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Research Paper

# General practitioners' knowledge and perspectives on post-stroke depression, anxiety, apathy, and fatigue: a cross-sectional survey study

Robert M. Callaghan [a,b], Kieran Dalton [a], Fiona Coffey [c], Tony Foley [d], Rachel D. Moloney [a,b,e], Christian Waeber [a,b,*], Irene Hartigan [f]

[a] School of Pharmacy, University College Cork, Cork, Ireland
[b] Department of Pharmacology and Therapeutics, School of Medicine, University College Cork, Cork, Ireland
[c] Ross Medical Practice, Killarney, Kerry, Ireland
[d] Department of General Practice, School of Medicine, University College Cork, Cork, Ireland
[e] APC Microbiome Ireland, University College Cork, Cork, Ireland
[f] School of Nursing and Midwifery, University College Cork, Cork, Ireland

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ABSTRACT

*Background:* Post-stroke neuropsychiatric symptoms are common but frequently overlooked in clinical practice. General practitioners (GPs) who maintain long-term patient relationships are well placed to identify these symptoms.
*Aims:* To assess GPs' knowledge, beliefs, and confidence in diagnosing and managing post-stroke neuropsychiatric symptoms, and to explore their management strategies as well as perceived barriers.
*Methods:* A survey was distributed to GPs practising in the Republic of Ireland in June 2024. Quantitative data was analysed descriptively and inferentially, and free-text responses underwent conventional content analysis.
*Results:* Of the 292 respondents, the majority (85%) viewed that post-stroke neuropsychiatric symptoms are underdiagnosed. Nearly two-thirds viewed themselves as the healthcare professionals most responsible for diagnosing and managing these symptoms. Despite this, the proportions who were very/extremely confident in diagnosing and managing these symptoms were low: depression (27%), anxiety (26%), apathy (15%), and fatigue (15%). The proportion who often/always screened for these conditions was low, with post-stroke depression (45%), and anxiety (34%) being screened more often than fatigue (23%) and apathy (17%) Some of the strongest perceived barriers to effective diagnosis and management included other post-stroke complications being higher priority, insufficient time during consultations, insufficient hospital discharge information, and post-stroke cognitive impairment.
*Conclusions:* GPs perceive post-stroke neuropsychiatric symptoms as frequently missed, highlighting a critical opportunity for earlier recognition in primary care. Enhanced support and resources are required to improve assessment and management. These findings can guide targeted resource allocation to address barriers in providing mental health care to stroke survivors.

## 1. Introduction

Stroke is a major cause of premature death and disability worldwide (Feigin et al., 2025). Advances in acute treatments like the introduction of thrombolysis and thrombectomy have seen increased post stroke survival rates (Kunz et al., 2020; Wardlaw et al., 1997). This improvement in acute stroke management has shifted attention to the long-term consequences of stroke, such as acquired speech impairment and reduced physical ability (Feigin et al., 2008; Fu et al., 2025). Stroke survivors often also experience significant psychological distress, leading to neuropsychiatric symptoms such as low mood, which negatively impacts quality of life and mortality (Donnellan et al., 2010; Waller et al., 2023). However, these symptoms are frequently not the immediate focus in either research or clinical practice which typically emphasise sensorimotor deficit recovery, viewing emotional impacts as secondary consequences to these sequelae (Callaghan et al., 2025; White et al., 2008).

If post-stroke mood changes are not identified, they can develop into

* Corresponding author at: School of Pharmacy, University College Cork, Cork, Ireland.
*E-mail address:* c.waeber@ucc.ie (C. Waeber).

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mental health disorders such as post-stroke depression and anxiety, affecting approximately 30–50% and 25% of stroke survivors respectively (Liu et al., 2023; MacKenzie and Moreno-Gomez, 2024; Schöttke and Giabbiconi, 2015). Depression and anxiety have been shown to significantly burden stroke survivors, causing reduced quality of life while also negatively impacting overall recovery, as survivors suffering from these neuropsychiatric symptoms frequently disengage with support services and rehabilitation programmes (de Graaf et al., 2022; Kim et al., 2018). These symptoms can also affect family members, who are more likely to experience feelings of sadness (Gurley Nettles, 2024; Yuliana et al., 2023). Depression in stroke survivors has financial implications as well, with hospitalisation costs higher in this subpopulation due to longer duration of admission (Husaini et al., 2013; van Eeden et al., 2016). Importantly, post-stroke depression has also been associated with increased rates of suicidal ideation, suicide attempts, and suicide mortality, further emphasising the importance of early recognition and effective management of post-stroke neuropsychiatric symptoms (Vyas et al., 2026).

The presence of other neuropsychiatric symptoms can complicate the identification of post-stroke depression; they include post-stroke apathy and post-stroke fatigue, which affect approximately 30% and 50% of survivors respectively (Paciaroni and Acciarresi, 2019a; Tay et al., 2021a; van Dalen et al., 2013). These symptoms may present similarly to depression but require their own clinical approaches. Post-stroke apathy is a syndrome involving a reduction in goal-directed behaviour, emotion, and cognition (Pallucca et al., 2024b). It manifests as diminished motivation, leading to less initiative, reduced emotional responsiveness, and decreased engagement in social or cognitive activities compared to the individual's previous functioning. Patients with apathy often appear indifferent, showing less interest in their health, environment, or relationships, and this condition can significantly impair recovery and daily functioning (Tang et al., 2018; Tay et al., 2021b). Fatigue after stroke is persistent and can severely affect daily activities and rehabilitation efforts; however, unlike apathy, fatigue is primarily characterised by an early onset of exhaustion rather than a loss of motivation or goal-directed behaviour (Douven et al., 2017). Post-stroke fatigue is a multidimensional experience encompassing physical, emotional, and cognitive exhaustion (Paciaroni and Acciarresi, 2019b). It is described as an overwhelming sense of weariness and lack of energy that arises during physical or mental activity and is typically not relieved by rest. Importantly, studies suggest that post-stroke depression, apathy, and fatigue are independent syndromes, and each requires distinct clinical recognition and management (Aubignat et al., 2023; MacIntosh et al., 2017). Similar to depression, apathy and fatigue can also profoundly impede stroke recovery and cause substantial distress to both the stroke survivor and their families (Choi-Kwon and Kim, 2011; Hama et al., 2007; Pallucca et al., 2024a). Thus, it is important that symptoms of apathy or fatigue are identified and dealt with appropriately to improve stroke recovery. Given the debilitating nature of these neuropsychiatric symptoms, early identification is crucial for improving patient outcomes.

