Clinical Epidemiology and Global Health 27 (2024) 101561

Contents lists available at ScienceDirect

Clinical Epidemiology and Global Health

journal homepage: www.elsevier.com/locate/cegh

Review article

Predictors of return to work after a year since stroke: A systematic review

Rinita Mascarenhas [a], Akshatha Nayak [a,*], Dhaval Pawani [a], Zulkifli Misri [b], Mahmood [c], K Vijaya Kumar [a], Vani Lakshmi R. Iyer [d]

[a] Department of Physiotherapy, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India
[b] Department of Neurology, Kasturba Medical College, Mangalore, Manipal Academy of Health Education, Manipal, Karnataka, India
[c] Department of Health Professions, Manchester Metropolitan University, Manchester, United Kingdom
[d] Department of Data Science, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, Karnataka, India

ARTICLE INFO

Keywords:
Stroke
Cerebrovascular accident
Return to work
RTW
Occupation

ABSTRACT

Purpose: Recent studies have identified an increased prevalence of stroke in young patients. Therefore, we aimed to systematically review the predictors contributing to return to work (RTW) within 1 year after a stroke and summarize the identified gaps.

Methods: Searches were conducted using keywords from the PubMed, Scopus, CINHAL, Embase, and Cochrane databases from inception to 2023. This review was based on the Preferred Reporting Items for Systematic Review and Meta-analysis for Scoping Reviews (PRISMA-ScR) guidelines. The retrieved articles were screened for titles and abstracts using the Rayyan QCR software. The quality of the study was determined using The Joanna Briggs Institute (JBI) critical appraisal tool.

Results: Eight studies encompassing 4587 stroke participants were included in the review. Ischemic stroke, male sex, and ability to perform activities of daily living were positive predictors of RTW, whereas older age, severe stroke, poor consciousness, and impaired cognition were negative predictors. Coping skills and ethnicity were found to be non-significant.

Conclusion: This review highlights predictors of RTW post-stroke. The Facilitation of RTW among stroke survivors necessitates a comprehensive rehabilitation program that emphasizes predictors such as stroke severity, functional independence, impaired cognition, and consciousness. In addition, vocational rehabilitation should be based on an individual's capacity, modifying the workplace environment, and prescribing assistive devices to enhance RTW.

Systematic review registration: International Prospective Register of Systematic Reviews (PROSPERO) registration number CRD42022348983.

1. Introduction

. Incidence of stroke was predominantly observed in individuals aged ≥65 years but, a recent study hasrevealed that approximately 33% of strokes occur in patients aged ≤ 65.[1] The journal of the American Heart Association reported a 43% increase in stroke incidence among young adults.[2]

7.06 million disability-adjusted life years have been lost due to stroke.[3] There is a loss of productivity, which accounts for approximately 10% of the costs in the first year after a stroke, with non-health-related costs rising to 40% in subsequent years.[4] Strokes are projected to cost $1515 for individual rehabilitation programs.[5] However, approximately 47% of individuals with stroke are known to not resume their work within one year of stroke due to persistent impairments that hamper the course of return to work (RTW).[6]

Stroke survivors must cope with both physical and cognitive impairments that can pose challenges in RTW.[7,8] Contributingto an increase in immediate and long-term health care expenses and indirect expenses from reduced productivity due to sick leave at retirement or death, post-stroke.[4,9] Resuming work after a stroke is an indicator of social participation and affects the quality of life of stroke survivors.[4,6] This might entail initiatives for recovery, workplace modifications, and assistance from employers.[10–12] Thus, these adjustments might facilitate the smooth re-integration of stroke survivors into work; however, it is crucial to understand the factors that predict and promote RTW.[10,11]

Previous observational studies have identified some of the factors

* Corresponding author. Department of Physiotherapy, Kasturba Medical College, Mangalore, Karnataka, 575003, India.
E-mail address: akshatha.nd@manipal.edu (A. Nayak).

