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REVIEW

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Investigating the reporting of participant characteristics relating to health equity in randomised controlled trials of non-pharmacological interventions for post-stroke anxiety and/or depression: a scoping review

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ABSTRACT

Purpose: The review aims to identify what characteristics are reported in randomised controlled trials for the non-pharmacological management of post-stroke anxiety and/or depression and whether research has explored the correlation between participant characteristics and their outcomes.

Methods: A comprehensive systematic search was completed of five databases: CINAHL, Medline, PsychInfo, Web of Science, and The World Health Organisation. Google Scholar was also accessed. The reporting of participant characteristics was assessed by adapting the PROGRESS-Plus framework, a research framework of protected characteristics known to impact health equity (such as, age).

Results: 19 papers ($n=2187$) were included. There was generally poor reporting of characteristics associated with an increased likelihood of post-stroke anxiety and/or depression. All studies reported the gender/sex of participants, 18 studies reported the age of participants, and 11 studies reported lesion location. None of the studies reported the sexual orientation or pre-existing disabilities of participants.

Conclusion: There was variation in the reporting and analyses of protected characteristics. Future research should follow a health equity framework to ensure reporting of protected characteristics to support clinicians in identifying whether the proposed interventions are relevant to their stroke population and consider undergoing subgroup analyses to compare outcomes across protected characteristics.

IMPLICATIONS FOR REHABILITATION:

- Overall review on the reporting of protected characteristics known to impact the engagement with services and outcomes of stroke survivors.
- Reviewing the lack of reporting on who is taking part in stroke research and how this impacts evidence-based practice in stroke services.
- Identifying how demographic and social factors can impact post-stroke anxiety and depression rehabilitation.
- Supporting the understanding of the effectiveness of non-pharmacological interventions for post-stroke anxiety and/or depression across subgroups.
- Identification of which characteristics should be reported in services and in stroke rehabilitation research.
- Furthering the consideration of health equity in stroke rehabilitation research.

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Anxiety; depression; mood; stroke; scoping review; systematic review; health equity; non-pharmacological; interventions; randomised controlled trials

Introduction

Stroke remains the third-leading cause of death and disability in the world with one in four people experiencing a stroke in their lifetime [1]. Whilst the incidence of stroke increases significantly with age, over 60% of strokes happen to people under the age of 70 and 16% to those under 50 years [2]. Along with physical difficulties that stroke survivors can face [3], mood and emotional conditions, such as anxiety and depression [4], are also common.

Anxiety is one of the commonest emotional consequences of stroke [4]. One study found that 51.3% of their participants experienced anxiety three months following their stroke [5], whereas other studies note 8% of stroke survivors continue to experience clinical levels of anxiety [6]. Gender, marital status, and place of residence (e.g., living at home vs in a care home) also increase the likelihood of post-stroke anxiety [1], with women, those who live alone or are single, divorced, or widowed also being more likely to experience anxiety after stroke [7]. Left hemisphere lesions and heightened physical and cognitive impairment also impact whether a stroke survivor is more likely to experience anxiety [8].

Depression is also prevalent following stroke [9], with 76.1% of stroke survivors experiencing symptoms three months post stroke in one study [5] and 31% at one year in another [10]. Stroke severity and lesion location have been linked to post-stroke depression [11], albeit with mixed findings regarding lesion location [12–15].

Demographic and social factors associated with the *risk* of post-stroke depression have also been investigated. There are

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conflicting findings regarding the impact of age, with some systematic reviews concluding older adults are more likely to experience post-stroke depression [3], and others concluding younger adults are more susceptible to post-stroke depression [8]. And although some research has suggested that women are more likely to experience post-stroke depression [3], there is still an ongoing debate due to the number of studies which have not identified any significant gender differences in post-stroke depression risk [14, 16]. Stroke severity and level of disability following a stroke have also been identified as risk factors for post-stroke depression [10, 11], as have being single, divorced or widowed, living alone, social isolation, and having a lower level of education [17–20].

Furthermore, it is also apparent that the *prevalence* of mood difficulties after stroke also differs based on demographic and social factors, including age and gender [17]. Additionally, stroke incidence, service access, and outcomes are linked to patient age, ethnicity, education, gender, location, marital status, prior disability, and/or socioeconomic status [21–24]. Moreover, there is evidence that beliefs around mental health conditions are influenced by demographic and social factors and that these factors can also influence accessibility and engagement of psychological interventions related to mood [2, 25, 26].

Due to the impact demographic and social factors can have on the accessibility of both stroke services and non-pharmacological interventions for post-stroke anxiety and/or depression, it is important to better understand whether research has reported and considered participant characteristics when reflecting on the clinical implications. This is especially important given the impact anxiety and depression have on stroke survivor quality of life and level of engagement in rehabilitation [5, 17, 27]. By doing so, research can better support services in applying a health equity lens, thereby providing all service users a fair and just opportunity to attain the highest level of health and maximising the effectiveness and feasibility of interventions across demographic and social groups.

Post-stroke anxiety and depression can be managed using pharmacological, medication-based interventions [2], and non-pharmacological methods, non-invasive interventions [28], and researchers exploring these can use frameworks to apply a health equity lens, such as PROGRESS-Plus [29]. PROGRESS-Plus captures demographic and socially stratifying factors, referred to as protected characteristics, thought to influence health opportunities, including; place of residence (housing), race/ethnicity/culture/language, occupation, gender/sex, religion, education, socioeconomic status, social capital (living arrangements and marital status [30]). Additional factors associated with discrimination including age, disability, and sexual orientation are captured under "Plus" from the framework [29].