A key feature of Irish primary care is the Chronic Disease Management (CDM) programme, which provides General Practitioner (GP)-led follow-up for patients with long-term conditions such as stroke (Tandan et al., 2022). However, routine CDM review templates primarily focus on physical health indicators and secondary prevention with limited emphasis on the systematic assessment of post-stroke mental health outcomes. Despite this limitation, the National Clinical Guidelines for Ireland and the UK emphasises the role of GPs as part of a multidisciplinary approach in recognising and managing these neuropsychiatric symptoms, advocating for training and resources to enhance their effectiveness in this area (National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023). Furthermore, as the primary point of contact for many stroke survivors in the community, GPs may be well placed to detect changes in mood and behaviour, informed by their ongoing understanding of patients' pre-stroke functioning, social context, and health trajectory. GPs are frequently involved in the identification and management of common mental health conditions in primary care and skills developed in this context may be transferable to the assessment and management of post-stroke mental health conditions (Poppleton et al., 2018; Sarzyńska-Długosz, 2023; Wittchen and Pittrow, 2002). However, it is currently unclear whether GPs view post-stroke neuropsychiatric symptoms as conditions requiring targeted treatment or as transient manifestations of sensorimotor recovery that will resolve without targeted intervention. It is also unknown how confident GPs are in assessing and managing these symptoms. Addressing these gaps is crucial for developing targeted educational interventions that could enhance the early identification and management of post-stroke neuropsychiatric symptoms. Therefore, this study examines GP perspectives, confidence, treatment approaches, and perceived barriers, with implications for policy and future research.

## 2. Materials and methods

### 2.1. Study design and eligibility criteria

This study employed a mixed-methods approach with the use of a cross-sectional survey. The survey was distributed to GPs in the Republic of Ireland using paper and electronic versions in June 2024, and it remained open until September 2024. Eligible participants had to be currently practising as a GP in the Republic of Ireland.

### 2.2. Ethical approval and study reporting

The study received ethical approval (application log 2024-114) from the Social Research Ethics Committee at University College Cork before its initiation. To ensure informed participation, consent was obtained from all participants via a yes or no question following their review of the study information. This study was reported in compliance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement (Elm et al., 2007).

### 2.3. Survey design

The survey was drafted via reviewing relevant literature, (Haws et al., 2011; Manning and Marr, 2003; Richards et al., 2004), then iteratively refined via feedback from research team members resulting in a questionnaire with twenty-six questions. The survey was then piloted with a stroke survivor, a GP, a clinical psychologist, and a stroke consultant independent of the research team; minor feedback from this pilot helped refine the survey, and the number of questions remained unchanged at twenty-six. However, the section focusing on management strategies was changed to focus solely on post-stroke depression, as exploring management strategies for all four symptoms was deemed too time consuming. The final survey contained yes/no, multiple choice, and Likert scale questions, in addition to an open-ended question. It covered three areas: 1) beliefs and knowledge around neuropsychiatric symptoms, 2) the identification and management of symptoms, and 3) perceived barriers associated with treating these symptoms. Relevant demographic information was also ascertained at the beginning of the survey (Supplementary Material Appendix A). While stroke can lead to a wide range of neuropsychiatric alterations such as emotionalism, mania, and suicidality (Broomfield et al., 2024; Ortega, 2022; Zhang et al., 2022), feedback from a pilot run of the survey suggested that we should limit its scope and the final survey focused on post-stroke depression, anxiety, apathy, and fatigue for this study.

### 2.4. Sampling and survey distribution

The names of 2866 practising GPs in the Republic of Ireland were transferred from the Irish Medical Directory 2024 into an Excel® spreadsheet. A number was assigned to each GP using the random

number function in Excel®, creating a random ordering of all eligible GPs. The first 1500 GPs in this randomly ordered list were selected to receive the postal survey. This approach was taken to match the scope of the survey to resources of the research team and considering a sample size selected to achieve a target of around 200 responses based on prior research with postal surveys to GPs in the Republic of Ireland, which received a response rate of approximately 25% with postal surveys. For this study, we took a conservative approach and based our sample size on a 15% response rate (Hurley et al., 2023). Within each survey-filled envelope was a smaller envelope which enabled participants to return a completed survey for free via post. An electronic version of the survey was developed using the online platform Qualtrics® XM. The survey link was distributed via email to GPs listed in the Irish Medical Directory 2024 who had provided an email address ($n = 998$), and via two GP WhatsApp groups (facilitated by gatekeepers independent of the research team). In addition, the survey was advertised on LinkedIn and X using the research team's accounts over a four-week period in a staggered manner. The participant information sheet stated that only practising GPs in the Republic of Ireland were eligible to participate. Prior to accessing the survey, participants were required to provide informed consent and confirm that they met the eligibility criteria. For respondents recruited via social media, eligibility was therefore based on self-declaration and was not independently verified. Multiple survey links were used to enable identification of the recruitment source for electronic responses.

### 2.5. Data analysis

Data from paper-based surveys were transferred to Qualtrics® XM by one researcher (first author RMC); thereafter, the data were transferred to IBM® SPSS version 28 to perform descriptive and inferential statistics. Descriptive statistics are presented with 95% confidence intervals where applicable. Graphs were generated with GraphPad Prism (GraphPad Software, Version 10.2.3). Chi-squared ($\chi 2$) testing was used to compare groups on categorical data. Differences were considered statistically significant when $p < 0.05$. Given the exploratory nature of this study, no adjustment was made for multiple testing (e.g., Bonferroni correction), and analyses were not restricted to pre-specified hypotheses (Bender and Lange, 2001). This approach was chosen to reduce the risk of missing potentially meaningful associations that could be investigated further. However, this increases the risk of type I error, and findings should therefore be interpreted as hypothesis-generating only.

Free-text responses to the final survey question were exported into NVivo® version 14 to facilitate data management and coding. The analysis followed a conventional content analysis, as described by (Hsieh and Shannon, 2005) whereby categories are derived inductively from the data without the use of preconceived coding schemes. The research team first familiarised themselves with the data to gain an overall understanding of the participants' responses. RMC conducted initial open coding using non-hierarchical codes, allowing codes and preliminary categories to emerge directly from the data. These initial categories were subsequently developed into themes through an iterative process involving ongoing discussion and refinement with the research team. This process enhanced the credibility of the findings and supported alignment between the themes and the participants' perspectives. As part of this process, related themes were reviewed and consolidated; for example, three closely related themes were combined into a single overarching theme comprising distinct subthemes.

Given the exploratory nature of this research and the optional open-ended format of the qualitative analysis prompt, the counting of code frequencies was intentionally omitted. This decision was made to prioritise qualitative insights and to avoid potential bias associated with frequency counts, thereby fostering a nuanced understanding of the complexities surrounding post-stroke mental health care. A critical realist epistemological stance underpinned the analysis, recognising that participants' accounts reflect both individual experiences and broader contextual influences (Leung and Chung, 2019).