https://doi.org/10.1016/j.cegh.2024.101561
Received 4 November 2023; Received in revised form 6 February 2024; Accepted 21 February 2024
Available online 6 March 2024

that predict early RTW, such as the age of stroke survivors, duration of the individual's functional recovery, type of impairments, areas affected, sex, education qualification, type of job (blue/white collar), and social support.[13–20] A meta-synthesis of qualitative analysis of factors associated with RTW among stroke survivors found that the success of RTW is influenced by complex factors such as the workplace and employers' ability to adapt to the patient's disabilities, rehabilitation services tailored according to the needs of the individual, and the ability of the survivor to adapt to modified job responsibilities, rehabilitation services tailored according to the needs of the individual and the ability of the survivor to adapt to deficits.[21] In addition, another systematic review found that examining cognitive function among stroke survivors could assist in faster RTW.[6]

Previous studies identified a timeline for RTW among stroke survivors. Yet they could not determine the predictors of RTW.. The current review was to identify predictors contributing to the return to work (RTW) after one year, as it was observed that patients who successfully returned to work within one year post-stroke were more likely to be employed[6]

2. Methods

2.1. Protocol registration and search strategy

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart,[22] and registered in the International Prospective Register of Systematic Reviews (PROSPERO) (CRD42022348983). (Fig. 1).

A comprehensive data search was performed using the PubMed, Scopus, CINHAL, Embase, and Cochrane databases to retrieve articles published from inception to 2023. MesH terms for "stroke" and" Return to work" were combined using – the Boolean operator 'AND,' while search terms for key concepts were combined using 'OR.' Bibliographies of relevant articles and gray literature were also searched for potentially appropriate studies. The keywords are in Table 1.

2.2. Study selection

Two reviewers (RM and DP) independently screened titles and abstracts, collected full-text papers meeting the eligibility criteria, verified references, selected appropriate studies, and removed duplicates using Rayyan online software.[23]

2.3. Eligibility criteria

For this study, we included- (i) studies that spoke about predictors that contributed to RTW within a year after stroke, (ii) no restrictions were placed on geographic location, and (iii) cohort studies that were conducted for a period of one year were taken into consideration to maintain homogeneity. Excluded, (i) studies published in any language other than English.

