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A scoping review of the measurement of depression in older adults with cognitive impairment

Running Head: Measuring depression in older adults

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Abstract

Objectives: Depression and cognitive impairment are disabling conditions that commonly occur together in older adults. The interaction is challenging when choosing appropriate measurement scales. This review aimed to summarise the scales to measure depression symptoms in older people with cognitive impairment, investigating how cognitive impairment is related to the choice of measurement, and how the setting may affect the choice of measurement. **Methods:** A scoping review of literature published between 2015-2021. **Results:** After screening 1580 articles, 26 were included in the review with 11 different measures of depression symptoms identified. The measures mostly commonly used were the Geriatric Depression Scale (GDS), Cornell Scale for Depression in Dementia (CSDD) and the Neuropsychiatric Inventory (NPI-Q). Most studies did not report on the usability of depression scales used with people with cognitive impairment and only two scales (CSDD and NPI-Q, not GDS) have been validated for use with this population. **Conclusions:** Severe cognitive impairment was under-represented in the identified studies, and no association was detected between study setting, cognitive impairment and type of measure used. **Clinical Implications:** Clinicians and researchers should consider both the cognitive status of participants and the setting they live in when choosing a measure of depression symptoms.

Keywords

Depression, cognitive impairment, dementia, scales, scoping review

Introduction

Depression can affect feelings, thoughts, behaviours and physical health, all of which can have a distressing impact on the person's everyday functioning (American Psychiatric Association, 2013). Common symptoms include feelings of intense sadness, being unable to think clearly, loss of interest or pleasure in usual activities, and feeling tired, unable to sleep or loss of appetite (American Psychiatric Association, 2013). It is a common disorder, with estimates of lifetime prevalence in the order of 10%, while in clinical settings, prevalence may be up to 20% (Tolentino & Schmidt, 2018) or up to 44% in residential aged care facilities (RACF; Teresi et al, 2001).

Older adults are not as likely to report altered feelings and are more likely to report cognitive change, physical symptoms, and behavioural symptoms such as loss of interest than are younger adults (Fiske et al, 2009). As a result, depression has been under-recognised in older people including those admitted to hospital (Shastri et al, 2019). Even when recognised, treatment in the form of psychological services can be difficult to access by people living in RACFs (Davison et al., 2017). Nevertheless, it is a treatable condition if assessed adequately (Chau et al., 2019). A major complicating factor in assessing depression in older people is the presence of cognitive impairment which can itself be due to the effects of depression (Reynolds et al, 2019). In older adults, cognitive impairment can range from normal age-related changes to more severe symptoms characteristic of mild cognitive impairment (MCI) or dementia. A recent systematic review and meta-analysis of the prevalence of depression, anxiety and PTSD in people with dementia found that across 120 studies, 25% of participants with dementia also had clinically significant levels of depression symptoms (Kuring et al., 2018). Leung et al (2020) found that 38% of people with dementia had depression symptoms (Leung et al, 2020). Late life depression has been found to be a risk factor for Alzheimer's disease (Saiz-Vasquez et al, 2021; Livingston et al, 2020; Zhao et al, 2022), and dementia is

associated with depressive symptoms (Linneman and Lang, 2020). Some consider the definition of depression and dementia to have intersecting boundaries so the interaction between mood and cognition creates difficulty for psychological assessment in measuring depression symptoms, especially when working in settings where cognitive impairment is common such as RACFs (Bennett & Thomas, 2014; Wilkins et al., 2009). For example, people living in RACFs may not have access to the same activities they used to engage in and physical health conditions may complicate assessment as symptoms such as lack of sleep may be due to other factors (Chau et al., 2019).

The first step towards treatment is accurate assessment to allow for effective interventions to be implemented. Psychological assessment can rely on diagnostic systems or screening scales, some of which offer cut-off points to signify depression. While screening tests detect symptoms associated with a disorder, diagnostic systems confirm the presence or absence of a disorder (Maurer et al, 2018). The two diagnostic systems, DSM-5 and ICD-10 specify thresholds to diagnose the presence or absence of depression, with DSM-5 requiring at least five symptoms of depression in order to be diagnosed with major depression while ICD-10 requires at least four symptoms to be present. The frequency and intensity of symptoms is also specified as important to detect the presence or absence of depression. Many find this bivariate view of mental illness less helpful than viewing it as being present along a continuum (e.g., Zhao & Tay,2022), and sub-threshold symptoms have been recognised in the NICE guidelines for depression as having a significant impact on people (National Institute of Health Care and Excellence, 2022), so screening scales to measure depression symptoms are an important part of psychological assessments.