Whilst protected characteristics (demographic and social factors) can increase the likelihood of experiencing post-stroke anxiety and/or depression, what is not known is the extent to which these characteristics are reported in randomised controlled trials (RCTs) exploring non-pharmacological management of post-stroke anxiety and depression. The present review aimed to identify and map evidence of the reporting of protected characteristics by taking an exploratory approach to address wide-ranging questions whilst adhering to a strict protocol, defining it as a scoping review [31]. Therefore, stroke literature was scoped to summarise what protected characteristics are being reported in these trials, using an adapted version of the PROGRESS-Plus framework, and to summarise potential differences in outcomes across characteristics. Stroke characteristics including lesion location, type of stroke, and time since stroke, were considered and included as part of the PROGRESS-Plus framework. Additionally, as protected characteristics are known to impact engagement with healthcare services and interventions [25, 27], the review also aimed to establish what recruitment strategies were used, what outcome measures were used, and what non-pharmacological interventions were found to be effective in reducing anxiety/depression after considering the protected characteristics mentioned above.

Methods

Study Design

A scoping review was conducted systematically where a set protocol was followed and conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA SCr) extension for scoping reviews guidelines ([31, 32]; see Appendix A, supplementary materials).

A reference librarian at the University of East Anglia was consulted to develop the search strategy. Search terms were compiled and tested repeatedly to produce sensitive searches and capture potentially relevant publications. The search was conducted on the following databases, CINAHL, Medline, PsychInfo, Web of Science, and The World Health Organisation. Google Scholar was also used as a supplement to the main search. Further, the reference lists of retrieved reviews and RCTs were manually searched for trials that may have been previously missed. Searches were conducted on the 20th of December 2022 and refreshed on the 24th of February 2023. There were no date constraints on searches for studies to include in the review.

Keywords used in the literature search to retrieve articles included: stroke, mood disorders, randomised control trials, and psychological therapy (see Appendix B, supplementary materials for a list of search strategies).

Eligibility criteria

Studies of adults, aged 18 years and older, with stroke and without significant neurological co-morbidities, such as dementia, were included. Additionally, studies which recruited participants who were considered to experience any form of anxiety and or depression post-stroke, regardless of whether it reached the clinical threshold were included. Participants who presented with cognitive impairment alongside mood disorder following a stroke were included. Studies focusing on interventions where carers and/or family members where the participants were not included.

Studies were included if they reported on non-pharmacological interventions that targeted the management of anxiety and/or depression symptoms or disorders as a primary aim. Preventative studies, as well as medical and drug interventions (which included medication, traditional medicines, transcranial magnetic stimulation, etc.) were excluded.

Studies with original data and anxiety and/or depression as primary outcomes, as measured using a validated tool(s), were included. RCTs were included in the review including pilot RCTs and feasibility RCTs. Studies originally published in English or translated into the English language and peer-reviewed were included.

Data extraction, summarising and reporting findings

Data extracted included: participants (sample size, place of residence/housing, race/ethnicity/culture/language, occupation, gender/sex, religion, education, socioeconomic status, social capital, age, disability, relationships, diagnosis), interventions (type), anxiety/depression outcome measures (valid measures used), recruitment methods, and results. The primary researcher was responsible for identifying whether published studies met the eligibility criteria

for the scoping review and for the data extraction, summarising, and reporting of findings.

Quality assessment

Although not viewed as essential to a scoping review [32], the methodological quality of the papers included in the review were assessed using the Critical Appraisal Skills Programme (CASP [33]) tool to determine any risk of bias and to ensure appropriate statistical analyses were used. A quality assessment took place using the CASP for RCT's to identify how robust results were if studies differentiated outcomes according to participant subgroups. The CASP RCT checklist has been updated to consider the CONSORT 2010 guideline which applies a health equity lens in assessing the quality of RCTs and includes 11 items. The primary researcher assessed the quality of all the studies included in the review and randomly selected 12 of the 19 studies to be assessed independently by an external reviewer. Where there were differences in responses, a discussion was held until a consensus was reached to appropriately respond to the item. While developers of the CASP checklist do not suggest a scoring system, as it is suggested to be a tool to make researchers think about aspects of studies systematically, an arbitrary scoring system was used for this review to analyse the inter-rater reliability (Yes = 2, No = 1, and Can't tell = 0).

Assessing the reporting of protected characteristics

To evaluate the evidence of demographic and social factors reported in published papers, the primary researcher extracted the data in line with the protected characteristics which are known to impact health equity and are included within the PROGRESS-Plus framework [29].

Definition of all PROGRESS-Plus protected characteristics (such as, race/ethnicity/culture/language) were based on the definition and interpretations by the authors of the included studies in their measure of demographic and social factors. This was to ensure that studies were included based on their own interpretation of reporting demographic and social factors and to prevent the primary researchers own definitions and/or potential biases from influencing the decision.

This study followed the guidance from Campbell and Cochrane Equity Methods Group [29] and adapted the PROGRESS-Plus framework to better represent the papers published globally and the topic area in which it is being used, as seen in Plastow et al.'s [30] review on the reported protected characteristics in research for post-stroke mood conditions in Africa. Therefore, along with the previously mentioned characteristics from the PROGRESS-Plus framework, the adapted framework for this review also included stroke characteristics (location, time since stroke, and type of stroke [30]). Papers were given a score of 1 for each protected characteristic reported by the authors, based on the adapted PROGRESS-Plus framework and the guidance from the mentioned systematic review, with a total score of 15 being possible [34, 35]. However, it is important to note that the protected characteristic of "ethnicity/race/culture/language" were split to allow papers to receive a point if ethnicity/race/culture or language was scored and 2 points if ethnicity/race/culture and language were scored.

Synthesis of results

Systematic scoping reviews do not typically present syntheses relating to the results, therefore the results from this review are descriptively summarised in line with the PRISMA SCr guidelines [32]. The results were summarised regarding which participant characteristics were reported in research, the results of trials across participant characteristics, the recruitment strategies used by researchers, the location of the research projects, the interventions investigated by researchers, and the outcome measures used.