Although data was generated through a widely distributed survey, the qualitative analysis remained inductive and flexible, consistent with the principles of conventional content analysis. This method allowed for a thorough exploration of participants' experiences without imposing a rigid structure on the responses. The flexibility of content analysis enabled the extraction of meaningful insights from the data, supporting the exploratory nature of the research. Key decisions made by the research team were documented regarding the development of themes which included code modifications and reflecting on potential biases which each member brought to the study. At the time of the study, RMC was a PhD candidate with BPharm and MPharm qualifications and experience in community pharmacy. While RMC had professional interactions with general practitioners, he was not personally known to any respondent. Prior to coding, RMC believed GPs should play a key role in identifying and managing post-stroke mental health conditions, with a particular interest in pharmacological treatments. These professional biases in the design and analysis stages were minimised by the multidisciplinary input of the research team: pharmacy (RMC, KD), general practice (FC, TF), nursing (IH), and pharmacology (RDM, CW).

## 3. Results

A total of 292 responses were received. Of these, 261 (89%) were received by the postal route: 205 paper surveys returned by post (70%) and 56 (19%) through the QR code on the paper survey's front page. The remainder were received via email ($n = 24$), WhatsApp ($n = 4$), and LinkedIn ($n = 3$) (Fig. 1).

Respondent demographics are displayed in Table 1.

### 3.1. Beliefs and knowledge around post-stroke neuropsychiatric symptoms

When asked what percentage of stroke survivors experience post-stroke depression within the first year, one in four (95% CI: 20%−30%) GPs reported prevalence estimates of post-stroke depression consistent with published literature (20–50%) (Fig. 2A), while nearly half of respondents (47%, 95% CI: 41%−53%) reported peak incidence rates of post-stroke depression consistent with published literature (Fig. 2B) (Dafer et al., 2008).

Regarding beliefs around post-stroke neuropsychiatric symptoms, 48% (95% CI: 42%−54%) agreed and 40% (95% CI: 34%−46%) strongly agreed that active screening should be undertaken in all stroke survivors. The same proportions agreed that treating these mental health symptoms were as important as sensorimotor symptoms. Similarly, 49% (95% CI: 43%−55%) agreed and 36% (95% CI: 30%−42%) strongly agreed that neuropsychiatric symptoms are underdiagnosed. Finally, approximately three quarters (78%, 95% CI: 73%−83%) of GPs agreed overall that a pharmacological approach to the management of neuropsychiatric symptoms was appropriate (Fig. 2C).

#### 3.1.1. Key contributors to post-stroke depression

When asked to rank four contributors to post-stroke depression, the presence of neurological complications (e.g. aphasia, dysphagia) and social risk factors (e.g. living alone, lack of support network) were ranked as the most important contributors by 35% (95% CI: 29%−41%) and 33% (95% CI: 27%−39%) of respondents respectively. Neurobiological changes as a result of stroke and psychological risk factors were deemed less influential, with 49% (95% CI: 43%−55%) and 24% (95% CI: 19%−29%) of GPs ranking these respective factors as the least important contributors to the development of post-stroke depression (Supplemental Fig. 1A).

#### 3.1.2. GP's role in post-stroke neuropsychiatric care

The majority of respondents (61%, 95% CI: 55%−67%) felt that GPs were most responsible for identifying and managing post-stroke neuropsychiatric symptoms (Supplemental Fig. 1B).

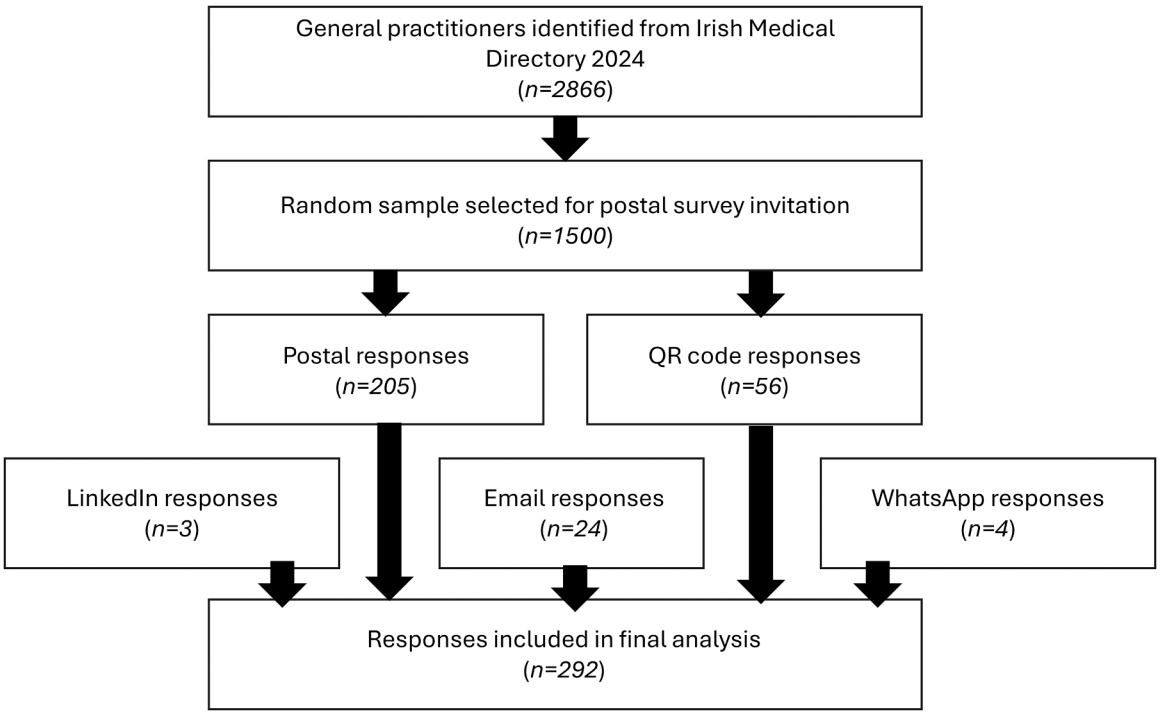



**Fig. 1.** Flowchart of GP recruitment channels for survey participation. A total of 2866 practicing general practitioners (GPs) were identified from the Irish Medical Directory 2024. Of these, 1500 were randomly selected and invited to participate in a postal survey. Additional participants were recruited via electronic distribution channels. Overall, 292 responses were received and included in the final analysis. Eligibility for electronic responses was based on self-declaration of being a practising GP in the Republic of Ireland.

### *3.2. Diagnosis and management of post-stroke neuropsychiatric symptoms*

#### *3.2.1. Confidence in identifying and differentiating post-stroke neuropsychiatric symptoms*

When asked about confidence in their ability to identify and manage neuropsychiatric symptoms, GPs were much more confident managing disorders such as major depressive disorder and generalised anxiety disorder when compared to post-stroke neuropsychiatric symptoms (Fig. 3A1).