To date there has been no comprehensive review that examines scales to measure depression symptoms in older people with cognitive impairment. Chau et al. (2019) reported

the most common scales for screening depression used with older people living in RACFs were the Cornell Scale for Depression in Dementia (CSDD; Alexopoulos et al., 1988), and the Geriatric Depression Scale (GDS; Yesavage et al., 1982), but the authors did not comment on the appropriateness of these scales for individuals with various levels of cognitive impairment. In their evaluation of depression scales for older adults diagnosed with dementia of the Alzheimer's type (AD), Müller-Thomsen et al. (2005) concluded that the GDS-15 was not adequate in measuring depression in those with severe cognitive impairment. Authors of another review reported that the Patient Health Questionnaire (Kroenke et al., 2001), the GDS and the Mental Health Index (Friedman et al., 2005) could be used to screen for depression in those with cognitive impairment living in the homecare setting (Niculescu et al., 2020), but they concluded that there was insufficient evidence to recommend a best screening tool.

Aim

This review synthesised the literature on scales to measure depression in older adults with varying levels of cognitive impairment and across different settings (e.g, residential, community, hospital).

The research questions addressed here were: (i) what scales have been used to measure depression in older people with cognitive impairment? (ii) is the choice of scale influenced by the presence of cognitive impairment? (iii) is there a relationship between setting and the choice of scale?

Methods

This scoping review utilised a systematic search of the literature and summarised the findings informed by the framework for scoping reviews suggested by Peters et al (2015) and Arksey

and O'Malley (2005). The PRISMA reporting guideline for scoping reviews was followed (Tricco et al, 2018). A scoping review was defined by PRISMA as "a systematic approach to map evidence on a topic and summarise the main concepts, theories, sources and knowledge gaps" (Tricco et al, 2018). When scanning the literature in preliminary searches while developing the methodology for this review we could find no similar reviews before 2015, the only related one being that of Russo et al (2015) which summarised tools up to that date to measure cognitive impairment in people of any age who were diagnosed with major depressive disorder. They concluded that future research should develop more tools to measure cognitive impairment in people with major depressive disorder so we used Jan 2015 as a starting point for a comprehensive search, which limited the size and scope of the search.

Search Strategy

A systematic search was conducted using MEDLINE and PsychInfo databases. These databases were searched between July and August 2020 and updated in September and October 2021 for literature published from January 2015 to October 2021. Search terms related to cognitive impairment, depression, and older adults were developed in consultation with a librarian and used to create the following search string terms: ("cognitive impairment*" OR "dementia*" OR "Alzheimer's" OR "cognitive difficult*") AND ("depression" OR "mood disorder*" OR "depressive") AND ("older adult*" OR "resident*" OR "elderly" OR "old* age"). The subject headings were searched within titles and abstracts and limited to peer-reviewed articles published in English.

Titles and abstracts were screened independently by two researchers (GM_1, CD or WYL) for studies that met the following inclusion criteria: (1) participants over 65 years of age, (2) studied any psychological intervention, (3) reported the number of participants included with a diagnosis and/or severity of cognitive impairment (4) included depression as an outcome variable. Review papers were excluded as were articles with participants under

65 years of age; measures of depression not defined; or not including people with cognitive impairment. Potential articles were screened independently and then conflicts about whether to include articles were discussed and resolved collaboratively. Full texts of the remaining articles were then retrieved and screened (GM_1, WYL) and relevant data from included studies were extracted into a spreadsheet detailing: study year, authors, country, study design and method, setting, participant characteristics, cognitive impairment diagnosis, and depression measure details. .

Results

After removing duplicates, 1580 titles and abstracts were screened. The full text of 121 articles were screened and 26 were included. Figure 1 shows screening and exclusion details.

Insert Figure 1 about here.

Study Characteristics

A total of 26 articles were included in this review. Table 1 provides a summary of the articles. Results of included studies were grouped according to (i) the depression scales used, (ii) severity of cognitive impairment, and (iii) the setting within which the studies were conducted.

Insert Table 1 about here

The studies were conducted across 15 countries with the most studies conducted in Spain, Taiwan, China and the USA (n = 3 each). The remaining studies were conducted in Brazil, Italy, South Korea (n = 2 each), Japan, England, Sweden, France, Poland, Norway, Wales and Switzerland (n = 1 each). The most common study designs were randomised controlled trials (n = 10), followed by pre-post designs (n = 7), and cross-sectional study designs (n = 5). Three longitudinal studies and a single case study were also included in the review.