Results

The number of records that were included/excluded at each stage of the systematic review process is detailed in the PRISMA flow diagram (Figure 1). 1603 records were initially identified, and 62 records reviewed at the full-text stage with 19 being retained for review.

Study characteristics

Key characteristics of the studies are presented in the study characteristics table (Table 1).

Design

All studies employed a RCT design, with three of these being pilot RCTs [34, 35, 39, 41].

Sample size and recruitment

Across all studies, a total of 2187 participants were recruited into either an intervention or control condition. Fifteen projects recruited participants from Hospitals [36–38, 40–43, 45, 47–53]. One project recruited participants *via* an advertisement in stroke survivor groups, in national stroke survivor publications, and stroke rehabilitation centres [35, 39]. One project advertised their project but did not disclose where [44], another used a database of stroke participants [34], and another did not disclose how they recruited participants [46]. The smallest sample size was 15 participants [34] and the largest was 411 [53].

Location of research

Four studies took part in the United Kingdom [35, 39, 45, 51, 53], two in Taiwan [37, 47], three in Australia [34, 40, 41], two in Norway [36, 42], two in South Korea [38, 46] two in China [49, 52], one in Bangkok [43], one in Italy [50], one in the Netherlands [44], and one in Nigeria [48].

Funding

Five studies did not disclose whether they received funding [38, 42, 44, 47, 48]). Four studies explicitly stated they received no funding for their studies [35, 37, 39, 46, 50]. All other studies reported that they received funding from government bodies, healthcare services, universities, and/or charities [36, 40, 41, 43].

Interventions

Studies included the following interventions: active music therapy [50], augmented CBT [44], behavioural therapy [51], CBT [41, 45], CBT with bilateral limb training [38], cognitive rehabilitation therapy [48], a computer-generated tailored written education programme [40], creative art therapy [43], dialogue based therapy [36], early rehabilitation combined with virtual reality training on muscle strength, mood state, and functional status [47], mind-body interactive qigong [37], mindful-based CBT [52], motivational interviewing [53],

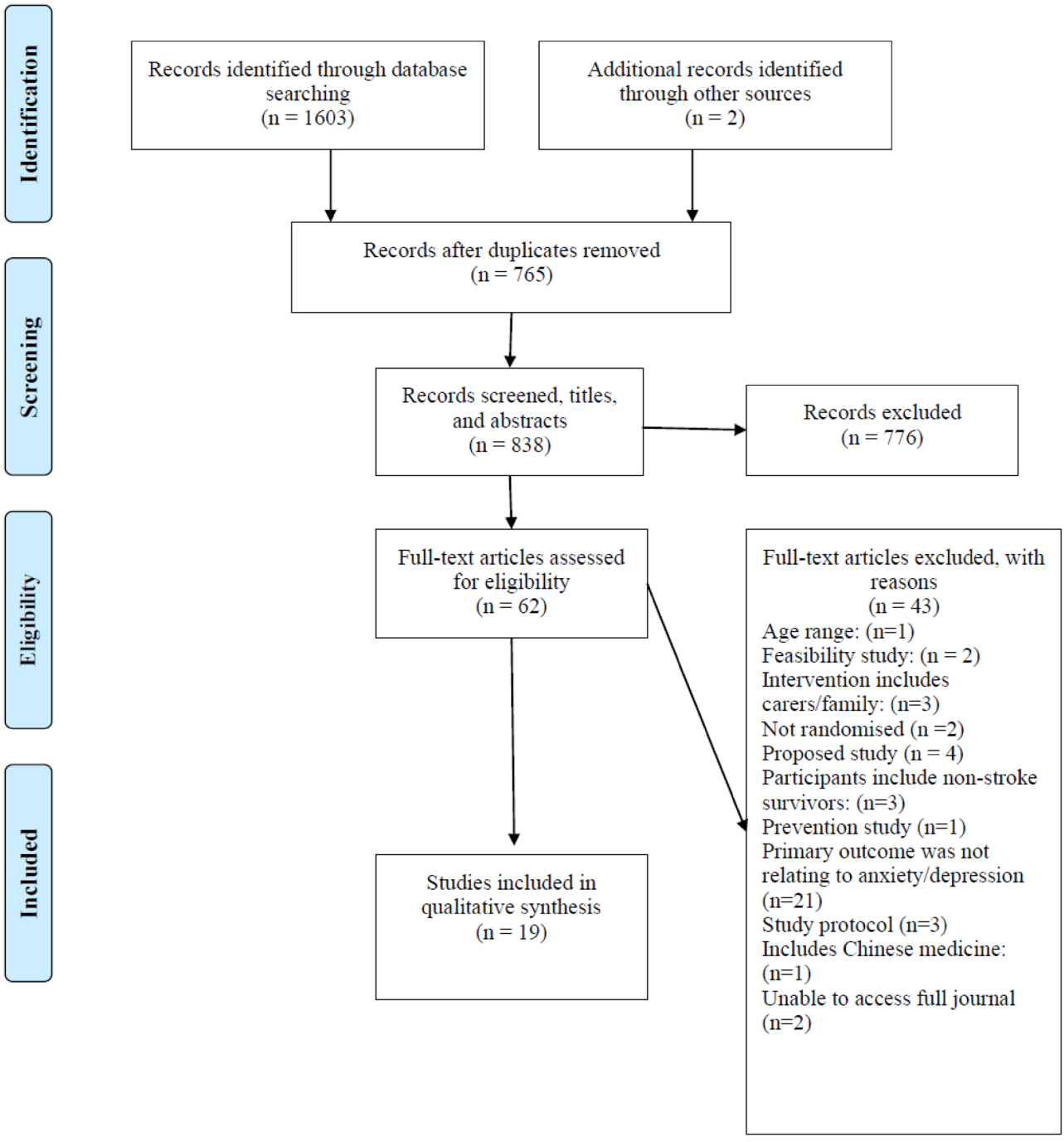

Figure 1. PRISMA flow chart.

multifactorial risk factor intervention program [42], neuro-linguistic programming brief therapy [49], psychoeducation [48], virtual reality training [47], Yoga and exercise [34], self-help relaxation training [35, 39], and social support & health education [46].

