Psychosocial Needs and Occupational Functioning of Younger Adults after Stroke

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Abstract

The post-stroke experience of younger adults (18-55 years old), is more complex than that of their older counterparts. The sudden change in their lifestyle following a stroke leads to challenges that extend beyond their physical disabilities. Young stroke survivors report cognitive dysfunction, depression, anxiety, fatigue and stigma, which limits their return to work, social relationships and quality of life. These “invisible dysfunctions” impede recovery and their re-integration back into society.

Post-stroke rehabilitation strategies used for older stroke survivors cannot be extrapolated to address the concerns of young stroke survivors. Most interventions that target the non-physical symptoms of stroke are mainly focused on managing anxiety and depression, while failing to address the complexity of the cognitive and emotional dysfunction faced by younger stroke population.

There is moderate evidence for the use of antidepressants, cognitive behavioural therapy, yoga, music therapy and mindfulness-based stress reduction to ameliorate the psychosocial and occupational limitations. Younger stroke survivors have largely unmet needs that include assistance with non-care related activities, intellectual fulfillment, social life, financial challenges and knowledge about their stroke. Rehabilitation strategies in this population are necessary to further identify patient-centered outcome measures and develop measuring tools specific to younger adults, and be able to appropriately target the factors that limit their successful rehabilitation after stroke.

Keywords: Stroke; Young Adult; Psychosocial Outcomes; Depression; Anxiety; Cognitive; Return to Work; Quality of Life

Abbreviations

TIA: Transient Ischemic Attack; HADS: Hospital Anxiety and Depression Scale; MADRS: Montgomery–Asberg Depression Rating Scale; FUTURE: Follow-Up of Transient ischemic attack and stroke patients and Unelucidated Risk factor Evaluation study; MRS: Modified Rankin Scale; IADLs: Instrumental Activities of Daily Living; MYS: Map Young Persons with Stroke Questionnaire; USER: Utrecht Scale for Evaluation of Rehabilitation; SECRETO trial: Searching for Explanations for Cryptogenic Stroke in the Young: Revealing the Etiology, Triggers and Outcome, a prospective multicenter case-control study of young adults (aged 18–49) presenting with first time, imaging positive ischemic stroke of undetermined origin. This study population is the focus of five different sub-studies; SSRI: Selective Serotonin Reuptake Inhibitors; TCA: Tricyclic Antidepressants; MAOI: Monoamine Oxidase Inhibitors; CBT: Cognitive Behavioural Therapy; BDI: Beck Depression Inventory; WDI: Wakefield Depression Inventory; CALM trial: Coordinated Anxiety Learning and Management trial, a randomized trial assessing the role of behavioural therapy in stroke patients with aphasia; PST: Problem Solving Therapy; SFT: Solution Focused Therapy; SOFIA trial: Adapted Solution Focused Therapy for people with Aphasia, which assesses the role of SFTs in stroke patients with aphasia; IPT: Interpersonal Therapy; MBSR: Mindfulness Based Stress Reduction

Psychosocial Symptoms of Stroke in Younger Adults

Limited knowledge exists about the impact of stroke on the younger adult population. Fifteen million people worldwide suffer a stroke each year, and 25% of these strokes happen in individuals aged under 60 years [1]. Taking a holistic perspective of stroke, it is important to explore not only morbidity and mortality (the ‘visible’ effects) but also the associated ‘invisible’ effects following their stroke challenge recovery and the patient’s re-integration back into society [2]. In this section, we focus on the psychosocial symptoms of stroke in younger adults.

Definition of "young" or "younger" adults varies between studies, but it typically includes those between the ages of 18 and 55 [3]. Research in this young stroke survivor population is sparse, and etiology, stroke deficits and long-term disabilities cannot be extrapolated from older stroke population [4]. Younger adults may differ in their neurological, cognitive and emotional dysfunction compared to older stroke survivors. This may influence their functional outcome and the long-term repercussions of their stroke. Furthermore, their psychosocial needs are also different from older stroke survivors, who are more likely to be able to return to their pre-stroke lifestyle, leaving young stroke survivors unable to return to work or social responsibilities [5].