Measures Identified

Eleven different scales to measure depression symptoms were identified across the studies, including three versions of the GDS. Scales were mostly designed for screening rather than diagnosis, and some also provided a cut-off point that indicated further investigations were necessary for a formal diagnosis to be made (see Table 2).

Insert Table 2 about here

Twenty-three studies measured depression symptoms using one scale to measure depression; while three studies used two scales to measure depression (Boström et al., 2016; Gómez Gallego & Gómez García, 2017; Tible et al., 2019; see Table 1). Seven of the scales identified were self-report, one scale utilised informant responses, one scale incorporated both self and informant ratings, and two scales utilised clinical judgment (See Table 1).

Two scales were identified that were specifically designed to measure depression symptoms in individuals with cognitive impairment: the Cornell Scale for Depression in Dementia (CSDD; Alexopoulos et al., 1988) and the Neuropsychiatric Inventory Questionnaire (NPI-Q; Kaufer et al., 2000). The CSDD was the second most common scale across articles included in the review, used in seven studies. By comparison, three studies used the NPI-Q to assess and screen for symptoms of depression (Balzotti et al., 2019; Chen et al., 2016; Gómez Gallego & Gómez García, 2017).

The remaining nine scales identified in the review were not specifically designed for individuals with cognitive impairment. The GDS was the most common scale used across the studies. Four studies used the original 30 item GDS (GDS-30; Ansai et al., 2019; Faria et al., 2018; Giuli et al., 2016), and six used the shorter 15 item scale (GDS-15; Bae et al., 2019; Boström et al., 2016; Cheung et al., 2018). One study utilised the shortened 12 item GDS (GDS-12-R; Subramaniam & Woods, 2016) which has been specifically modified to only

include items applicable to individuals living within a RACF (Sutcliffe et al., 2000). Of the 10 studies that utilised the GDS, only one study commented on its applicability for people with cognitive impairment.

Boström et al., (2006) commented that the tool is considered appropriate for those with cognitive impairment, whereas Cheung et al. (2018), who also used the GDS-15, commented on the measure's potential limitation of not being sensitive enough in measuring depression in those with moderate dementia and recommended that studies with such participants use the CSDD instead.

The Montgomery Asberg Depression Rating Scale (MADRS) was used in addition to the CSDD by Tible et al. (2019), and in addition to the GDS-15 by Boström et al. (2016). Both studies recruited participants with dementia but did not report on the validity of using the MADRS with these participants. The MADRS is a 10-item scale typically used to assess change in depression symptoms due to treatment or intervention (Montgomery & Åsberg, 1977). Ratings on the items are based on the clinical judgment of severity of depression symptoms through an interview with the participant.

Two studies utilised the Hospital Anxiety and Depression Scale (HADS; El Haj et al., 2020; Gómez Gallego & Gómez García, 2017). Similarly, to the MADRS, both studies recruited participants with AD but did not comment on the measure's usability for individuals with cognitive impairment. The HADS is a self-report questionnaire that includes 7 items related to anxiety and 7 related to depression (Zigmond & Snaith, 1983).

Four measures (CES-D, HAM-D, and PHQ-9) identified in the review were only used in one study each. Three did not comment of the validity of the chosen measure for the population studied (Demiris et al., 2017; Gonzalez et al., 2015; Liu et al., 2016). One study used the Zung Self-Rating Depression Scale (ZSDS) and cited a validity study with individuals with cognitive impairment (Mess et al. 2018).

Cognitive Impairment

To explore if there was a relationship between the type and severity of cognitive impairment, and the choice of depression measures used, we segregated studies by the type of diagnosis and severity of cognitive impairment. Despite the range of cognitive impairment in the samples studied, none of the papers questioned the usability of a single depression scale for the whole range of participants. The diagnoses or labels of cognitive impairment used to categorise participants across the studies included dementia (n = 14), MCI (n = 7), AD (n = 6), and cognitive deficit (n = 1; see Table 1). Only two studies recruited participants with different diagnoses. One study included participants with a diagnosis of MCI or AD (Ansai et al., 2019), while another included people with dementia or cognitive impairment who scored less than 25 on the Mini Mental Status Examination (Olsen et al., 2016).