Outcome measures

The most frequently used primary outcome measure was the Hospital Anxiety and Depression Scale (HADS) which was used in eight of the studies [35, 37, 39, 40, 42–44, 47, 50]. In addition to the HADS, studies included as measures of anxiety the State-Trait Anxiety Inventory-Korean YZ (STAI-KYZ [38]) and the State Trait Anxiety Inventory (STAI [34]), and for depression, Beck's Depression Inventory scale (BDI [45, 48]) and the Centre for Epidemiologic Studies Depression Scale (CES-D [52]), or general mental health or quality of life measures, such as the McGill Quality of Life Questionnaire [50] and the General Health Questionnaire-28 (GHQ-28 [36, 53]). One of the studies included three measures of mood for people affected by aphasia, the Stroke Aphasic Depression Questionnaire, the Visual Analog Mood Scales 'sad' item, and the Visual Analog self-esteem scale [51].

Appraisal of quality of RCTs

Overall, we found that all RCT studies included in the analysis had a focused objective and appropriate steps were taken to reduce bias through randomisation during group allocation (CAPS-2020). Furthermore, all studies used appropriate statistical tests to analyse

Table 1. Study characteristics.

Author (Year)	Country	Recruitment strategy	Sample size (N)	Intervention	Control	Outcome measures	Main findings	Analyses regarding differences in outcomes based on demographics
Bragstad et al. [36]	Norway	Internally from hospital wards	322	Dialogue based intervention ($n = 166$)	Usual care ($n = 166$)	General Health Questionnaire-28 (GHQ-28)	No statistical difference between groups in psychosocial wellbeing at 12 months ($p > 0.05$)	Not reported
Chan et al. [34]	Australia	Database of stroke participants (Centre for Physical Activity in Ageing)	15	Yoga and exercise ($n = 9$)	Exercise only ($n = 6$)	Geriatric Depression Scale (GDS15) and State Trait Anxiety Inventory (STAI)	Significant difference within groups on pre and post outcome measure scores ($p < 0.05$). No significant difference in scores between groups	Not reported
Chen et al. [37]	Taiwan	Recruited from medical and rehabilitation wards, Taiwan	72	Mind-body interactive qigong (physical exercises and meditation; $n = 36$)	Standard Care ($n = 36$)	Hospital Anxiety and Depression Scale (HADS)	Significant difference between groups regarding anxiety ($p = 0.04$) but not depression ($p > 0.05$)	Not reported
Choi & Kim, [38]	South Korea	Recruited internally from hospital	20	CBT with Bilateral limb training ($n = 10$)	30-min conventional occupational therapy and bilateral limb training ($n = 10$)	The State Trait Anxiety Inventory-Korean YZ (STAI-KYZ), Korean Depression Scale (KDS)	Significant decrease between groups ($p < 0.01$) for anxiety and depression. Statistically significant differences within groups regarding anxiety and depression ($p < 0.001$)	Not reported
Golding et al. [35, 39]	United Kingdom	Advert circulated on stroke survivor groups in the UK and in national stroke survivor publication	21	Self-help relaxation training ($n = 11$)	CD given 3 months after ($n = 10$)	HADS	Significantly more likely to report reduced anxiety since screening (month 1, 2, & 3), compared to those in the control group ($p = 0.001$)	Not reported
Hoffman et al. [40]	Australia	Recruited on admission to stroke unit.	133	Computer-Generated tailored written education programme ($n = 67$)	Provided with Stroke Fact Sheets produced by Stroke Association Queensland ($n = 66$)	HADS	Anxiety scores improved slightly more in favour of the control group (no significant differences)	Not reported
Hoffman et al. [41]	Australia	Recruited on a consecutive admission basis from the stroke unit of a large ter- tiary hospital in Brisbane, Australia	33	Coping skills ($n = 11$) Self-management ($n = 12$)	Usual care ($n = 10$)	Montgomery and Asberg Depression rating scale (MADRS), HADS, Self-efficacy questionnaire, the stroke knowledge questionnaire	No significant difference found between or within groups for anxiety/depression	Not reported
Ihle-Hansen et al. [42]	Norway	Recruited from Hospital	195	Multifactorial risk factor intervention program ($n = 98$)	Usual Care ($n = 97$)	HADS	Significant between group differences in anxiety and depression ($p = 0.044$) in favour of intervention group.	Not reported
Kongkasuwan et al. [43]	Thailand	Recruited from stroke rehabilitation ward, Bangkok	118	Creative art therapy ($n = 59$)	Conventional physical therapy only ($n = 59$)	HADS	Significant difference between groups in depression scores ($p < 0.001$) in favour of the intervention group not between anxiety ($p = 0.123$)	Not reported
Kootker et al. [44]	Netherlands	Recruited from rehabilitation centres	61	Augmented CBT ($n = 31$)	Computer Cognitive Training ($n = 30$)	HADS	Mixed model analyses showed a significant and persistent time effect for HADS-D ($p < 0.001$)	Not reported

(*Continued*)

Table 1. Continued.