Stroke survivors are often faced with the impact of these ‘invisible disabilities’ on their recovery [1]. This may lead to psychological implications, such as depression, anxiety, and life satisfaction, that affect their social participation and quality of life [6]. This section aims to describe the current evidence around the psychosocial needs and occupational functioning of younger adults after stroke.

Introduction

The young adult population is defined as 18 to 50 years old and has been described as a relatively healthy and productive segment of the population [6]. However, stroke in this age group is becoming more prevalent, with a reported 15% increase in stroke incidence in this age group between 2007 and 2016 [7]. This is likely to be due to increased awareness of stroke and increased trend towards unhealthy lifestyles [8].

Younger adults are a diverse group and may differ in their sociodemographic characteristics as compared to older stroke survivors [9]. A major difference is the proportion of younger stroke survivors with a history of smoking, which has been reported to range from 25 to 72% [10]. Moreover, the prevalence of depression is also higher in younger stroke survivors, with one study reporting a prevalence of 50% in young stroke survivors [11]. This is likely to be due to their increased employment status, which may lead to increased stress levels [12].

Psychosocial Needs of Stroke in Younger Adults

The psychosocial impact of stroke is complex and can be classified into acute and chronic stages [13]. In the acute phase, the stroke affects the immediate decision-making process, impact on employment, and physical abilities. This is followed by the chronic phase, where the long-term effects of stroke on the individual’s psychological and socioemotional well-being are observed. The chronic phase can last for months or even years, and can lead to physical, psychological, and social challenges [14].

The psychological impact of stroke in younger adults has been shown to be significant and can have long-lasting effects on mood, social relationships, return to work, and quality of life. A study by Brosch et al. [15] found that younger stroke survivors reported higher levels of anxiety and depression compared to older stroke survivors. This highlights the importance of identifying and addressing the psychosocial needs of younger stroke survivors to improve their quality of life and functional outcomes.

Table 1: Stroke Outcomes and Prognostic Factors

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Type</th>
<th>Inclusion Criteria</th>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrie and Makin 2007</td>
<td>The Age-specific prevalence of anxiety after TIA in a cohort of stroke survivors aged 65 years</td>
<td>Cohort</td>
<td>Age 65 years</td>
<td>Anxiety after TIA</td>
</tr>
<tr>
<td>Hannerz et al. 2015</td>
<td>FUTURE study P 437 Age 18-50 with TIA, stroke</td>
<td>Prospective cohort</td>
<td>Age 18-50</td>
<td>TIA or stroke</td>
</tr>
<tr>
<td>Melin et al. 2007</td>
<td>Return to working of stroke patients aged 18-60 years</td>
<td>Case-control study</td>
<td>Age 18-60</td>
<td>Return to working</td>
</tr>
<tr>
<td>Mathiesen et al. 2017</td>
<td>Return to gainful occupation after stroke in young adults</td>
<td>Longitudinal study</td>
<td>Age 18-55</td>
<td>Return to gainful occupation</td>
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</table>

In conclusion, stroke in younger adults has significant psychosocial implications, which can have long-term effects on mood, social relationships, return to work, and quality of life. It is crucial to address these psychosocial needs to improve the overall quality of life and functional outcomes of younger stroke survivors.
Psychosocial Needs and Occupational Functioning of Younger Adults after Stroke

Cognitive deficits

Cognitive deficits following stroke have long lasting impacts on younger populations. The Follow-Up Of Transient ischemic attack and stroke patients and Unelucidated Risk factor Evaluation (FUTURE) study, a large contemporary cohort study from Netherlands, had been investigating the causes and long-term consequences of stroke in young adults. Using neuropsychological tests authors determined that patients aged 18 - 50 years old with an ischemic stroke or TIA, demonstrate impaired processing speeds (p < 0.0001), working memory (p < 0.0001), immediate memory (p = 0.0002), delayed memory (p < 0.0001), attention (p < 0.0001) and impaired executive function (p < 0.0001) [12], and these changes can last up to eleven years or more, with 50% of individuals performing below-average in at least one cognitive domain [3].