Of the 14 studies that included participants with a diagnosis of dementia, only one study recruited participants with mild dementia (Gonzalez et al., 2015), one recruited those with moderate dementia (Cheung et al., 2018), three studies recruited those with mild to moderate dementia (Chen et al., 2016; Fields et al., 2021; Subramaniam & Woods, 2016), and one single case study participant had severe dementia (Tible et al., 2019). The remaining studies recruited participants with any stage of dementia and the majority of these did not specify the severity or type of dementia of the participants included in the study. Of the studies that did report the severity of cognitive impairment among participants, one study recruited a majority of participants with moderately severe to severe dementia (Ballard et al., 2018) and another recruited a majority of participants with moderate and severe dementia (Chang & Chen, 2018). Those who recruited participants with severe dementia all utilised the CSDD as a measure of depression (Ballard et al., 2018; Chang & Chen, 2018; Tible et al., 2019). No other patterns emerged between dementia severity and depression measures selected.

Some studies included participants with a specific diagnosis of AD rather than recruiting those who fell under the umbrella term of dementia. Similar to the studies that recruited older adults diagnosed with dementia, few studies included participants diagnosed with AD at the severe cognitive impairment stage. The majority of the studies that recruited participants with AD included those with mild severity, with two studies including those with mild to moderate AD (Gómez Gallego & Gómez García, 2017; Liu et al., 2021). None of the AD studies selected a scale designed for those with cognitive impairment and no pattern emerged between severity of cognitive impairment and choice of depression scale.

Settings

There was no pattern observed between setting and type of depression measure chosen. Studies included in the review were conducted across four settings: RACFs (n = 11); the community (n = 6); the hospital setting including those recruited as outpatients (n =3), and an independent living facility (n = 1). Included in this breakdown was one study that recruited individuals across both a hospital and RACF setting (Mess et al., 2018), and one study that recruited participants from both an independent living facility and RACF (Fields et al., 2021). Considering setting is important, as some individual items of a depression measure may not be a good representation of depression in those in different living situations such as living in the community and those in a RACF (e.g. ‘Do you prefer staying in rather than going out and doing new things,’) may not be an appropriate indicator of depression when some older adults may not be able to go out due to mobility or health difficulties, or they may not have the required support staff available (Sutcliffe et al., 2000).

All studies conducted in the RACF setting measured symptoms of depression in participants who met criteria for dementia or AD, and no studies recruited those with MCI. Apart from one study conducted in a hospital setting (Baek, Lee and Sohng, 2020), the

studies conducted in the RACF setting were the ones that utilised measures specifically designed to measure depression in individuals with cognitive impairment - the CSDD and the NPI-Q. The CSDD was used in six studies in RACFs, and was the most common measure used in RACFs.

Another common scale to measure depression utilised in the RACF setting was the GDS-15, which was utilised in five studies (Boström et al., 2016; Cheung et al., 2018; Fields et al., 2021; Hammarlaund et al., 2021; Liu et al., 2021). Only one study utilised the GDS-12-R despite it being developed for those living in RACFs (Subramaniam & Woods, 2016). The GDS-12-R excludes three items from the GDS-15 about preferring to stay at home, memory issues, and thinking that others are better off, that were deemed irrelevant or ambiguous to those living in RACFs (Sutcliffe et al., 2000). The longer 30 item version of the GDS was not used in the RACF setting. In the RACF setting, two studies used the HADS (El Haj et al., 2020; Gómez Gallego & Gómez García, 2017), and other studies used either CES-D (Gonzalez et al., 2015), MADRS (Boström et al., 2016; Tible et al., 2019) or ZSDS (Mess et al., 2018). One study was conducted in both a RACF and independent living facility setting and they used the GDS-15 scale (Fields et al., 2021).

In contrast, all studies conducted within the community setting measured depression symptoms in individuals with MCI, while just one study included participants with both MCI or AD (Ansai et al., 2019). None of the scales utilised in the community settings were developed specifically for use with individuals with cognitive impairment. In addition, the majority of the studies did not mention the validity of the depression scale used with people with cognitive impairment. The one study that used the PHQ-9 to measure depression commented that it was appropriate for people with MCI and early dementia without any evidence to support this (Demiris et al., 2017). The most common scale in the community studies was the GDS, with three studies using GDS-30 (Ansai et al., 2019; Giuli et al., 2016;

Wu et al., 2021) and one study using GDS-15 (Bae et al., 2019). The study that included participants with MCI or AD used the longer form of the GDS. The final scale that was identified in the community setting was the Hamilton Depression Scale (HAM-D; Liu et al., 2016).