Author (Year)	Country	Recruitment strategy	Sample size (N)	Intervention	Control	Outcome measures	Main findings	Analyses regarding differences in outcomes based on demographics
Lincoln & Flannaghan, [45]	United Kingdom	Hospital register	123	CBT ($n=39$)	No Intervention ($n=41$) Attention Placebo ($n=43$)	BDI, Wakefield Depression Inventory	No significant difference between groups	Not reported
Lin et al. [46]	South Korea	N/A	62	Social Support & Health Education ($n=31$)	Routine Rehabilitation ($n=31$)	Depression scale (from the "Taiwan Longitudinal Study on Aging"	A significant difference was found between groups after social support for 8 weeks, in favour of the intervention group	There was a significant correlation between depression and the economic status of the patients with chronic stroke, satisfaction in leisure, the presence or absence of caregivers, and the duration of stroke
Lin et al. [47]	Taiwan	Recruited from neurological care ward, Taiwan	143	Early Rehabilitation combined with virtual reality training on muscle strength, mood state, and functional status ($n=38$)	Conventional physical therapy only ($n=114$)	HADS	significant decrease in anxiety and depression compared to control group ($p=0.047$)	Not reported
Olukolade & Osinowo [48]	Nigeria	Health Care Centre (University Hospitall	20	Cognitive rehabilitation therapy (CRT; $n=10$) Psychoeducation ($n=10$)	Usual care ($n=10$)	Beck's Depression Inventory (BDI)	Significant differences in depression scores within intervention groups and control. Significant difference between groups in depression scores (CRT difference and control being the greatest)	Not reported
Peng et al. [49]	China	Recruited from Hospital	180	Neuro-Linguistic Programming (NPL) brief therapy ($n=90$)	Usual care ($n=90$)	Hamilton-17 Depression Scale and Hamilton Anxiety Scale	Significant difference between groups in the prevalence of anxiety ($p=0.016$) depression and ($p=0.003$) after intervention. Not after 6-month follow-up ($p>0.05$).	Not reported
Ragliol et al. [50]	Italy	Recruited from hospital rehabilitation ward following stroke	38	Active Music Therapy ($n=19$)	Standard Care ($n=19$)	HADS, Italian version of the McGill Quality of Life Questionnaire	No significant difference between control and music therapy. Significant decrease in anxiety and depression scores within experimental group ($p=0.016$)	Not reported
Thomas et al. [51]	United Kingdom	Recruited from hospital wards	105	Behavioural therapy ($n=54$)	Usual Care ($n=51$)	Stroke Aphaisic Depression Questionnaire, Visual Analog Mood Scales 'sad' item, and Visual Analog self-esteem scale	significant difference at 6 months between control and intervention group ($p=0.02$)	Not reported
Wang et al. [52]	China	Recruited from Hospital	134	Mindful based CBT ($n=67$)	Stress management education ($n=67$)	Centre for epidemiologic studies depression scale (CES-D)	Significant differences in depression score in intervention group.	Not reported
Watkins et al. [53]	United Kingdom	Recruited from hospital wards	411	Motivational Interviewing ($n=204$)	Usual Care ($n=207$)	GHQ- 28	Significant difference between groups ($p=0.03$).	Not reported

their data. From the 12 studies assessed by the primary researcher and external researcher, 100% agreement was met on 7 items of the CASP RCT (items 1, 2, 3, 4, 5, 10 and 11), there was 96% agreement on 2 items (items 6 and 7), 88.89% on item 8, and 80% on item 9. The overall agreement rate for the quality assessments between researchers was 97% ($n = 12$) and the inter-rater reliability (Cohen's kappa) for overall quality was substantial, $k = 0.94$.

Appraisal of the reporting of protected characteristics

Using the augmented PROGRESS-Plus framework [29, 30] to assess the reporting of protected characteristics, the highest rating given to the included studies was 9/15 [46] and the lowest rating given was 2/15 [48], see Table 2. Age and Gender were the most reported and Sexual Orientation was the least reported, see Figure 2. Despite the potential links to post-stroke anxiety and/or depression, less than half the studies reported the marital status of participants [36, 37, 41, 47, 49, 51, 52]. None of the studies reported whether participants experienced any pre-morbid disability. However, five studies reported the inclusion of participants with aphasia [36, 40, 41, 50, 51]. Of these, four reported the number of participants with aphasia who took part in their studies [40, 41, 50], with one study including aphasia as an inclusion criterion [51]. Two studies reported the number of participants with a physical impairment [37, 47] and two studies reported the number of participants with vision and visual perception impairments [40, 41].

What protected characteristics have been reported in non-pharmacological intervention studies in stroke research?

Place of residence

Two studies reported the place of residence (e.g., care home vs home) of the participants ([45, 51]; See Table 2), with most participants residing at home. However, within-group differences were not explored in relation to the participant's place of residence.

Race/ethnicity/culture/language

Two of the 18 studies included demographic information regarding ethnicity and/or language [24, 37, 52]. Chen et al. [37] reported that most of their participants' primary language was Mandarin (compared with Taiwanese and Hakka). Wang et al. [52] reported that the majority of their participant's ethnicities were Han. Additionally, none of the authors reported information regarding the cultural background of the participants, other than the location of where the study took place.

Occupation

Five studies included information as to whether participants who took part in the project were employed [37, 44, 46, 49, 52]. Across these studies, most participants were unemployed. Again, the number of individuals in the control group and intervention group who were employed/unemployed was shown in the study characteristics table in these studies, but any differences within groups were not explored by any of the authors.

Gender/sex

All 19 studies included information regarding the gender of participants who took part in their study. The number of males and females in each intervention and control group were expressed in tables. However, no studies explored the differences between gender and primary or secondary outcomes. Furthermore, there was no description of whether sex was equated with gender or whether any participants identified as non-binary or transgender or if participants were provided with these options to choose from. All studies reported a mix of male and female participants.