In a survey of 1068 patients that examined perceived cognitive deficits, individuals also reported difficulties with completing tasks (p = 0.04), engaging in discussions (p = 0.01), multitasking (p = 0.01) and staying in crowded environments (p < 0.001) [20]. These findings debate the assumption that young people recover well in their personal activities of daily living [20].

The findings of cognitive impairments have adverse consequences for both, the individual patient and the society as a whole, as the inability to engage with one’s surroundings impairs social functioning and the skills needed to return to work and financial independence [21].

Depression

Post-stroke depression can either manifest in response to acute event and remit, or could occur months after the event, characterized as "late-onset depression", which develops insidiously and has fewer rates of remission [22,23]. Forty five percent of young adults with stroke experience depressive symptoms even twelve years after the event [8,10,24]. Young stroke survivors are also at a higher risk of recurrent depression years following the stroke [13]. Of 1233 patients recruited in the acute phase of their stroke, 100% scored more than 7 on the Hospital Anxiety and Depression Scale (HADS) within 15 years of follow-up, indicating relapse into depression [13].

Depression can also manifest differently with age. Whereas older patients tend to demonstrate a profile of vascular depression, predominantly characterized by anhedonia, depression among younger patients has more psychotic features [25]. This further places them at higher risk for suicide (up to 7%) and suicide ideation (6 - 15%), especially if there is an underlying history of mood disorder prior to the stroke [26,27], or previous stroke, lower education status and concurrent cognitive impairment [27]. This suggest the need to monitor and screen for the risk of suicide in young stroke patients.

However, there is no known association between the etiology of the stroke and risk of depression [2]. In a study of young patients with a first-ever stroke (mean follow-up 6 years), higher Montgomery–Asberg Depression Rating Scale (MADRS) scores were observed with comorbid disease; excessive alcohol consumption (p = 0.016), depression prior to the infarct (p = 0.016) and severe stroke deficits on admission (p = 0.043) [28]. Unemployment status following the stroke further affected the rates of depression in these individuals [28].

Anxiety

Although depression is more prevalent, many young patients also suffer from anxiety following their stroke. The FUTURE Study followed patients for 12 years and when compared to age-matched controls they found that approximately 20% of stroke survivors had anxiety based on HADS scale (p = 0.009) [10]. These patients also had lower functional status based on modified Rankin Scale (mRS) and Instrumental Activities of Daily Living (IADLs) (mRS > 2 or IADL < 8), suggesting that anxiety impacts functional outcomes in young stroke population [2].

As expected, young stroke survivors attribute their anxiety to a stigma and fear that they are treated differently by those around them, or that their relationships are adversely affected following their stroke [9]. This poses a significant burden on these patients as such a behaviour threatens their social relationships. While we understand that stigma exists among patients with disability, there are very few studies that address this issue in young stroke patients.

Fatigue

Post-stroke fatigue is a commonly reported symptom that affects over 50% of individuals [29,30]. It often begins in the early stages after a stroke, but can persist for long time. Fatigue dramatically impairs rehabilitation and recovery [9]. In a 4-year follow up of 158 young people with stroke, 86% reported persistent fatigue (p < 0.05) on the Map Young persons with Stroke (MYS) questionnaire. Fatigue impacts activities of leisure in 58% (p < 0.05) and return to work in 52% (p < 0.05) of stroke survivors [29]. Fatigue is also associated with poor outcomes (p = 0.001), with many patients reporting an inability to regain pre-stroke functioning [30,31]. Most rehabilitation programs are based on objective deficits like cognition and physical limitations. However, regression analysis of three Utrecht Scale for Evaluation of Rehabilitation (USER) scores suggests that subjective participation in these rehabilitation programs can be largely limited by fatigue and mood [31].

Post stroke deficits in attention and arousal likely results from vascular lesions in the reticular activating system, limbic system and basal ganglia, or the pathways connecting those structures [32]. Interestingly, 36% of young individuals with stroke also suffer from sleep problems, which can further perpetuate the cycle of inadequate effort and poor functioning [10]. It is therefore not surprising that post-stroke fatigue is an independent risk factor that determines return to social activities and paid work [33].