GPs expressed difficulty in differentiating between post-stroke neuropsychiatric symptoms with approximately half expressing they were not at all or only slightly confident in differentiating between post-stroke depression and apathy (55%, 95% CI: 49%–61%), depression and fatigue (49%, 95% CI: 43%–55%), and apathy and fatigue (59%, 95% CI: 53%–65%) (Fig. 3A2).

#### *3.2.2. GP screening practices for post-stroke neuropsychiatric symptoms*

The likelihood of screening stroke survivors for neuropsychiatric symptoms was low, with post-stroke fatigue and post-stroke apathy being the least often screened for by GPs (Fig. 3B1).

Approximately one in eight (13%, 95% CI: 9%–17%) GPs frequently used screening tools such as the Patient Health Questionnaire-9 (PHQ-9), Beck's Depression Inventory (BDI), and Generalised Anxiety Disorder Questionnaire (GAD-7) (Lakkis and Mahmassani, 2015); 4% (95% CI: 2%–6%) 'always' used these tools, 9% (95% CI: 6%–12%) 'often' used them, and 33% (95% CI: 27%–39%) 'never' used them. When asked about diagnostic criteria such as those listed in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) or the 11th revision of the International Classification of Diseases (ICD-11), 4% (95% CI: 2%–6%) 'always' used them, 18% (95% CI: 13%–23%) 'often' used them, and 29% (95% CI: 24%–34%) 'never' used them (Fig. 3B2).

#### *3.2.3. GP management strategies for post-stroke depression*

GPs were asked to specify how likely they would be to recommend or prescribe various interventions for post-stroke depression. As shown in Fig. 4, non-pharmacological approaches were popular, with most respondents being likely or extremely likely to recommend psychosocial interventions (91%, 95% CI: 88%–94%), rehabilitation with a physiotherapist/occupational therapist (91%, 95% CI: 88%–94%), and information/education provision (83%, 95% CI: 79%–87%). Some classes of pharmacological therapy were also favoured, with 87% (95% CI: 83%–91%) of GPs being likely or extremely likely to recommend selective serotonin inhibitors (SSRIs), and to a lesser extent serotonin and noradrenaline reuptake inhibitors (55%, 95% CI: 49%–61%), and tetracyclic antidepressants (43%, 95% CI: 37%–49%).

An open question asked GPs prescribing SSRIs which agent they would be most likely to prescribe for post-stroke depression. Sertraline was the most common, mentioned by 170 respondents (58%), followed by escitalopram ($n = 76$; 26%), citalopram ($n = 33$; 11%), fluoxetine ($n = 13$; 4%), and paroxetine ($n = 2$, 1%).

### *3.3. Barriers to identifying or managing post-stroke neuropsychiatric symptoms*

GPs were asked to rate the extent to which they believed various factors were barriers to identifying or managing post-stroke neuropsychiatric symptoms. The factors most highly rated as a 'strong barrier' were lack of time (42%, 95% CI: 36%–48%), other post-stroke complications being more pressing (38%, 95% CI: 32%–44%), lack of discharge information from secondary care (35%, 95% CI: 29%–41%), limited access to mental health services (33%, 95% CI: 27%–39%), and the co-morbidity of post-stroke cognitive impairment (32%, 95% CI: 27%–37%) (Fig. 5).

To identify factors associated with perceived barriers to detecting and managing post-stroke neuropsychiatric symptoms, chi-squared analysis was conducted to explore potential associations between each barrier and respondent characteristics (Supplemental Table 1).

**Table 1**
Respondent profile.

| Descriptor | Frequency (number, %) | Descriptor | Frequency (number, %) |
|---|---|---|---|
| **Years practicing as a GP:** | | **Practice location (interpretation left to participant):** | |
| 0–4 | 17 (6%) | Inner city | 25 (9%) |
| 5–9 | 51 (17%) | City suburb | 88 (30%) |
| 10–19 | 86 (29%) | Town | 126 (43%) |
| 20–29 | 63 (22%) | Village | 53 (18%) |
| ≥30 | 75 (26%) | | |
| **Gender:** | | **Practice is a primary care centre[#]:** | |
| Man | 138 (47.4%) | Yes | 79 (27%) |
| Woman | 152 (52.2%) | No | 213 (73%) |
| Prefer not to say | 1 (0.34%) | | |
| **Rotations undertaken during GP training:** | | **Designated mental health professional available at your practice:** | |
| Psychiatry | 223 (76%) | No | 240 (82%) |
| Geriatric | 186 (64%) | Yes – full time | 13 (4%) |
| Stroke Unit | 72 (25%) | Yes – part time | 38 (13%) |
| Neurology | 46 (16%) | | |
| **No. of GPs working in practice on a given day[&]:** | | **Confidence managing the neurological consequences of stroke** | |
| 1–3 | 191 (65%) | Not at all confident | 48 (16%) |
| 4–6 | 94 (32%) | Slightly confident | 80 (27%) |
| 7–9 | 9 (3%) | Moderately confident | 130 (45%) |
| ≥10 | 4 (1%) | Very confident | 28 (10%) |
| | | Extremely confident | 5 (2%) |
| **Sessions (defined as 4-hours of work) worked per week[&]:** | | **Engagement with continuous professional development in the area of psychiatry:** | |
| ≤2 | 3 (1%) | At least once per year | 146 (51%) |
| >2–≤4 | 19 (7%) | Every two years | 36 (13%) |
| >4–≤6 | 53 (18%) | Every three years | 15 (5%) |
| >6–≤8 | 143 (49%) | Less than every three years | 45 (16%) |
| >8–≤10 | 75 (26%) | Never | 44 (15%) |
| >10 | 2 (0.7%) | | |
| **Consultations with stroke patients per month:** | | **Confidence in knowledge around mental health conditions:** | |
| 0–10 | 174 (60%) | Not at all confident | 0 (0%) |
| 11–20 | 101 (35%) | Slightly confident | 16 (6%) |
| 21–30 | 13 (4%) | Moderately confident | 173 (60%) |
| > 30 | 2 (1%) | Very confident | 96 (33%) |
| | | Extremely confident | 3 (1%) |
| **Distance from acute stroke service (kilometres):** | | | |
| 0–5 | 88 (31%) | | |
| 6–15 | 65 (23%) | | |
| 16–30 | 65 (23%) | | |
| 31–50 | 47 (16%) | | |
| >50 | 20 (7%) | | |

Respondent profile of GPs enrolled in the study. [&] indicates participants provided a range which fell into two groups clustered and were consequently counted in both groups. [#]A medical centre 'that allow many of the services being delivered to be made available on a single site, providing a single point of access for the user and encouraging closer coordination between providers'.