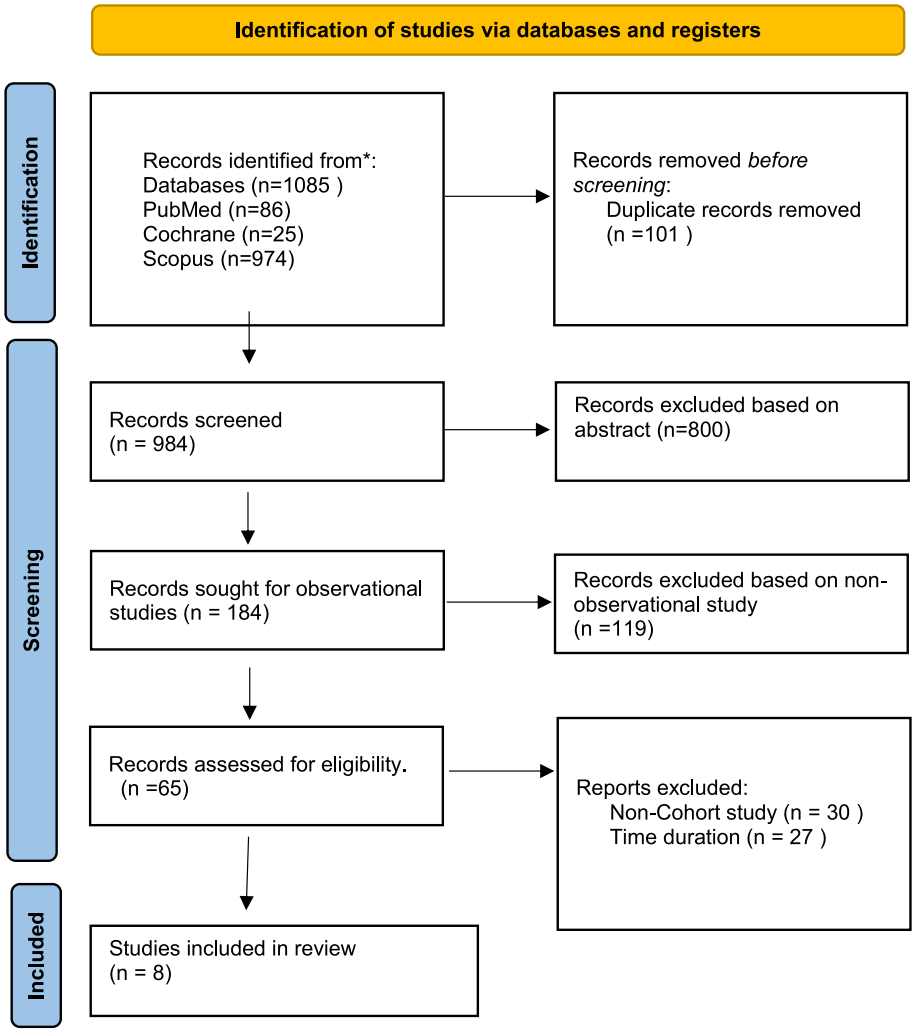

Fig. 1. PRIMSA flow diagram.

Table 1
Keywords used to search the studies.

Stroke	Strokes; Stroke; Cerebrovascular Accident; Cerebrovascular Accidents; CVA (Cerebrovascular Accident); CVAs (Cerebrovascular Accident); Cerebrovascular Apoplexy; Apoplexy, Cerebrovascular; Vascular Accident, Brain; Brain Vascular Accident; Brain Vascular Accidents; Vascular Accidents, Brain; Cerebrovascular Stroke; Cerebrovascular Strokes; Stroke, Cerebrovascular; Strokes, Cerebrovascular; Apoplexy; Cerebral Stroke; Cerebral Strokes; Stroke, Cerebral; Strokes, Cerebral; Stroke, Acute; Acute Stroke; Acute Strokes; Strokes, Acute; Cerebrovascular Accident, Acute; Acute Cerebrovascular Accident; Acute Cerebrovascular Accidents; Cerebrovascular Accidents, Acute
Return to work	Return to work; RTW; Return to paid work; Return to Occupation; Work; Job

2.4. Risk of bias assessment

The Joanna Briggs Institute (JBI) critical appraisal tool was used to assess the methodology of each study by R.M. and D. P.[24] The studies were scored under the domains of review questions, inclusion and exclusion criteria, search strategy, research sources, and methods to minimize bias. Scoring was performed in the good, fair, and poor domains. A discussion with A. N. resolved any discrepancies in scoring between the two reviewers. *Data Extraction.*

Two authors (RM and DP) independently extracted the data, and any disagreements regarding the choice of study or data extraction between the two reviewers (RM and DP) were resolved after a discussion with AN. The following data were extracted: (1) author, year of the study, and study design; (2) sample size, mean/median, type of stroke, and country of data collection; (3) outcome of measures reported; (4) statistical results for the outcomes of RTW reported in each study and (5) positive, negative, and non-significant predictors that have contributed to RTW (Table 2).

3. Results

3.1. Study selection

The databases yielded a total of 1085 articles. After removing duplicates, 984 articles were screened based on their titles. Following this 800 studies were excluded based on their abstracts. Furthermore, 119 studies were reviewed and excluded based onnon-observational study design. 65 observational studies were retrieved, of which we included 8 cohort studies based on a study duration of 1 year.[13–20]

3.2. Characteristics of the studies

Of the eight studies, one retrospective cohort,[16] and seven prospective cohorts[13–15,17–20] were included. The geographical distribution of the studies revealed that a majority of the studies were from Europe (two UK,[14,19] one Finland,[20] one Sweden,[17] one Netherland,[18] followed by Asia (one Japan[16]), Australia,[15] and North America (USA[13]).