Return to Work

The ability to return to work is an important determinant of life satisfaction in young stroke survivors [34,35], but to those who are part of the workforce, this is a sign of a successful rehabilitation [9].

Most people return to work shortly after stroke (50 - 80%) [14-16,33,36], but long term studies suggest that this percentage diminishes over time. However, when followed for 12 years, only 40% of stroke survivors remained in full-time employment [10].

Individuals who have an unfavourable clinical course with severe handicap at the time of discharge or undergo major cardiovascular surgery or those who suffer from a psychiatric co-morbidity are less likely to return to their prior job or are likely to find an alternative career [1,16]. The most predictive factor for successful return to work is the educational requirement of the job. Individuals from professional backgrounds are more likely to return to work (OR 3.04, CI 2.70 - 3.43) than those whose jobs have minimal to no formal education (OR 1.50, CI 1.38-1.64) [14,15,35]. Higher socioeconomic status was also a positive predictor of return to work [15], while preserved cognitive function and age were less important determinants than the ability to self-care and function well [37-39].

Young individuals who sustain the disabilities of a stroke also cost the economy a loss of their productive years of employment [40]. Therefore, the return to work is not only important to young stroke survivors, but as mentioned before to the entire society.

Quality of Life

Life satisfaction is most dependent on vocational situation, sexual life, physical and mental health. Among young stroke survivors, this is further determined by gender, severity of stroke, marital status, rehabilitation model, country, occupational status and duration of rehabilitation therapy [17]. Young males with short hospital stay, who are in a relationship and employed, are most likely to endorse a better quality of life.

However, whether age is a determinant of quality of life remains a matter of discussion [41,42]. Although the mortality rate among younger adults with stroke is lower, it is reasonable to assume that their quality of life is adversely affected because they live with their disability for longer. This is particularly significant because they tend to endure social challenges such as marital separation, childcare issues and caregiver burnout [43]. In a study of 563 stroke survivors, 14.5% were separated from their spouse, 22% were involved in conflict with their children, and 18.1% were not able to return to their previous residence following their stroke [43]. The factors affecting quality of life certainly vary with age. To most individuals, a low quality of life is characterized by unemployment, motor deficits and speech impairment. More specifically, older individuals are also affected by other comorbidities like diabetes and vascular disease, while
to younger individuals, restrictions in their job and/or leisure activities has major impact to their well-being and quality of life [29]. As such, interventions for Young Stroke Survivors with Psychological Symptoms we need to have enhanced tools to follow young patients over a longer period to adequately assess their quality of life. A study with such tools (e.g. using the HOQI study, prospective, multi-center case-control study, which anticipates first results in 2019 [44]).

Interventions for Young Stroke Survivors with Psychological Symptoms

Rehabilitation strategies currently used to improve the non-physical symptoms in younger stroke patients predominantly target depression and anxiety (Table 2). However, the interventions that are typically used to manage these symptoms cannot be reliably extrapolated to young individuals, restrictions in their job and/or in leisure activities has major impact to their well-being and quality of life [29]. As such, interventions for Young Stroke Survivors with Psychological Symptoms we need to have enhanced tools to follow young patients over a longer period to adequately assess their quality of life. A study with such tools (e.g. using the HOQI study, prospective, multi-center case-control study, which anticipates first results in 2019 [44]).

Table 2: Summary of Contemporary Literature on Interventions to Improve Post-Stroke Outcomes.

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Non-Pharmacological Interventions

Limited research has examined psychological interventions specifically tailored to the needs of young stroke survivors. Here, we present new pharmacological interventions that show promise in managing non-physical consequences of stroke.

Cognitive Behavioral Therapy (CBT) is a psychological technique that helps individuals with thoughts, feelings and behavior, and help with recovery [51]. There are several case studies and case series that support CBT use in post-stroke depression [14]. However, the only randomized trial investigating the effect of CBT (standard care with 10 sessions of CBT) found no significant difference in depression between 1000 patients (13 studies) with stroke depression in cases with stroke depression, but there was no evidence to support the benefit of psychological therapy against standard care in preventing PSD and known side effect profile. Significant improvement in mood and sustained improvement in depression with psychotherapy (although treatment effect size small).