### *3.4. Qualitative results of the survey*

Approximately one-third of survey participants (34%; 99/292) provided free-text responses to the final question ("Please provide any additional thoughts you have regarding the diagnosis and management of mental health conditions post stroke by general practitioners.") (Supplementary Material Appendix A). Three main themes were identified from the responses to the final open comment section, with three subthemes under theme 1. Additional supporting quotations are included in the Supplementary Material.

**Theme 1**. – Systemic barriers to integrating post-stroke mental health care into routine practice

**Subtheme 1.1**. – Need to integrate post-stroke mental health care into routine practice

GPs noted the current lack of focus on post-stroke neuropsychiatric symptoms in routine stroke aftercare, with one GP mentioning "we do now have a more structured review of our stroke patients… however despite there being multiple parameters and biomarkers, mental health is NOT assessed…". This was reiterated by another GP highlighting the lack of communication between primary and secondary care: "The hospital services never, ever provide any information at all regarding the mental health of patients following stroke, even patients who have been in hospital/rehab for prolonged periods". Another GP also suggested that a lack of psychiatric support in hospital may be exacerbating this: "I think lack of liaison psychiatry support in hospital and rehabilitative facilities and psychiatry of later life is an issue – more for MDT [multidisciplinary team] support and guidance on second line therapy if needed".

GPs highlighted the need for a multidisciplinary approach when it comes to stroke aftercare "It needs to be a combined/team approach with not just the GP" while also mentioning the need for proactive screening early: "Early screening, early identification, early treatment, better outcome."

**Subtheme 1.2**. – Time constraints and competing priorities

GPs expressed that a major issue identifying these symptoms is lack of time, with one mentioning "time limitations are the biggest barrier in everything we do! So much complex needs". Another GP highlighted how traditional appointment times only allows a short period of time to assess post-stroke neuropsychiatric symptoms: "Generally, we don't have time to delve into mental health consequences other than a few minutes at a time".

This is further exacerbated by the considerable workload for GPs associated with stroke aftercare: "we are usually focusing more on new medications started or trying to get linked with services. We often have 15-minute appointments and that includes bloods." As well as this, another GP noted that other issues post stroke take precedence: "It just is not usually a priority given there are so much other issues to discuss in the consultation." Indeed, the presence of other neurological complications can further worsen time constraints when issues such as communication challenges are present: "Communication can be slow."

**Subtheme 1.3**. – Structural and resource constraints in primary care

Some GPs expressed frustration that while they were willing to address these symptoms, they were limited by the lack of funding for follow-up mental health and rehabilitation support services within the community: "…stroke victims have virtually no follow up support in community. Needs radical input of community supportive services in mental and physical supports". This lack of resources limits the treatment options available to GPs and potentially worsens patient outcomes: "…the overall treatment would improve if we had better and quicker access to secondary services". Stroke services were noted to be absent by one GP in their area: "No local stroke services. Therefore, no additional resources such as mental health support teams post stroke. Local mental health team would not see any patient post stroke unless very severe symptoms".

Financial constraints also play a role, with one GP mentioning that services in the public sector through the General Medical Services (GMS) scheme (an Irish scheme that provides free public health services to individuals based on an income assessment) was limited: "…there is little or no access to psychological support services for GMS patients". However, the opposite was expressed by another GP who felt that

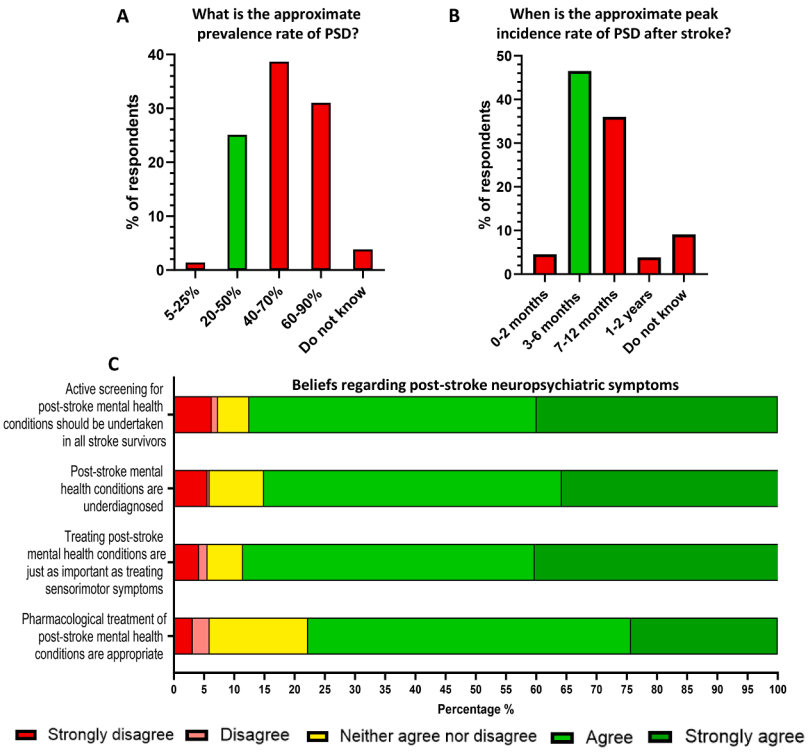



**Fig. 2.** Knowledge and beliefs of post-stroke neuropsychiatric symptoms A) GP knowledge on post-stroke depression (PSD) prevalence with green bars indicating the current estimated prevalence and incidence rates of post-stroke depression according to the literature ($n = 287$). B) GP knowledge on peak incidence of post-stroke depression ($n = 286$). C) GPs' beliefs regarding post-stroke neuropsychiatric symptoms ($n = 288$).