Of the three studies conducted in the hospital setting, one measured depression symptoms in participants with MCI (Faria et al., 2018), one in those with dementia (Baek et al., 2021) and one in those with AD but this study was also conducted with those living in a RACF (Mess et al., 2018). Consistent with common scales used in other settings, in the hospital setting the GDS-30 was used for those with MCI (Faria et al., 2018), and CSDD was utilised for those with dementia (Baek et al., 2021). The ZSDS was the final measure employed in the hospital setting (Mess et al., 2018).

Discussion

This is the first review synthesising recent literature on depression measures used with older adults with varying degrees of cognitive impairment across different settings. Two new findings, and take-away messages, are highlighted by this review: lack of acknowledgment about the usability of depression measures used in those with cognitive impairment, and lack of research on the measurement of depressive symptoms in those with severe cognitive impairment. A recent study by Park (2022) found that the GDS was more suitable for assessing depression in people without cognitive impairment, and the CSDD more suitable for assessing depression in people with cognitive impairment, but our results showed that forms of the GDS have commonly been used to assess depression symptoms in people with cognitive impairment, including in settings where cognitive impairment and dementia is common.

Another take-away message from this review is that most studies did not use a depression scale designed for people with cognitive impairment and failed to report on the validity and reliability of the scale chosen with this population. The two measures identified in the review that were developed for people with cognitive impairment (CSDD and NPI-Q) were only utilised in the RACF setting and with individuals with a diagnosis of AD or dementia. The validity and justification for using general depression scales with participants with cognitive impairments was overwhelmingly underreported across the studies included in the review. Omitting this information does not imply that the measure is not valid and reliable for this population, but it raises concerns about not rigorously evaluating the best depression scale for participants who may overlap in symptoms of depression and cognitive impairment and the misdiagnosis or treatment of vulnerable older adults.

The review was unable to examine the whole spectrum of cognitive impairment from mild to severe as there was a lack of research measuring depression symptoms in those with severe dementia. Although many of the dementia studies did not exclude those with severe impairment only a small number reported the severity of dementia in their participants. In addition, none of the studies explicitly tried to recruit those with severe dementia.

Consistent with Chau et al. (2019), the most common depression scales used within the RACF setting were the CSDD and the GDS. The GDS-30 was not used in the RACF setting but was used in the community. The GDS-15 was designed to be simpler for those with cognitive impairment (Yesavage & Sheikh, 1986) and as all RACF studies were with individuals with dementia it may have been viewed that the 30 items were appropriate for those with mild cognitive difficulties but not for those with dementia. Further, the GDS-12-R was specifically designed to be more appropriate for those in RACFs, eliminating items that are perceived as inappropriate for this population (Sutcliffe et al., 2000). Despite this, only

one study utilised the GDS-12-R in the RACF setting, leading to the conclusion that setting is not being considered when choosing depression scales.

Consistent with Niculescu et al. (2020) the GDS (both 15 and 30 item) and PHQ-9 were identified as being used within the community setting. The GDS-30 was the most common measure in this population however findings are interpreted with caution as the number of studies conducted in this population was small. Studies were included across settings and therefore a small number of studies were identified in the hospital or outpatient setting. As in the RACF setting, measures to be selected for use within the hospital or community should be evaluated for items not appropriate for the setting.

This review was limited by the time frame included, and also by including only those studies published in English. While literature published earlier than 2015 was scanned for relevant studies in preliminary stages, a more thorough review of studies published in all years may have brought more studies to light. However, earlier studies may not have been as relevant to current practice. Another limitation associated with all scoping reviews is that we did not carry out formal validity assessment of the included studies.

Through this review it was apparent that research assessing depression symptoms in individuals with cognitive impairment is limited within the hospital setting and in those with severe cognitive impairment. This may be due to the perceived barriers of assessing depression symptoms in this population such as informed consent or it could be due to a lack of appropriate assessment tools available. Dementia care mapping is an observational tool that has been used to assess quality of life and wellbeing in people with dementia and such an observational tool could be useful in highlighting depression in those with severe dementia (Fossey et al., 2002; Surr et al., 2018). Future research should also explore appropriate depression scales suitable for use in the hospital setting for older adults with cognitive impairment. Although studies aimed to recruit individuals with dementia, the majority did not

specify the severity of the cognitive impairment in the participants they sampled. This information would allow for better understanding about the results and applicability of the depression measures. A further reporting issue identified in this review was not stating the validity of the measure with the population of the study. Adequate definition of sampling and population is a primary requirement in the development of psychometric testing (Boateng et al, 2018; Hussey & Hughes, 2020), yet this step has not received enough attention especially for the older adult population with their increased diversity in cognitive capacity. Future research should consider more investigation of screening for depression symptoms in people with cognitive impairment presenting to hospital. Further research is also recommended to conduct a systematic review of outcome measure properties of depression measurement scales for people with cognitive impairment (Stephenson et al., 2020).