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The challenge with implementing CBT sessions is the variability in which they are performed. The CBT is not administered with a uniform framework, and its effect dependent on several factors; including the duration and number of sessions, the person administering CBT, and the receptiveness of the individual undergoing therapy. Since stroke survivors are also likely to sustain cognitive or communication deficits, which could compromise their participation in CBT, current therapies need to be restructured to account for such deficits [55].

The CALM trial demonstrated the benefits of behavioral therapy in stroke patients with aphasia, where the focus was on behavioral activation in depression and relaxation [60]. Behavioral therapy did not require communication and instead focused on education and increasing activities that improve mood. This was a randomized trial with 105 patients, where 54 received standard care, and 51 received behavioral therapy [60]. At 6 months, behavioral therapy with an average of 9 sessions was more beneficial for mood (p = 0.015), self-esteem (p = 0.005)) and even for less depression among stroke patients with aphasia (p = 0.03) [60].

While support for CBT in stroke therapy is limited, there is an ongoing effort to create a framework better suited to the needs and limitations of stroke patients. The development of a modified CBT approach for stroke survivors has been suggested, but this initiative has not been investigated in a young population. Further randomized trials implementing a uniform framework are required to determine its benefits in this population.

**Problem Solving Therapy (PST)** is a brief psychological intervention where the therapist teaches the patient a structured approach to solving their problems. In recently published trial, PST was positively associated with better health related quality of life and a reduction in avoidant coping in stroke patients [61]. The authors noted that further research on PST in stroke is needed.

**Solution Focused Therapy (SFT)** is future-focused and goal-directed technique that if centered on solutions [59]. SFT has been found to reduce the intensity of depression and anxiety and enhances self-efficacy compared to controls. The SOFIA trial in Europe is now enrolling stroke patients with aphasia to assess the efficacy of SFT in this population (clinicaltrials.gov) [57].

**Interpersonal Therapy (IPT)** views interpersonal relationships as potential precipitators and opportunities for recovery in individuals with psychiatric issues including depression, post-traumatic stress disorder, and eating disorders. It has good evidence and is considered an evidence-based treatment of depression in those with co-morbid medical conditions [9]. However, only one study (N~460) has examined the feasibility and effectiveness of IPT in post-stroke depression, and confirmed that combination therapy (IPT plus medication) was effective as a single intervention alone [62-65].

**Psychotherapy** is described in many variations in the literature, from cognitive behavioural therapy [59], motivational interviewing [66], health education [67], counselling [68], and neuro-linguistic programming [69]. Furthermore, the duration and frequency with which it is provided can vary between individuals. This makes its benefits challenging to assess. Two Cochrane reviews which investigate the effects of pharmacotherapy and psychotherapy in post-stroke depression reveals that psychotherapy is not associated with treatment effect [23,51]. The 2004 review compares 3 trials that involve a total of 745 patients, with outcome measures of depression and dysthymia. Although these studies suggest a small improvement in psychological distress, there was no significant difference between psychotherapy and no intervention [51]. The 2008 review evaluated 4 randomized control trials, one of which was included in the 2004 study [59]. Psychotherapy interventions in 445 patients were, again, not consistent with therapeutic effect [23]. It is important to note, however, that these trials were limited by their methodology; specifically, that they lacked a standardized therapeutic framework.

There have since been at least two new studies that assess benefits of psychotherapy in depression and anxiety, with no long-term evidence of its benefit [60,69]. Interestingly, however, it has shown promising results in post-stroke fatigue [52,70,71]. Nevertheless, psychotherapy needs to find some common ground in its administration before we can truly begin to appreciate its therapeutic benefit.