A total of 4587 post-stroke survivors were included in this study. One study included only ischemic stroke subjects,[13] whereas all other studies included both hemorrhagic and ischemic.[14–20]

3.3. Outcome assessment

RTW among post-stroke individuals was assessed using a self-administered questionnaire that was mostly dichotomous regarding RTW. Some of the questionnaires consisted of questions on employment status, paid/unpaid status, job category (blue/white-collar, manual/non-manual job), job type (managerial, clerical, employee, entrepreneur), company size, company area (rural/urban), mental stress at the workplace, duration, and workplace environment.[13–16,19,20] A few of the questionnaires included questions on job satisfaction. Utrecht Scale for Evaluation for Rehabilitation- Participation (USER-P),[18] is a self-evaluated questionnaire, that evaluates an individual perceived barriers and abilities to RTW.

4. Predictors of RTW

4.1. Positive predictors

4.1.1. Disease factors

Two studies found that individuals with cerebral infarction returned to work faster than those with haemorrhage.[16,20] Better muscle strength post-stroke contributes to faster RTW than poor muscle strength.[13] Stroke subjects with a better QOL were found to RTW faster.[19]

4.1.2. Personal factors

Younger individuals have been found to RTW faster than older post-stroke individuals.[13–15,17,19,20] Two studies found that individuals in the age group between 35-44[13] as well as those younger than 54 years, were found to RTW earlier.[17] However, age was found to be a non-significant predictor in one study.[14] Additionally, in comparison to post-stroke females, post-stroke males were found to have RTW earlier.[14,15,19] However, early RTW has been observed in both male and female subjects with stroke without prior illness.[15]

4.1.3. Family support

Individuals with financially independent spouses, RTW earlier.[15]

4.1.4. Occupational factors

4.1.4.1. Type. Self-employed, managers, and individuals employed in non-manual occupations were found to RTW faster than individuals employed in manual occupation.[16,20] Individuals working in workplaces that modified the environment based on individuals needs were found to RTW earlier.[18]

4.1.4.2. Income. RTW is also associated with the income of individuals affected by stroke.[13,15,17] An individual receiving more than $30,000 per year was positively correlated with RTW.[13] In addition, there was a positive correlation with RTW if the individual was the only breadwinner of the family.[15]

4.1.4.3. Education. Hackett et al.,[15] reported that a higher education level is a significant. However, two studies found education to be a non-significant predictor of RTW among stroke survivors.[17,20]

4.1.5. Other factors

A previous study found that white raced individuals RTW faster.[14] An individual's perceived ability in the workplace post-stroke adds to the RTW.[20] Individuals with access to health insurance have been found to RTW faster.[15]

4.2. Negative predictors

4.2.1. Disease factors

Stroke severity assessed using the NIHSS was negatively correlated with RTW among stroke participants, indicating that individuals with severe stroke had a lower rate of RTW.[18] Individuals with severely affected stroke required longer hospitalization and were thus negatively correlated with RTW.[19] Stroke survivors who were dependent on rehabilitation such as occupational and physiotherapy, were found to have RTW slower.[19] Individuals with dysphagia experience RTW much later.[13]

4.2.1.1. Cortical dysfunction. The presence of hemineglect, apraxia,

Table 2
Characteristics of the studies.

