading to the implementation of social distancing and lockdown measures to curb the spread of the virus. Older people with dementia are a vulnerable group during this period due to increased risk of infection and difficulties accessing healthcare and social services.<sup>102–105</sup> The majority of prior investigations were undertaken during the initial wave of the COVID-19 pandemic and revealed a rise in NPSs.<sup>106–111</sup> Given the prolonged duration of the COVID-19 pandemic, it is imperative to examine its long-term impact on older people with dementia because both healthcare professionals and the general public would have improved coping strategies. However, studies investigating the long-term impact of the pandemic have been limited and inconclusive.<sup>112,113</sup>

## Research gaps

In conclusion, psychotropic drugs are widely prescribed to older people with dementia, with long-term use and polypharmacy being common. In clinical practice, physicians, nurses, and informal caregivers tend to prioritize the benefits of antipsychotics or other psychotropic drugs over their adverse effects, often disregarding established guidelines. However, warnings regarding the side effects of psychotropic drugs, treatment guidelines for dementia and NPSs, advocacy efforts by dementia or Alzheimer's disease committees, changes in reimbursement policies, and the ongoing pandemic may influence physicians, formal and informal caregivers, and patients' attitudes and choices towards pharmacological and non-pharmacological treatments. Over the past decade, some studies explored the patterns in psychotropic drug prescriptions, mainly about antipsychotics, in the general population, nursing home residents, or community-dwelling people. The decrease in antipsychotics is consistent among studies. However, the patterns in other psychotropic drugs differ among studies, which may be because of differences in healthcare systems.

The Dutch long-term care system differs from those of other European countries in the following aspects. First of all, a clear preference is evident for home-based care services over institutional care, with informal care being viewed as a potential substitute for the formal care in the Netherlands.<sup>114</sup> The reform in 2007 aimed at promoting individual responsibility in long-term care.<sup>115</sup> In 2015, the introduction of the “Long-term Care Act” marked a significant policy shift in the Netherlands, from residential care to non-residential care.<sup>115</sup> It is expected that 92% of the older people aged 75 years and older live in their own house.<sup>114</sup> This trend has presented GPs with heightened challenges in their practice. In the Netherlands, GPs serve as primary gatekeepers for healthcare services and are granted the authority to diagnose dementia and prescribe psychotropic drugs.<sup>41</sup> Secondly, the Dutch training system for skilled personnel in elderly care is well-developed. The Netherlands has established a medical care continuum for the older population, consisting of GPs who provide medical care within the community, elderly care physicians who cater to the needs of institutionalised older people, and clinical geriatricians and other hospital-based medical specialists who attend to older people requiring hospital care.<sup>116</sup> In the 1990s, the “consultative function of nursing homes” was introduced, allowing GPs to seek consultation from elderly care physicians or other professionals for patients dealing with complex care challenges either in their homes or in residential facilities.<sup>116</sup> To further improve the coordination and continuity of care, the Netherlands merged nursing home medicine with community geriatric medicine in 2008 to form a broader medical specialty known as elderly care medicine.<sup>117–120</sup> This medical specialty is designed to train elderly care physicians to not only provide comprehensive care to older people, but also bear the duty of facilitating collaboration, specifically among medical professionals.<sup>118</sup> The other purpose is to help older people live at home for as long as possible.<sup>119,121</sup> Because of these differences in the Dutch long-term care system, it is assumed that the patterns in psychotropic drug prescriptions in the Netherlands might differ from other countries. However, there are limited studies on patterns in psychotropic drug prescriptions in the Netherlands. Consequently, this thesis endeavours to learn these patterns among Dutch older people with dementia.

## **Aims and research questions**

The objective of this thesis is to examine the longitudinal patterns in psychotropic drug prescriptions in Dutch older people with dementia in different population segments. Specifically, one aim is to investigate the patterns in psychotropic drug prescriptions among community-dwelling older people from the time of dementia diagnosis onwards, community-dwelling older people during the COVID-19 pandemic, and nursing home residents with prevalent dementia. The other aim is to examine the likelihood of successful withdrawal from psychotropic drugs.

## The main research questions addressed in this thesis

1. What are the longitudinal patterns in psychotropic drug prescriptions among subpopulations of community-dwelling older people since the diagnosis dementia onwards?
2. What are the longitudinal patterns in psychotropic drug prescriptions and general practice consultations among community-dwelling older people with prevalent dementia during the first two years of the COVID-19 pandemic?
3. What are the longitudinal patterns in psychotropic drug prescriptions among Dutch nursing home residents with prevalent dementia from 2003 to 2018?
4. What is the success of withdrawing psychotropic drugs, in terms of trial completion, in older people with dementia?

## Outline of the thesis

**Chapter 2** uses routinely collected primary care data from the Academic General Practitioner Development Network database to explore the longitudinal patterns in psychotropic drug prescriptions in subpopulations of community-dwelling older people since the diagnosis of dementia onwards.

**Chapter 3** uses routinely collected primary care data from three general practice research networks, covering the years 2019, 2020, and 2021, to investigate the long-term impact of the COVID-19 pandemic on psychotropic drug prescriptions and general practice consultations in community-dwelling older people with prevalent dementia.

**Chapter 4** uses secondary data from nine studies collected in Dutch nursing homes between 2003 and 2018 to investigate the patterns in psychotropic drug prescriptions in nursing home residents with prevalent dementia.

**Chapter 5** is a review with trial completion as the primary outcome, to assess the success of withdrawing psychotropic drugs and how this outcome would complement the results of previous reviews.

**Chapter 6** summarises the main findings of the previous chapters and reflects on the methodological considerations, as well as provides recommendations for clinical practice and future research.

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