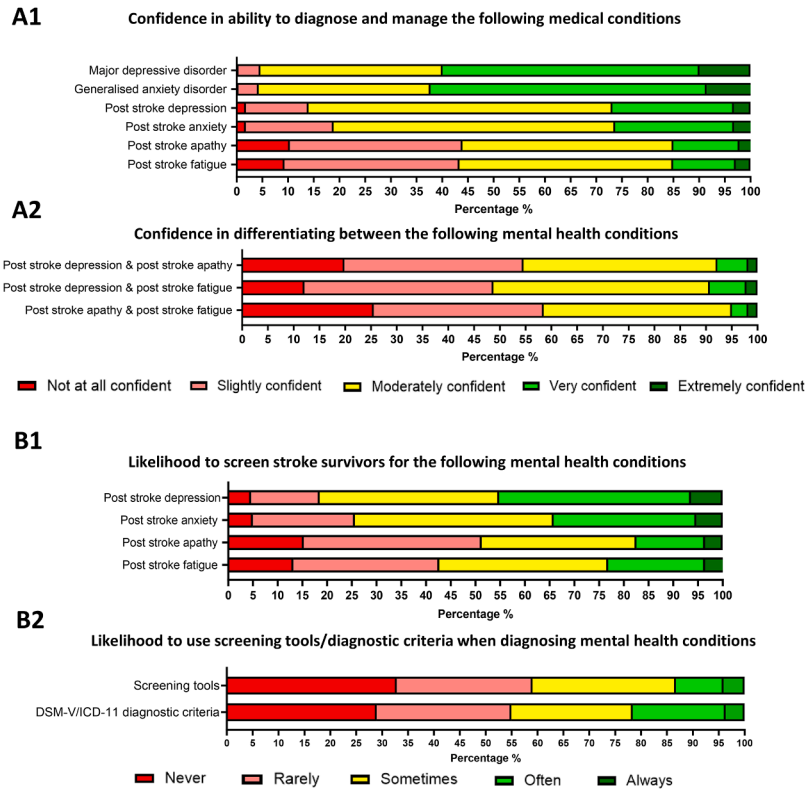



**Fig. 3.** A1) GPs' confidence in their ability to diagnose and manage mental health conditions ($n = 279–282$). A2) GPs' confidence in differentiating between different post-stroke neuropsychiatric symptoms ($n = 281–282$). B1) Likelihood for GPs to screen for different neuropsychiatric symptoms ($n = 281$). B2) GPs' likelihood to use screening tools and diagnostic criteria when diagnosing mental health conditions ($n = 271–273$).

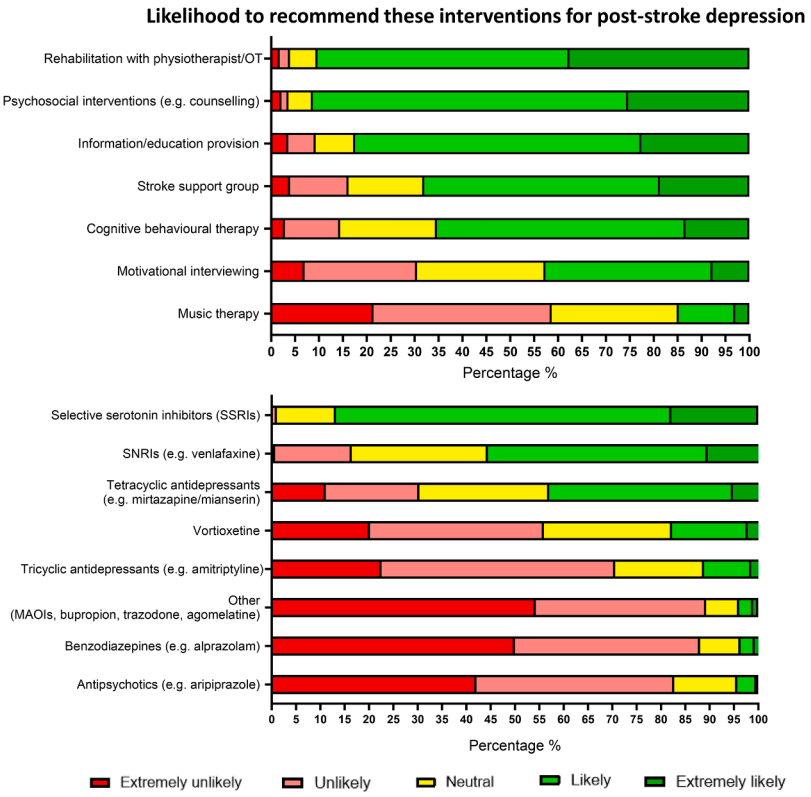



**Fig. 4.** GPs' likelihood to recommend/prescribe different non-pharmacological (top) and pharmacological (bottom) interventions to stroke survivors to treat post-stroke depression ($n$ = 270–280).

private services were lacking in comparison "access to counselling in primary care is limited to full medical card holders only."

**Theme 2.** – Difficulty recognising post-stroke mental health disorders and its burden on patients

GPs described stroke as a "life-changing, devastating diagnosis for patients with understandable mental health and quality of life consequences". However, they highlighted the difficulty in distinguishing between emotional responses following a stroke, such as grief and clinical depression. One GP noted it is "difficult to differentiate depression (endogenous) from the consequences of the stroke". Another noted that this lack of clarity often results in patient confusion: "…time is wasted and difficult for patients when they fail to identify that the way they feel is related to depression. This can lead to unnecessary setback". GPs also expressed concern about the broader impact on family and caregivers, noting that "…. think depression common especially in family or caregiver." This underscores the dual burden on both patients and their support networks, particularly when access to assessment and care is delayed.

**Theme 3.** – A willingness to manage post-stroke neuropsychiatric symptoms in primary care despite challenges

GPs identified several challenges in managing post-stroke neuropsychiatric symptoms in primary care. Many felt underprepared, "most have no formal training in this. Experience [is the] only teacher." Another expressed concern that "psych want us to manage everything when we can be out of our depth" highlighting a difference between expectations from secondary care and the realities of general practice. This was especially evident in relation to prescribing, "in regards to choice of pharmacotherapy: we follow psychiatrists' advice," and others noted the complexity of treatment decisions: "appreciating the risk-benefit profile of pharmacotherapy and how those with extreme symptoms are more likely to benefit is important."

A further challenge was the limited contact with patients in the early post-stroke period, as one GP explained: "often in the first few months after stroke we rarely see the patient as [they are] actively involved in hospital appointments." Despite this, there was a strong willingness among GPs to engage more deeply with post-stroke mental health care. Many recognised their unique position, with one noting: "GPs know their patients well. Knowing someone, their past medical history, their personality, their preferences, is very important in understanding what is contributing to mental ill health." This continuity of care was seen as a valuable asset in identifying and managing mental health issues that might otherwise go unnoticed.

## 4. Discussion

This study explores GPs' roles in identifying and managing post-stroke neuropsychiatric symptoms in primary care. Most GPs viewed themselves as primarily responsible for identifying and managing these symptoms, highlighting their unique position given longstanding patient relationships and prior knowledge of patient history (Colligan et al., 2020; Hjortdahl, 1992). GPs are also well placed to manage these symptoms due to their experience dealing with conditions such as major depressive disorder and generalised anxiety disorder (Barkil-Oteo, 2013; Parker et al., 2020). However, this study has identified a number of challenges, including limited GP confidence and structural barriers within primary care.