Author, Year, & Type of cohort	Sample size, Mean/ Median age type of stroke, and country	Outcome Measures	Results	Predictors
M.A. Wozniak et al.,[15] 1999 Prospective cohort	*Sample size*: 203 (136 males, 67 females) *Mean/Median age:* 55.3. *Type of stroke:* Ischemic stroke *Area:* Baltimore, USA	Socio-demographics: - Age - Sex - Race - Education - Employment - Income Functional status: Barthel Index Depression: Centre for Epidemiologic Studies-Depression scale (CES-D) Diagnostic factor: - Location - Type - Side of stroke - Size of infarct Cortical Deficit: - GCS - On examination, presence of neglect, apraxia, homonymous visual field deficit, aphasia or anosognosia RTW: Self-reported	*Univariate analysis:*Barthel Index (independence) ($P < 0.001$). Household income >$30,000/y ($P < 0.02$). Aphasia ($p = 0.08$), cortical dysfunction ($p < 0.008$), depression ($p < 0.05$) and age >54 years, persistent motor weakness ($p < 0.007$), aphasia (0.08), and cortical dysfunction ($p < 0.008$) .	*Positive predictors:* - Annual Income ($30,000/y) - GCS score (alert) - Higher Barthel index - Motor strength *Negative predictors:* - Persistent cortical dysfunction - Age >54 years *Non-significant predictors:* - Absence of cortical findings - Race - Education - Aphasia - Depression - Location - Size
M A Busch et al.,[16] 2009 Prospective study	*Sample size:* 266 (103 females, 163 males) *Mean age:* 53.8. *Type of stroke:* Ischemic and Hemorrhagic *Area:* London, UK	Socio-demographic details: - Age - Sex - Ethnicity - Occupational class - Type of residence - Living alone Comorbidities: - Hypertension - Diabetes - Atrial fibrillation - Coronary heart disease - Transient Ischemic Attack - Current Smoker Consciousness: - GCS score Stroke factors: - Type of stroke - Location Stroke severity: - Urinary incontinence - Dysphagia - Dysarthria Service provision: - Hospital stays - Length of stay - Stroke unit treatment - PT/OT within 3 months RTW: Self-reported Activity: - French Activity Index (FAI) Disability: Barthel index (BI)	*Multivariable model:* Increasing age OR 0.23 (95% CI 0.07–0.76) ($p < 0.001$), female sex (OR 0.45; 95% CI 0.23 to 0.9) ($p = 0.02$), black ethnicity (OR 0.47; 95% CI 0.24 to 0.93) ($p = 0.02$), diabetes (OR 0.25; 95% CI 0.08 to 0.79) ($p < 0.01$) and dependence at 1 week (OR 0.24; CI 0.11–0.49) ($p < 0.001$)	*Positive predictor:* - Younger age (<55 years) - Male sex - White ethnicity *Negative predictors:* - Diabetes - Poor BI - Stroke severity *Non-significant predictors:* - Old Age
ML. Hackett et al.,[17] 2012 Prospective cohort	*Sample size:*441 *Mean Age:* 52 years. *Type of stroke:* Ischemic and Hemorrhagic *Area:* Sydney, Australia	Socio-demographic: - Gender - Age - Education - Marital status - Lifestyle - Main income - Dependence on family - Health insurance Stroke factors: - Date - Subtypes - GCS - Received recombinant tissue plasminogen activator Employment: - Type of work	*Univariate analysis:*Independent in activities of daily living (OR 10.23, 95% CI 4.11 to 25.46), had health insurance (not having health insurance OR 0.40, 95% CIs 0.18 to 0.89), were younger (OR 0.94, 95% CI 0.90 to 0.98), male, and female without a prior activity restricting illness (5.89 OR 1.21 to 28.7)	*Positive predictors:* - Higher education, - Self-employed, - Main income earner - Higher FAI - Male with prior illness - Male and female without prior restricting illness. - Health insurance - Younger age group - Married - Financially dependent children - Non smokers *Negative predictors:*

(*continued on next page*)

Table 2 (*continued*)