Table 2. Appraisal of reporting adapted PROGRESS-Pluss characteristics.

Author	Demographic Characteristics reported in project	Personal characteristics reported in project	Features of relationships reported in project	Stroke Characteristics reported in study	Total Score (n/15)
Bragstad et al. [36]	Gender/Sex, Disability	Age	Marital Status or living arrangements	Location, Type of Stroke	6
Chan et al. [34]	Gender/Sex	Age	Not reported	Location, Time since stroke	4
Chen et al. [37]	Race or ethnicity or culture or language, Occupation, Gender/Sex, Religion, Education, Disability	Age	Marital Status or living arrangements,	Not reported	8
Choi & Kim, [38]	Gender/Sex	Age	Not reported	Location, Type of Stroke	4
Golding et al. [35, 39]	Gender/Sex	Age	Not reported	Time since stroke	3
Hoffman et al. [40]	Gender/Sex, Disability	Age	Not reported	Location, Type of stroke	5
Hoffman et al. [41]	Gender/Sex, Education, Disability	Age	Marital status or living arrangements	Location, Type of stroke	7
Ihle-Hansen et al. [42]	Gender/Sex, Education,	Age	Not reported	Location, Type of stroke	5
Kongkasuwan et al. [43]	Gender/Sex, Education	Age	Not reported	Location, Type of stroke	5
Kootker et al. [44]	Occupation, Gender/Sex	Age	Not reported	Location, Type of stroke	5
Lincoln & Flannaghan, [45]	Place of residence, Gender/Sex	Age	Not reported	Time since stroke	4
Lin et al. [46]	Occupation, Gender/Sex, Education, Socio-economic status	Age	Satisfaction in community	Not reported	6
Lin et al. [47]	Gender/Sex, Education, Disability	Age	Marital Status or living arrangement	Not reported	5
Olukolade & Osinowo [48]	Gender/Sex, Education	Not reported	Not reported	Not reported	2
Peng et al. [49]	Occupation, Gender/Sex, Education, Socio-economic status	Age	Marital Status or living arrangements,	Time since stroke, Location, Type of stroke	9
Ragliol et al. [50]	Gender/Sex, Education, Disability	Age	Not reported	Location, Type of stroke	6
Thomas et al. [51]	Place of residence, Gender/Sex, Disability	Age	Marital Status or living arrangements	Time since stroke, Location	7
Wang et al. [52]	Race or ethnicity or culture or language, Occupation, Gender/Sex, Education	Age	Marital Status or living arrangements	Not reported	6
Watkins et al. [53]	Gender/Sex	Age	Not reported	Type of stroke	3

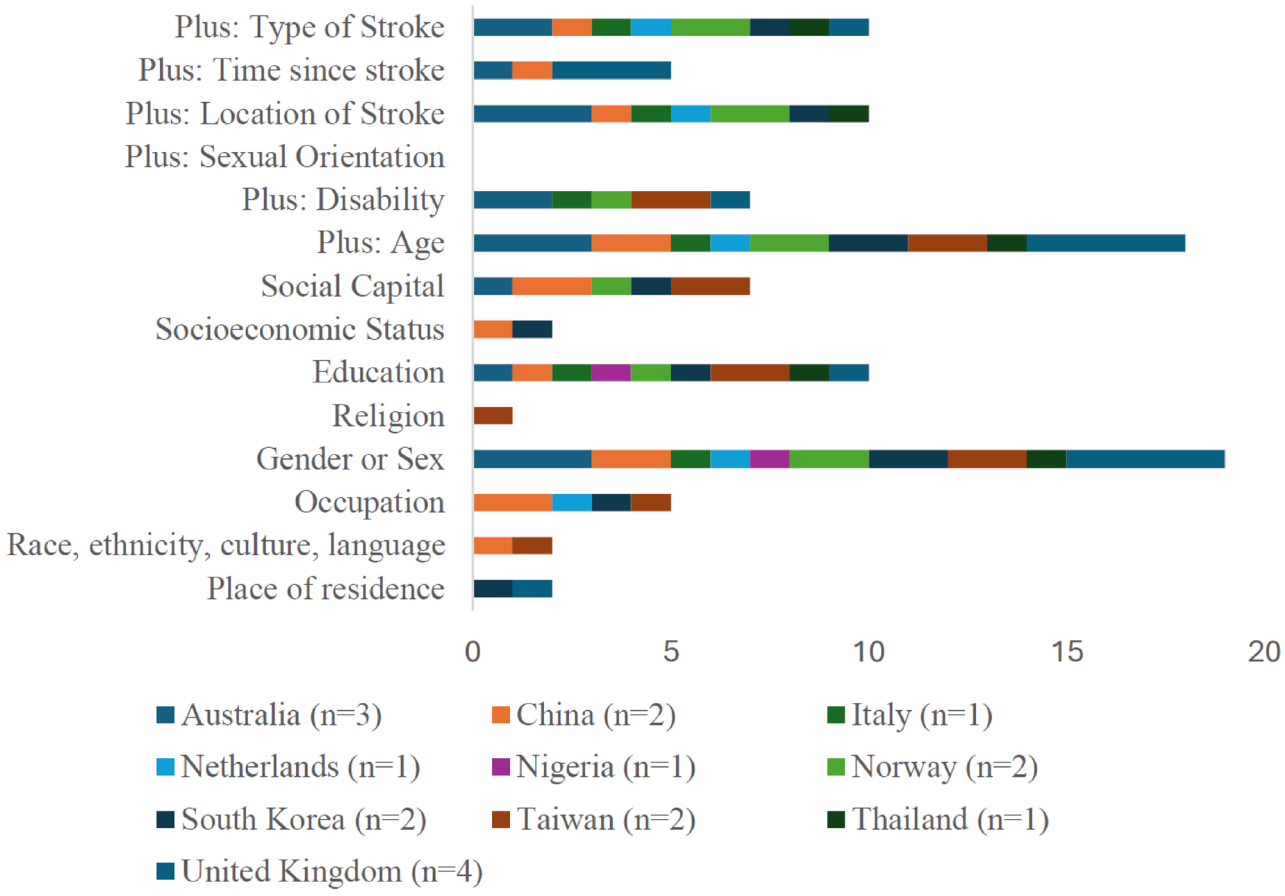

Figure 2. The number of included papers per country which reported protected characteristics across adapted PROGRESS-plus items.