Although GPs viewed themselves as primarily responsible for dealing with post-stroke neuropsychiatric symptoms, their confidence doing so was limited. This finding aligns with evidence that healthcare professionals across the stroke care pathway often report variable levels of stroke related knowledge and competence, particularly in areas requiring specialised assessment and management with specific stroke training in particular being associated with stroke knowledge in primary care (Ding et al., 2023; Jarva et al., 2021; Kipinä et al., 2024). GPs

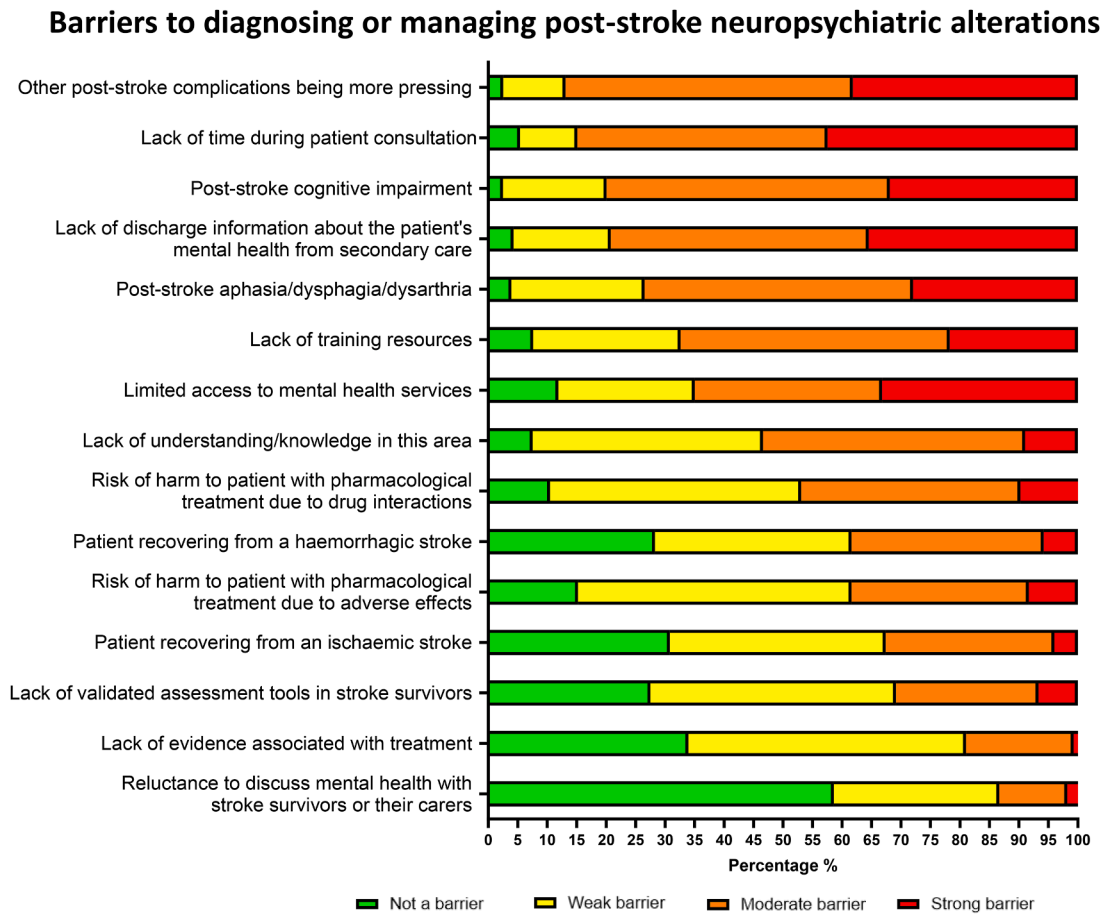



**Fig. 5.** GPs' perceptions of perceived barriers associated with the diagnosis and management of post-stroke neuropsychiatric symptoms ($n$ = 269–279).

reported greater confidence in managing major depressive disorder and generalised anxiety disorder compared to their post-stroke counterparts, despite the similarities between conditions (Hoertel and Limosin, 2020). This is consistent with the wider literature indicating that post-stroke neuropsychiatric conditions are not always well recognised in non-specialist settings where exposure to such presentations may be limited (Santos et al., 2019). Furthermore, other post-stroke complications, such as aphasia and cognitive impairments make diagnosis more challenging, as highlighted by these complications being viewed as some of the strongest barriers to identifying and managing these symptoms (Baker et al., 2021a; Jeffares et al., 2022). It should be noted that stroke healthcare professionals also find distinguishing mood symptoms difficult when aphasia and cognitive impairments are also present so for these patient cohorts it may be prudent that GPs refer to healthcare professionals specifically trained in these comorbidities (Baker et al., 2021b; National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023; Oğuz and Sapmaz Atalar, 2025).

Confidence differentiating post-stroke neuropsychiatric symptoms could also be improved, as conditions such as depression, apathy, and fatigue often overlap (Lanctôt et al., 2023; Rahamatali et al., 2021). This may reflect limited exposure among GPs to the complexity and overlap of post-stroke neuropsychiatric symptoms, alongside the variable emphasis placed on stroke education within general medical training (Loebel et al., 2024). Misdiagnosis can worsen outcomes, for example SSRIs may worsen apathy due to frontal lobe neurotransmitter dysfunction (Chong and Husain, 2016; Padala et al., 2020). Improving GP confidence in distinguishing these conditions is therefore essential. Validated screening tools such as the Patient Health Questionnaire (PHQ-9), Geriatric Anxiety Inventory (GAI), Dimensional Apathy Scale (DAS), and Fatigue Assessment Scale (FAS), and training in their use may aid differentiation (Kneebone et al., 2016; Myhre et al., 2022; Quinn et al., 2018). However, time constraints during patient consultations may limit feasibility (Braunschneider et al., 2021). The use of shorter screening tools could address this issue, as would the implementation of self-screening by patients prior to consultations, as has been validated for the PHQ-9 (Gilbody et al., 2007). The inclusion of routine mental health screening in stroke units during the acute stage of recovery would also provide GPs with additional information when assessing stroke survivors for these neuropsychiatric symptoms. This practice would align with recent European Stroke Organisation guidelines which emphasise that psychological wellbeing is a crucial aspect of stroke recovery that should be addressed as part of a comprehensive stroke care plan (Quinn et al., 2021).

Limited consultation time was identified as a major barrier to addressing post-stroke neuropsychiatric symptoms, consistent with evidence from GP management of depression and anxiety (Meredith et al., 2006; Wakida et al., 2018). This is compounded by the significant workload associated with post-stroke aftercare, including care coordination, medication management, bloodwork, and management of other post-stroke sequelae (Kyle et al., 2020). Patient and carer education may support earlier identification of symptoms (Wang et al., 2022). While task-sharing with other healthcare professionals such as nurses could reduce GP workload and free time for post-stroke mental healthcare (Clarke and Forster, 2015), structural-level measures, such as increased funding, workforce expansion, and reduced bureaucracy are also needed (Croxson et al., 2017; National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023; Svedahl et al., 2019). Additionally, in the Republic of Ireland, the addition of mood changes into the Chronic Disease Management programme may help, as this programme would afford GPs the time to more thoroughly review post-stroke

patients who have a medical card via a structured approach which would cover post-stroke neuropsychiatric symptoms.