Author, Year, & Type of cohort	Sample size, Mean/ Median age type of stroke, and country	Outcome Measures	Results	Predictors
		RTW: Questionnaire Depression: Hospital and Anxiety Depression Scale (HADS) ADL: Frenchay activities index (FAI) Fatigue: SF-36 questionnaire At risk' alcohol consumption -Alcohol use disorder identification test (AUDIT-C) Cognition function: Telephone interview for cognitive status, (TICSm)		- Female with prior illness *Non-significant Predictors:* - Depression - Alcohol consumption - GCS score - Cognitive impairment
Endo M et al.,[18] 2015 Retrospective cohort	*Sample size:* 380 (332 males, 48 females) *Mean age:* 52.7 years *Type of stroke:* Ischemic and Hemorrhagic *Area:* Japan	Demographics: - Age - Gender RTW**:** Self rated Company size: <1000 employees ≥1000 employees Stroke subtype: - Infarct - Haemorrhage Occupation type: - Desk/Manual worker - Manager/Non- Manger	*Cox regression:*Full-time RTW: Age ≥50 0.81 (0.61–1.09) p-value-0.16; Female 0.70 (0.46–1.06) p-value-0.09; Company size- ≥1000 employees 0.78 (0.50–1.21) pvalue- 0.27 Urban area 0.89 (0.67–1.17) p-value- 0.40 Manual worker 1.12 (0.83–1.52) p-value-0.45 Manager 1.81 (1.07–3.06) p-value-0.02 Cerebral haemorrhage 0.49 (0.36–0.68) p-value-<0.01 Subarachnoid haemorrhage 0.76 (0.53–1.08) p-value-0.12 *Regression analysis:* Age 2.94 (1.04–8.30) p-value 0.04 Female 1.36 (0.57–3.26) p-value 0.49 Company size ≥1000 employees 3.19 (0.44–23.26) p-value 0.25 Company area Urban area 1.10 (0.53–2.27) p-value 0.8 Manual worker 0.27 (0.82–0.87) p-value 0.03 Manager 0.96 (0.23–4.00) p-value 0.95 Cerebral haemorrhage 2.19 (1.09–4.41) p-value 0.03 Subarachnoid haemorrhage 1.05 (0.38–2.90) p-value 0.93	*Positive predictors:* - Cerebral infarcts Manual workers *Negative predictors:* - Cerebral Haemorrhage - Older participants - Desk worker
EL Glader et al.,[19] 2016 Retrospective cohort study	*Sample size:* 2539 (1594 male 945 female) *Mean age:* 46. *Type of stroke:* Ischemic and hemorrhagic *Area:* Sweden	Demographics: - Age - Sex RTW: Self-rated Diagnostic factors *Stroke subtype: Hemorrhagic Ischemic Unspecified Socioeconomic factors: - Income Low/Middle/High - Education Primary/Secondary/High - Living alone Yes/No - Country of birth Nordic/European/Outside Europe - Low mood: (yes/no) - Pain: (yes/no) - Dependent in ADL: (yes/no) - Help with answering questionnaire: (yes/no)	*Multiple regression model:*Income-Low 1, Middle 1.14 (0.91–1.42), High 1.64 (1.30–2.06)Education- Primary 1, Secondary 1.00 (0.77–1.30), University 1.23 (0.92–1.64); Living alone- no 1, yes 0.89 (0.71–1.11); Country of birth- Sweden 1, Nordic countries (except Sweden) 0.93 (0.59–1.48), European countries 0.52 (0.34–0.78) Countries outside Europe 0.45 (0.29–069). Experience oflow mood (54.0% vs 78.2%) or pain (52.5% vs 78.6%).	*Negative predictor:* - Low income - low mood - Pain - Dependent in ADL *Positive predictor:* - High income - Middle age *Non-significant predictor:* - Education - Country of birth
Van der Kemp et al.,[20] 2017 Prospective longitudinal cohort	*Sample size:* 121 (94 male 27 female) *Mean age:* 56.3. *Type of stroke:* Ischemic and Hemorrhagic *Area:* Utrecht, Netherlands	Demographic: - Age - Sex - Education - Marital status - Residence Stroke factors: - Location - Type - Vascular area - Recurrent stroke Severity of stroke: NIHSS I ADL: BI RTW: Self-reported Occupation status: the Utrecht scale for evaluation of rehabilitation-participation (USER-P) Work satisfaction: the Utrecht scale for evaluation of rehabilitation-	*Bivariate Analysis:* Depressive symptoms (r = −0.16) (p = 0.92)and global cognitive functioning (r = 0.19) (p = 0.43); Age (r = −0.06) (p = 0.506); Higher level of education (r = 0.13) (p = 0.155); Independence in ADL (r = 0.05) (p = 0.56); passive coping 0.03.781 Self-efficacy (r = 0.07) (p = 0.475); Anxiety symptoms (r = −0.11) (p = 00.254)	*Positive predictor:* - Depression free - Good cognition *Negative predictors:* - NIHSS *Non-significant predictor:* - BI - USPER - UCLP - GSES