Religion

One study reported the preferred religion of the participants who took part in their study [37]. With most participants being reported as having an "Other" religion (compared to Buddhism or Taoism). However, within-group differences were not explored based on religion and mood measure outcomes.

Education

Ten studies included information regarding the participant's level of education [37, 41–43, 46–50, 52] but did not explore within-group differences on outcome measure scores. The majority of participants had at least attended elementary (primary) school, with a minority of participants having completed degree level education.

Socioeconomic status

Two projects reported the economic status of participants [46, 49]. The studies appeared to have a mix of participant from different socioeconomic backgrounds or perceived sufficiency of financial satisfaction. However, only one project explored within group differences in the intervention group regarding the economic status and outcome measure scores [46]. The researchers found that those from a lower socioeconomic status were less likely to experience a significant change in mood following taking part in the intervention group.

Social capital (marital status, living arrangements including caregivers, networks and engagement in the community)

Only one study reported information regarding engagement in the community, with the researchers reporting participants' perceived level of satisfaction within a community [46, 47]. Marital status and living arrangements are considered a feature of a relationship [29] and the review found that seven studies reported data regarding whether participants were married and/or reported on living arrangements [36, 37, 41, 47, 49, 51, 52]. Most participants across all studies were married, lived with another person, and/or lived in independent housing. One study reported whether participants had caregivers [46]. It was uncertain whether Chen et al. [37] reported whether participants were primary caregivers or had primary caregivers. Projects were not given additional scores for including both marital status and living arrangements.

The only study which explored subgroup differences relating to caregivers and social capital, was Lin et al.'s [46] study. Social factors such as whether participants had caregivers were found to have an impact on the likelihood of experiencing depression following stroke at different points of the project [46]. Additionally, Lin et al. [46] found that in the intervention group who received social support, there was a significant difference in mean depression scores in favour of those with social support. However, no other studies explored the impact social capital can have on the accessibility/effectiveness of post-stroke anxiety/depression interventions.

Plus (additional factors associated with discrimination)

Age. 18 studies included the mean age of the participants in the data analysis. However, no exploration regarding differences in age and outcome measure scores on the targeted intervention took place in any of the studies. The mean (M) age of participants across all these studies were over 60 and under 76 years of age. One study did not include the age of participants [48].

Disability/stroke characteristics. None of the 19 studies reported whether participants experienced any pre-stroke disability. Five studies explicitly stated that they included participants with a form of aphasia/language impairment [36, 40, 41, 50, 51]. However, those with severe expressive aphasia were not included in most of these studies [36, 40, 41, 50]. Of these, three reported the number of participants with Aphasia (Hoffman [40, 41, 50]. Only one study included participants with severe communication difficulties and set communication difficulties as an inclusion criterion [51]. All other studies included in the review cited the ability to verbally communicate as being an inclusion criterion to take part in their study.

Two studies reported the level of physical disability required to take part in their studies [37, 47] and two studies reported the number of participants with vision and visual perception impairments [40, 41].

None of the studies reported the number of participants with cognitive impairment included in their studies.

Eleven of the 19 studies reported the location of participants' strokes [34, 36, 38, 40–44, 49–51]. Five studies reported the time since participants had had a stroke [34, 35, 39, 45, 49, 51], and 10 reported the type of stroke participants had experienced [36, 38, 40–44, 49, 50, 53].

Sexual orientation. None of the 19 studies reported the sexual orientation of those who took part in their research.

Discussion

This scoping review investigated the reporting of protected characteristics in non-pharmacological intervention studies for post-stroke anxiety and/or depression. The pooled analysis of the 19 studies revealed a range of differences in the reporting of demographic information of participants in stroke research.

Using the augmented PROGRESS-Plus framework [29, 30] to assess protected characteristics reporting, the highest rating given to the included studies was 9/15 (46) and the lowest rating given was 2/15 [48]. Age was the most reported protected characteristics, sexual orientation the least reported (see Table 2).

The majority of the studies reported the recruitment process for those taking part, but with one study being more ambiguous as to where the project was advertised [44]. Furthermore, the trialists were transparent regarding the outcome measures used, at what time points participants completed the measures, and what interventions were used to support post-stroke anxiety/depression.

Despite the understanding that protected characteristics can impact the accessibility of healthcare services and research [54], many papers reported few protected characteristics regarding the participants who took part. Other reviews analysing the consideration of the exploration of protected characteristics in health-related research also report similar findings [30, 55]. For example, Plastow et al. [32] noted in their systematic review of mental health interventions for post-stroke survivors in Africa that the median number of protected characteristics from their adapted PROGRESS-Plus framework was 9 out of 18. Plastow et al. [32] and Madani et al. [54] also commented on the poor reporting of protected characteristics across their adapted PROGRESS-Plus frameworks, with some characteristics, such as religion or social capital, not being reported. In this scoping review, several studies reported as little as three or four participant protected characteristics with none including information regarding the sexual orientation of participants [35, 38, 39, 43].