Conclusions

There is a lack of information about the usability of depression scales used with people with cognitive impairment and especially a lack of research on depression in those with severe cognitive impairment. Future research should further explore appropriate depression scales in different settings for older adults with cognitive impairment. Clinicians need more valid assessment tools to measure depression in older adults with moderate to severe dementia.

Clinical Implications

- Clinicians and researchers should consider the appropriateness of a depression scale to the setting and cognitive capacity of participants.

- Choosing an appropriate scale to measure depression symptoms can help with valid reliable screening of depression symptoms and facilitate a more thorough assessment of depression by a trained clinician.

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Table 1. Characteristics of the articles included for review.

Study (year)	**Country**	**Setting**	**Design**	**Participants**	**Severity of cognitive impairment**	**Depression measure**	**Type of assessment**
Ansai et al. (2019)	Brazil	Community-dwelling	Longitudinal	40 participants with MCI, 38 with mild AD	MCI or AD (mild)	GDS-30	Self-report
Bae et al. (2019)	Japan	Community-dwelling	RCT	83 participants	MCI	GDS-15	Self-report
Baek, Lee, and Sohng (2020)	South Korea	Hospital	Pre-post	28 participants	Dementia	CSDD	Self-report and informant
Ballard et al. (2018)	England	RACF	RCT	847 participants at baseline, 553 at follow up	Dementia	CSDD	Self-report and informant
Balzotti et al. (2018)	Italy	RACF	RCT	30 participants	Dementia	NPI-Q	Informant

Boström et al. (2015)	Sweden	RACF	RCT	186 participants	Dementia	GDS-15 and MADRS	Self-report Clinical judgment
Cancela et al. (2016)	Spain	RACF	RCT	51 participants in experimental group and 63 participants in control group	Dementia	CSDD	Self-report and informant
Chang et al. (2017)	Taiwan	RACF	Cross-sectional	98 wheelchair bound participants with dementia	Dementia	CSDD	Self-report and informant
Chen et al. (2016)	Taiwan	RACF	Pre-post	23 experimental group, 21 in the comparison group, all with dementia	Dementia	NPI-Q	Informant
Cheung et al. (2018)	China	RACF	RCT	58 participants in the music-in-movement intervention, 54 in music listening group, and 53 in	Dementia (moderate)	GDS-15	Self-report

				the social activity group, all with dementia			
Demiris et al. (2016)	USA	Community-dwelling	Pre-post	10 female participants with MCI	MCI	PHQ-9	Self-report
El Haj et al. (2019)	France	RACF	Cross-sectional	30 participants with mild AD and 33 control participants	AD (mild)	HADS	Self-report
Faria et al. (2018)	Brazil	Hospital Outpatients	Longitudinal	62 participants	MCI	GDS-30	Self-report
Fields, Xu, Greer, and Murphy (2021)	USA	Independent living facility and RACF	Pre-post	8 participants with no cognitive impairment, 7 participants with Dementia	Dementia (mild or moderate)	GDS-15	Self-report
Giuli et al. (2016)	Italy	Community-dwelling	RCT	94 participants	MCI	GDS-30	Self-report

Gomez Gallego and Garcia (2015)	Spain	RACF	Pre-post	42 participants	AD (mild to moderate)	HADS and NPI-Q	Self-report; Informant
Gonzalez et al. (2015)	Spain	RACF	Pre-post	23 participants in experimental group and 19 in control group	Dementia (mild)	CES-D	Self-report
Hammarlund, Whatley, Zielinski, and Jubert (2021)	USA	RACF	Within-subjects repeated measures	5 participants	AD (moderate to severe)	GDS-15	Self-report
Jung, De Gagne, Lee, and Lee (2021)	South Korea	RACF	Cross-sectional	117 participants	Dementia (mild to severe)	CSDD	Self-report and informant