(*continued on next page*)

Table 2 (*continued*)

Author, Year, & Type of cohort	Sample size, Mean/ Median age type of stroke, and country	Outcome Measures	Results	Predictors
		participation (USER-P) Personal and neuropsychological factors: - Utrecht coping list (UCL-P), - The general self-efficacy scale (GSES), - Hospital anxiety and depression Scale (HADS) Cognitive: Montreal cognitive assessment Test (MoCA)		
A Sen et al.[21] 2018 Cohort study	*Sample size:* 940 (641 male, 299 female) *Mean age: 53.4* *Type of stroke:* Ischemic & Hemorrhagic stroke *Area:* London, UK	Sociodemographic: - Age - Sex - Ethnicity - Pre-stroke residence - Co-morbidities: Stroke factors: - Length of hospital stay - Urinary incontinence - Dysphagia - Motor deficits - Dependent on OT or PT ADL: Barthel Index Level of consciousness: Glasgow coma scale (GCS) Cognition: mini mental state exam (MMSE) and abbreviated mental test (AMT) Depressions and anxiety: hospital anxiety and depression scale (HADS) Quality of life: Short Form-36 (SF-36) RTW: Self-reported Occupational class: Manual/Non-manual	*ODDs ratio* Length of stay (days) = 1 (0.99, 1.01) p-value 0.4278 Occupational therapy = 0.32 (0.12,0.9) p-value0.0303 *Association* BI (>19)148 (87.6) p-value <0.0017 HADS anxiety (0–10) = 145 (89.0) pvalue-0.007 (11+) = 18 (11.0) SF-12 mental score 51.1 (9.1) p-value <0.001 SF-12 physical scor-48.9 (8.8) p-value <0.001 Cognition Intact- 97 (92.4) p-value 0.003 Impaired 8 (7.6)	*Positive predictors:* - Younger age - Males - Functionally independent - Cognitively intact - Better QOL - GCS - Intact motor function *Negative predictors:* - Dysphagia - Anxiety and depression - Longer hospital admission - Continuing PT and OT - Manual job
K Saar et al.[22] 2023 Prospective study	*Sample size:* 77 (21 female, 56 male) *Mean age: 53* *Type of stroke:* Ischemic & Hemorrhagic stroke *Area:* Helsinki, Finland	Demographics: - Age - Sex Occupational type: - White collar - Blue collar - Entrepreneurs Education: - Comprehensive school/middle school/civic school -Vocational school/high school; -University of applied sciences degree; and -University degree. Cognition: Cognitive screening method for stroke patients (CoMet) Motivation: dichotomous response Questionnaire on work-related matters: The Work Ability Index Perceived working ability and barriers: Self rated questionnaire	Association: CoMet mean scores (p = 0.049) Positively perceived working ability (p = 0.001)	*Positive predictors:* - Higher CoMet score - Perceived working ability *Negative predictors:* - Perceived barriers *Non-significant predictors:* Occupational type Age Sex Educational level

homonymous hemianopia, aphasia, anosognosia, and other cognitive dysfunction was grouped into cortical dysfunctions.[13] Most of these symptoms are assessed using standard bedside examination tools. Some authors have used the Montreal Cognitive Assessment (MoCA), Mini Mental State Examination (MMSE), **Abbreviated** Mental Test (AMT), and cognitive screening method for stroke patients (CoMet) scales to further assess cortical deficits.[18,19] Cortical dysfunction in post-stroke individuals is associated with poor RTW.[13] Individuals with poor scores in MoCA, MMSE, AMT, and CoMet were unlikely to have RTW.[13,18,19]