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Yoga: The benefit of yoga in chronic diseases like cancer, cardiac disease and other neurologic illness derives from an improvement in mood and general physical function [72-75]. However, many stroke survivors are limited in their physical ability, and are unable to exert themselves in strenuous activities as they did prior to the stroke [49]. A meta-analysis by Thayabharanathan., et al. [46] reveals that yoga promotes well-being in stroke by ameliorating symptoms of anxiety and depression. The physiology of this benefit is not fully understood; but it is hypothesized to be parasympathetically driven, where body postures and breathing reduce palpitations, blood pressure and signs of restlessness [76]. It also encourages a state of mindfulness, which allows an individual to recognize anxiety and thereby, target and reduce it [77,78].

However, these are primarily observational studies, which confound the true benefits of yoga with any group based activity or shared experience [79]. Moreover, the trials are limited by their small sample size and short periods of follow up (8 - 10 weeks) [72] and were not performed in specific populations such as young stroke survivors.

Mindfulness based stress reduction (MBSR) is a technique that teaches coping strategies and ways to manage behavioural and emotional patterns, to encourage a generalized state of well-being [80,81]. Its benefits have previously been studied in cancer and chronic fatigue syndrome, where it has been shown to relieve symptoms of depression, anxiety and fatigue [77,82-84].

It has also been attributed to alleviate the psychosocial impact of stroke. Firstly, it appears to have an unequivocal treatment effect on fatigue in stroke [47]. The mechanism by which it does so is theorized to be due to increasing grey matter density and altering in neuronal transmissions [85,86]. MBSR also improves symptoms of depression, anxiety and perceived quality of life in the stroke population [50].

Music Therapy: The benefit of music therapy in stroke stems from animal models that suggest that a positively stimulating environment enhances post-stroke recovery and functioning. A minimum of 1 hour a day of active listening showed recovery in both verbal memory and focused attention, as early as 3 months after a stroke. Patients in this study were also found to be less agitated and confused compared to groups that had no intervention [87]. Music therapy also improves symptoms of depression and anxiety, although the latter outcome was not significant [87,88]. Additionally, more sessions were associated with an improvement in social interaction and behavior [89].

Music therapy is believed to enhance neuromodulation and plasticity, which tends to be highest in the first weeks and months after a stroke [90]. Through modulating pathways in the limbic and paralimbic structures, music therapy stimulates emotional processing and social cognition [91]. Therefore, patients benefit from music interventions implemented in the acute periods of stroke recovery [92].

Discussion
While the severity of stroke is milder and the physical prognosis after stroke is more favorable in younger adults than in the elderly, the long-term psychosocial consequences, as well as its risk for recurrence, is higher due to their longer life expectancy [2]. Limited literature on young stroke survivors suggests that the impact of stroke on psychosocial and occupational outcomes has the greatest effect on quality of life in this population. A significant percentage of younger adults with stroke are disabled by their resulting cognitive deficits, anxiety, depression and fatigue, resulting in an inability to fully return to work or their pre-stroke life. This inevitably risks a poor prognosis in the long-term, and can cause a devastating impact on patients, their families, as well as on society [19].

Recovery in stroke is primarily focused on physical rehabilitation, leaving behind largely unmet needs. In a survey of 315 young stroke survivors, these were identified to be assistance with non-care related activities (19%), intellectual fulfillment (17%), social life (15%), financial challenges (24%), physiotherapy (15%) and knowledge about their stroke (45%) [9,93]. It is important to recognize these needs because they limit young stroke survivors to engage with people around them, and further impede the recovery process.
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However, we currently lack standard measurements of those needs when we follow young stroke patients in stroke prevention clinics. For example, most papers employ standard scales to assess functionality (mRS) and mood symptoms (BDI, HADS, MDI) after stroke, regardless of an individual’s age. From the limited research on the post-stroke experience of the younger adult, it had been recognized that these measurement tools do not adequately capture the symptom burden in young patients [10,14]. As highlighted in table 3, there is also a lot of variability in how psychosocial symptoms are measured in this population, which challenges comparison between studies.

Table 2: Available Measurements for Non-Physical Symptom/Outcomes.