Post-stroke neuropsychiatric symptoms are not routinely managed in hospital stroke care in Ireland or internationally, and continuity of care after discharge remains poor (Swartz et al., 2016). The literature highlights two main causes of inadequate discharge information: primary carers' difficulty contacting secondary care for clarification and hospitals' limited understanding of GPs' information needs (Aquino et al., 2020; Cresswell et al., 2015). Incorporating routine mental health screening in secondary care stroke management, with records shared to primary care, would strengthen continuity. International initiatives such as "stroke passports", which summarise a survivor's medical history and needs have improved care coordination and merit consideration in Ireland (O'Leary, 2024). Furthermore, implementing prescheduled depression screening within post-stroke care pathways has been shown to improve identification of post-stroke depression and reduce missed cases (Berg et al., 2018). This study also identified limited access to primary care mental health services and other stroke supports as major barriers to continuity of care (Bodenheimer and Pham, 2010). Despite the recognised importance of clinical neuropsychology in managing post-stroke conditions, limited funded access to these services remains a significant barrier for stroke survivors in Ireland. The National Clinical Guideline highlights the necessity of integrated psychological support into post-stroke care, yet challenges in funding exacerbate the issue of accessibility (National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023). Hence, additional investment in both mental health and stroke support services are essential, as multidisciplinary care would improve post-stroke outcomes (Vluggen et al., 2021).

Non-pharmacological interventions were widely endorsed by GPs as treatment options for post-stroke depression. Indeed, approaches such as rehabilitation therapy with a physiotherapist or an occupational therapist have been shown to improve symptoms of post-stroke depression, particularly when severe sensorimotor symptoms are also present (Yuan and He, 2019). Pharmacotherapy in conjunction with such rehabilitation programmes has been shown to benefit stroke survivors with depression (Kalbouneh et al., 2022). The National Clinical Guideline for Stroke for the UK and Ireland emphasises the importance of psychological support and recommends offering psychological interventions such as cognitive behavioural therapy, acceptance and commitment therapy, and problem therapy as potentially useful interventions (National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023). Similarly, education and counselling interventions have been shown to improve symptoms of depression, particularly when a holistic approach is applied to the whole family unit – whereby improved family functioning further promotes survivor recovery (Lee et al., 2021; Wang et al., 2022). However, it should be noted that patients with post-stroke depression are also less likely to engage with such programmes and the benefits gained are much less than non-depressed patients (Lee et al., 2023).

This survey showed that SSRIs and to a lesser extent SNRIs are commonly used to manage post-stroke depression. GPs who reported limited consultation time as a barrier were more likely to prescribe SSRIs, consistent with evidence that time constraints reduce the use of non-pharmacological options such as counselling (Hyde et al., 2005; Johnson et al., 2017). However, concerns about drug interactions and adverse effects were also noted. SSRIs are recommended in clinical guidelines and have been shown to reduce symptoms and to be safe in stroke patients (Kalbouneh et al., 2022; Mortensen and Andersen, 2021). It should be noted that SSRIs inhibit platelet function, increasing the risk of bleeding (de Abajo, 2011). While SSRIs may reduce the risk of recurrent ischaemic stroke, a possible increase in haemorrhagic stroke remains debated, thus stroke type should be considered when prescribing (Kubiszewski et al., 2020; Mortensen et al., 2013). Although generally less well tolerated, SNRIs such as duloxetine and venlafaxine are effective and may additionally help control post-stroke pain, which frequently co-occurs with depression (Karaiskos et al., 2012; Mahesh et al., 2023; Payton and Soundy, 2020; Weinmann et al., 2008). Vortioxetine does not appear to inhibit platelet function, or interact with commonly-used drugs, while also improving cognitive functions (Chen et al., 2015; McIntyre et al., 2014). Despite low preference rates in this survey, one might speculate that these properties suggest vortioxetine could be particularly suitable for post-stroke depression.

This survey was developed using a comprehensive process, drawing on previous surveys in related conditions (major depressive disorder and generalised anxiety disorder) and incorporating feedback from a stroke survivor, practicing GPs, and a post-stroke care specialist (Casini et al., 2013; Martín-Agueda et al., 2005; Petersen et al., 2002; Richards et al., 2004; Verdoux et al., 2014). Its multi-modal distribution likely broadened the reach and diversity of respondents. Although conducted solely among GPs in the Republic of Ireland, the findings may be internationally relevant, as challenges such as time pressures, treatment complexity, and administrative burden are common across healthcare systems (Liu et al., 2011; Sinnott et al., 2022). Furthermore, Ireland's mixed public-private system also resembles many global healthcare models, further supporting the wider applicability of these results (Kringos et al., 2013). A limitation of the study is that it is based on self-reported confidence and perceived knowledge among non-specialist clinicians, which may not necessarily reflect actual diagnostic ability or level of stroke specific expertise. GP status and eligibility were based on self-report and cannot be independently verified, although participants were required to review eligibility criteria before providing consent. It should also be noted that potential associations highlighted in this study require validation in future hypothesis-testing studies, as multiple testing corrections were not applied consistent with the exploratory and hypothesis-generating nature of the analysis.

## 5. Conclusion

This study highlights the crucial role that GPs play in the identification and management of post-stroke neuropsychiatric symptoms in primary care. While Irish GPs widely recognise their responsibility, significant barriers including limited confidence, inadequate training, time constraints, and limited support services currently impede their ability to provide optimal mental health care. Adherence to the National Clinical Guideline, alongside targeted education programmes to enhance GP knowledge and skills, improved communication between primary and secondary care, increasing awareness of validated screening tools, and expanding access to multidisciplinary support services are essential steps toward improving outcomes for stroke survivors. A more integrated and holistic approach to post-stroke care, underpinned by adequate system-level support and resources, will be essential to ensure the mental health needs of this vulnerable population are effectively met.

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## CRediT authorship contribution statement

**Robert M. Callaghan:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kieran Dalton:** Writing – review & editing, Methodology. **Fiona Coffey:** Writing – review & editing. **Tony Foley:** Writing – review & editing, Methodology. **Rachel D. Moloney:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Christian Waeber:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Irene Hartigan:** Writing – review & editing, Validation, Supervision, Methodology, Formal analysis, Conceptualization.

## Declaration of competing interest

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

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jadr.2026.101148.

## Data availability

Aggregated data that support the findings of this study are available from the corresponding author upon reasonable request.

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