Although, understandably, researchers may not feel the need to disclose all the characteristics outlined in PROGRESS-Plus [56], it was worrying to notice that key clinical characteristics relating to stroke and health inequity were missed, including lesion location, type of stroke, and time since stroke. Furthermore, considering that besides age and gender, ethnicity, health history, living alone, marital status, place of residence, socioeconomic status [21, 57–59], accessibility to services [21, 23], and perceived quality of life of stroke survivors [24] are all known to impact stroke likelihood, it is surprising that these demographic and social factors were rarely reported in the included studies. Most papers in their inclusion/exclusion criteria did disclose the time frame in which participants sustained their stroke and whether those with cognitive impairment, language deficits, or physical disabilities were eligible to take part. It would have been beneficial to gain a better understanding of specific stroke characteristics, such as lesion location, of those taking part as well as any other disabilities or mental health conditions (outside of anxiety/depression) as these are also known to impact the likelihood of experiencing anxiety or depression following a stroke [9, 60].

Furthermore, only eight studies reported the marital status or living arrangements of stroke participants [36, 37, 41, 46, 47, 49, 51, 52] and only nine of the studies reported level of participant education [37, 41, 43, 46–50, 52]. As some research suggests that marital status, living arrangements, and level of education have a significant impact on post-stroke anxiety and/or depression [17], this would seem like an important characteristic to include when reporting effectiveness of non-pharmacological interventions.

By reporting the context of who is taking part in post-stroke anxiety/depression non-pharmacological research, services and clinicians can gain a better understanding of what interventions may be accessible for those in their care [56]. Here, only one non-pharmacological intervention paper investigated subgroup (protected characteristics) differences in outcome measures [46]. The researchers found that those from a lower socioeconomic status or without social support were less likely to experience a positive outcome following the intervention [46]. As there are many factors which can impact an individual's ability or willingness to engage in an intervention [54], these additional analyses would provide fellow researchers and clinicians with a greater understanding of the context in which the intervention may be more or less accessible.

A strength of this systematic review is that it is the first to examine the reporting of protected characteristics in non-pharmacological stroke research for post-stroke anxiety and/or depression, globally. Further strengths of the review include the use of a quality tool [33] in order to assess the robustness of findings, despite scoping reviews not being required to check for quality and the use of a protected characteristics framework (PROGRESS-Plus [29]), which incorporates the demographic and social factors considered to impact stroke likelihood, access to services, and outcomes, adding to the robustness of the review.

Limitations include that the search for papers was limited to those written in English; several RCT papers investigating the effectiveness of CBT interventions for post-stroke anxiety and/or depression identified in Wang et al.'s [24] review were thus not included, and others not known to the authors may have been missed. Furthermore, only studies which investigated post-stroke anxiety/depression as a primary goal were investigated. Therefore, other non-pharmacological RCT studies investigating the impact of interventions on anxiety/depression as secondary outcomes were not included. Additionally, the review solely focused on the reporting of demographic and social factors in RCTs, which could be a potential source of bias. A further limitation is that it is not known what characteristics researchers gathered for their studies

but did not report, or whether subgroup analyses to compare outcomes across protected characteristics were originally planned in their protocol. Therefore, the review is unable to reflect on whether the intentions of reporting and analysing subgroup data by the researchers differed to what was then reported.

Despite attempting to extract data, due to the limited number of studies exploring differences on outcome measure scores across protected characteristics (demographic and social factors), we have not been able to advance our understanding of what non-pharmacological interventions may be more effective for whom. However, whereas only Lin et al. [46] investigated differences in outcomes according to participants' protected characteristics, it was interesting to identify that those with caregivers and social support were less likely to experience depression following a stroke. Interestingly, this aligns with other work suggesting that those with social support are less likely to experience post-stroke depression [17, 61]. Furthermore, the Lin et al. [46] study is also consistent with evidence that people from a lower socioeconomic background are more likely to experience post-stroke depression as there was no significant change in outcome measure scores for mood [20, 62, 63]. However, there is a mixed research base regarding how this may interact with the place of residence of an individual, such as if individuals live in more urban areas or rural [62]. Additionally, research suggests that socioeconomic status can act as a barrier to accessing and engaging with stroke services and impact health outcomes [57].

To reduce health disparities, we must better understand what may work and what may not work for different subgroups, based on researchers' analyses and explanations of their results. Future studies focusing on the use of non-pharmacological for post-stroke anxiety and/or depression should thus consider using the PROGRESS-Plus framework when reporting participant characteristics [29]. This would allow researchers and healthcare professionals to know who is currently taking part in stroke research, whether stroke research is representative of the population being treated, and how effective the various non-pharmacological interventions are, across subgroups [55]. It is understandable that subgroup analysis of outcomes across protected characteristics may only sometimes be possible. Barriers to performing such analysis may be restricted to the data itself and if the study becomes underpowered when analysing subgroup data, the data analysis may no longer be of interest to other researchers and will be considered to have weak methods [64]. However, regardless of this, protected characteristics (demographic and social factors) known to impact the likelihood of stroke, access to stroke services, and stroke outcomes, such as age, disability, ethnicity/race/culture/language, education, gender/sex, socioeconomic status, social capital, place of residence, stroke type, location of stroke, and time since stroke, should be investigated and reported in relevant research.

Conclusion

In summary, the majority of the RCTs included in the study reported some of the protected characteristics most relevant to the non-pharmacological management of post-stroke anxiety and/or depression. However, only one of the included studies detailed relevant analyses to enable us to determine which population subgroups may find the specified non-pharmacological interventions to be more accessible and/or beneficial. Future research should focus on including the relevant protected characteristics of their participants and analyse any differences in anxiety and/or depression outcomes across protected characteristics where sample size allows. This will assist stroke services in adhering to evidence-based practice and be better able to support rehabilitation post-stroke by understanding what interventions may be more accessible to their service users.

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