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<tr>
<th>Available Measurements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beck Depression Inventory</td>
<td>A 21-question self-assessment scale to detect depressive mood symptoms. Scored from 0-40, depending on severity.</td>
</tr>
<tr>
<td>Montgomery -Asberg depression rating scale (MADRS)</td>
<td>A 10-item diagnostic questionnaire that is administered by an assessor, to assess for depressive symptoms in a patient. Scores range from 0 to 60, depending on severity.</td>
</tr>
<tr>
<td>Duke Depression Evaluation Schedule</td>
<td>A diagnostic interview instrument; includes the Center for Epidemiologic Studies Depression Scale, Carroll Rating Scale, NIMH Diagnostic Interview Schedule and the Montgomery-Asberg Depression Scale.</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td>A self-report questionnaire with 20 questions. The scores range from 0-60, based on the likelihood of depression.</td>
</tr>
<tr>
<td>NIMH Diagnostic Interview Schedule–Dysphoria (DIS)</td>
<td>A self-rating scale to assess the psychological and somatic symptoms of depression.</td>
</tr>
<tr>
<td>Cognitive function</td>
<td>Assess mental status with an 11-question to measure five areas of cognitive function: orientation, registration, attention and calculation, recall, and all language. The maximum score is 10. A score of 23 or lower is indicative of cognitive impairment.</td>
</tr>
<tr>
<td>Mini-Mental State Exam</td>
<td>A structured clinical interview developed to evaluate subjective cognitive, behavioural and emotional complaints. It consists of 33 items concerning cognitive complaints and 9 items addressing emotional and behavioral complaints, with each item scored as 0 (not present), 1 (doubtful), 2 (present, but not affecting daily life) or 3 (present and negatively affecting daily life).</td>
</tr>
<tr>
<td>Wechsler Adult Intelligence Scale–Revised (WAIS- R)</td>
<td>A general test of intelligence that consists of 6 verbal subtests and live performance subtests. The verbal tests are: Information, Comprehension, Arithmetic, Digit Span, Similarities and Vocabulary. The Performance subtests are: Picture Arrangement, Picture Completion, Block Design, Object Assembly and Digit Symbol. The scores derived are Verbal IQ, Performance IQ and Full Scale IQ.</td>
</tr>
<tr>
<td>General Health Questionnaire (GHQ-28)</td>
<td>A general health screening questionnaire to assess psychiatric comorbidity, with scores ranging from 0-28.</td>
</tr>
<tr>
<td>Hospital Anxiety and Depression Scale (HADS)</td>
<td>A 14-item self-report measure of anxiety and depression. Scores range from 0-21.</td>
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</table>

Rehabilitation strategies need to focus on providing emotional and practical support to young patients during their periods of transition. This can be achieved through effective communication between patients, families and health professionals and providing suitable coping strategies like yoga or mindfulness to help their recovery in the long-term [19,46,47]. It is also beneficial to inform and obtain the support of employers, as this makes the process of returning to work easier; which inadvertently translates to improved life satisfaction in this patient population [11,95].

Finally, educating individuals about their psychosocial risks following a stroke, providing them with adequate resources, and appropriately referring them to specialist agencies (for example, smoking cessation services, psychological assessments, social workers, etc.) can equip them to better manage themselves and alleviate their fear of stroke recurrence [93]. Furthermore, it helps them to be more engaged in rehabilitation process and ensures that their individual needs and priorities are met and appropriately followed through the process of care.

Limitations
The lack of standardized tools for the measurements of psychosocial needs and occupational functioning are major limitations of this review. Additionally, most studies are from Scandinavian countries or Western Europe, and have little heterogeneity in the study population. These studies also use different variables and tools to assess the degree of psychiatric and cognitive dysfunction in these patients. Some studies also emphasize how the mRS scale does not assess complex tasks of daily living, that might better characterize the challenges of younger stroke survivors [10], and this could further underestimate the true degree of disability that these individuals sustain.

Conclusion
The young stroke population represents a significant rehabilitation challenge to an individual as well as society. There is an urgent need to better understand the complexity of psychosocial consequences following stroke in younger individuals using patient-reported outcome measures, so that patient-oriented interventions can be rapidly developed.

Conflict of Interest
The authors of this study have no conflicts of interest to disclose.

Bibliography

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