Liu et al. (2019)	China	Community-dwelling	RCT	30 participants in experimental group and 15 in control group	MCI	HAM-D	Clinical judgement
Liu et al. (2021)	Taiwan	RACF	RCT	50 participants	AD (mild or moderate)	GDS-15	Self-report
Mess et al. (2018)	Poland	Hospital or RACF	Cross-sectional	90 participants	AD (mild)	ZSDS	Self-report
Olsen et al. (2016)	Norway	RACF	RCT	28 participants in intervention group and 30 in control group	Dementia or cognitive deficit as indicated by score of less than 25 on MMSE	CSDD	Self-report and informant
Subramaniam and Woods (2016)	Wales	RACF	Pre-post	6 participants	Dementia (mild to moderate)	GDS-12R	Self-report

Tible et al. (2017)	Switzerland	RACF	Single case study design	1 participant	Dementia (severe)	CSDD, and MADRS	Self-report and informant Clinical judgment
Wu et al. (2021)	China	Community-dwelling	Cross-sectional	199 participants with MCI, 1187 participants without cognitive impairment	MCI	GDS-30	Self-report

Table 2. Characteristics of depression measures identified in review.

Measure	**Abbreviation**	**Reference**	**Rated by**	**Administration Time**	**Psychometrics Properties**	**Type[a]**
The Centre for Epidemiological Studies Depression Scale (20 items)	CES-D	Radloff, 1977	Self-report	10 mins	Internal consistency: high (Cronbach's alpha = .85 in the general population and Cronbach's alpha = .90 in the patient sample) Test-retest reliability: adequate (r =.45 - .70) Construct validity: discriminant validity was reported (Radloff, 1977)	S (C ≥ 16)
The Cornell Scale for	CSDD	Alexopoulos et al., 1988	Self-report and informant	20 mins	Internal consistency: high (Cronbach's alpha = .84)	S (C ≥ 6)

Depression in Dementia (19 items)					Interrater reliability: high (k_w = .67) Criterion validity: concurrent validity was reported (Alexopoulos et al., 1988)	
The Geriatric Depression Scale (30 items)	GDS-30	Yesavage et al., 1982	Self-report	45 mins	Internal consistency: high (Cronbach's alpha = .94) Test-retest reliability: high (r = .85) Construct validity: convergent validity was reported (Yesavage et al., 1982)	S (C ≥ 9)
The Geriatric Depression Scale - Short Form (15 items)	GDS-15	Yesavage & Sheikh, 1986	Self-report	20 mins	Internal consistency: high (Cronbach's alpha = .87) Criterion validity: was reported (Lach et al., 2010)	S (C ≥ 4)

The Geriatric Depression Scale – Residential (12 items)	GDS-12R	Sutcliffe et al., 2000	Self-report	15 mins	Internal consistency: high (Cronbach's alpha = .805 - .848) Validity: higher levels of specificity and sensitivity when compared with GDS-15 (Sutcliffe et al., 2000)	S (C ≥ 4)
The Hospital Anxiety and Depression Scale (14 items)	HADS	Zigmond & Snaith, 1983	Self-report	2-5 mins	Internal consistency: moderate to high (Cronbach's alpha = .67 - .90 (mean .82)) for the depression subscale Criterion validity: concurrent validity was reported (Bjelland et al., 2002)	S (C ≥8 or 10)
The Hamilton Depression Scale	HAM-D	Hamilton, 1960	Clinical judgement	20 mins	Internal consistency: adequate (Cronbach's alpha = .46 - .97)	S (C ≥ 8)

(17 items)					Interrater reliability: high (r = .82 - .89) Test-retest reliability: high (r = .81 - .98) Criterion validity: predictive validity was reported Construct validity: convergent validity and discriminant validity were reported (Bagby et al., 2004)	
The Montgomery Asberg Depression Rating Scale (10 items)	MADRS	Montgomery & Åsberg, 1977	Clinical judgement	20-60 mins	Inter-rater reliability: adequate (r = 0.76) Criterion validity: concurrent validity was reported Construct validity: was reported (Montgomery & Åsberg, 1977)	S (C ≥ 16)

The Neuropsychiatric Inventory Questionnaire (12 items)	NPI-Q	Kaufer et al., 2000	Informant	5 mins	Test-retest reliability: adequate (r = .80) Construct validity: convergent validity was reported (Kaufer et al., 2000)	S
The Patient Health Questionnaire (9 items)	PHQ-9	Kroenke et al., 2001	self-report	3 mins	Internal consistency: high (Cronbach's alpha = .86 - .89) Criterion validity: was reported Construct validity: was reported (Kroenke et al., 2001)	D (C ≥ 5)
The Zung Self-Rating Depression scale (20 items)	ZSDS	Zung, 1965	self-report	5-10 mins	Internal consistency: high (Cronbach's alpha = .82) Criterion validity: predictive validity was reported Construct validity: discriminant validity was reported	S (C ≥ 50)

					(de Jonghe & Baneke, 1989; Gabrys & Peters, 1985)

[a] S = screening tool, C = cut-off point provided, D = diagnostic tool.

Figure 1. Flowchart of search strategy

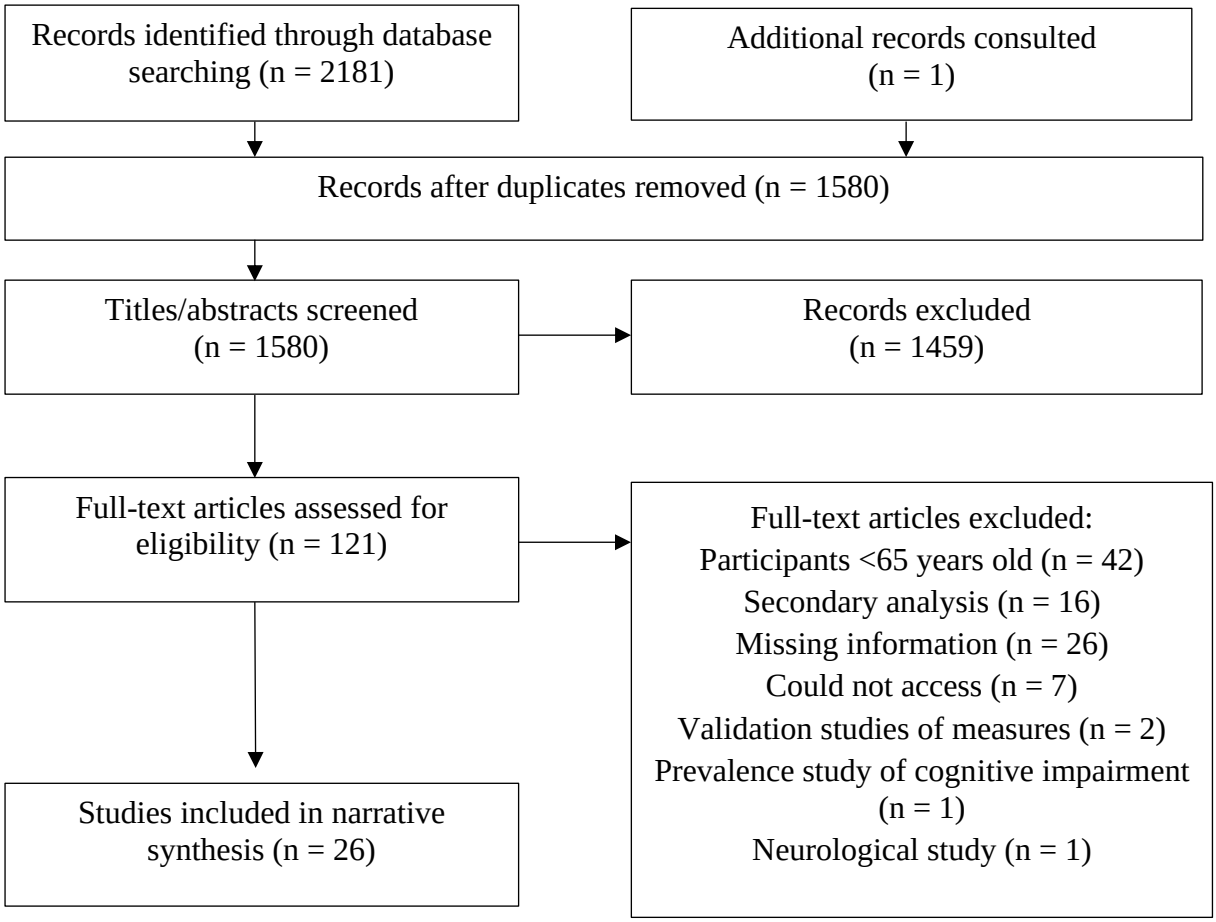

Figure captions

Figure 1. Flowchart of search strategy