4.2.1.2. Impaired consciousness. Initial consciousness levels were assessed using the Glasgow Coma Scale (GCS).[14,15,19] Individuals with poor GCS scores were found to have RTW slower.[14,19] One study found GCS scores to be non-significant predictors.[15]

4.2.1.3. Independent ADLs. Of the 8 studies, 6 studies examined the ability of stroke patients to perform independent ADLs and RTW among stroke patients.[13–15,17–19] The Barthel index (BI) and Frenchay activity index (FAI) were used to evaluate independent activity levels among post-stroke individuals.[13–15,17–19] Five studies found that individuals with stroke who were dependent on ADL were more unlikely to RTW.[13–15,17,19] Although the ability to perform ADLs independently was an important factor, it was reported to be statistically non-significant in one study.[18]

4.2.1.4. Co-morbidities and lifestyle. Stroke survivors with pre-existing diabetes were found to have poor RTW.[14] Smokers are less likely to RTW faster.[15]

4.2.1.5. Psychological factors. Psychological factors, including depression, anxiety, and low mood, were evaluated using the Hospital Anxiety

Table 3
JBI quality assessment of the included studies.

Authors	Were the two groups similar and recruited from the same population?	Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Was the exposure measured in a valid and reliable way?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Were the outcomes measured in a valid and reliable way?	Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Were strategies to address incomplete follow up utilized?	Was appropriate statistical analysis used?	Score
M.A.Wozniak et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11/11
M A Busch et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11/11
ML. Hackett et al.	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	9/11
M Endo et al.	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	9/11
E.L. Glader et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11/11
JVD Kemp et al.	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	9/11
A Sen et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11/11
K Saar et al.	Yes	Yes	Yes	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	9/11

NA = not applicable.

and Depression Scale (HADS-D, HADS-A), and the Centre for Epidemiological Studies-Depression (CES-D) in four studies.[13,15,18,19] Two studies found that depression was a negative predictor of RTW,[18,19] while two other studies foundt depression to be not significant.[13,15] Post-stroke pain was identified to poor RTW.[17] Additionally low mood was associated with a lower chance of RTW.[17]

4.2.2. Occupational factors

The type of work was inconclusive, as desk workers were found to RTW later than comparison to non-desk workers.[16] By contrast, manual workers RTW much later.[19] Additionally, stroke individuals with perceived barriers in their work-place are less likely to RTW.[19]

4.2.3. Other factors

Black ethnicity was a poor predictor of RTW while another study found that the race of an individual was a non-significant predictor.[13,14]

4.3. Non-significant predictors

4.3.1. Disease factors

One study correlated the size and location of the infarct on RTW among stroke survivors. They found that the size and location of the infarct were not significant in RTW.[13] Post-stroke aphasia has been reported to be a non-significant predictor of RTW.[13]

4.3.2. Psychological factors

Post-stroke individuals with poor self-efficacy and coping skills were found to be non-significant predictors of RTW.[18]

4.3.3. Personal factors

4.3.3.1. Lifestyle. A history of alcohol consumption among stroke survivors is a non-significant predictor of RTW[15]

4.4. Other factors

Country of birth was a non-significant predictor in RTW.[17]

4.5. Quality assessment

JBI critical tool of appraisal was used as a quality assessment tool was used to assess the quality of the study methodology. The studies were scored according to population, exposure method, confounding factors, outcomes, follow-up time, and statistical analysis. Of the eight articles, four articles were found to have confounding factors, and the authors examined these factors. Four articles scored more than 81%[15,16,18,20] and whereas the other four articles scored 100%.[13,14,17,19] Therefore, this review consisted of good methodological studies. Detailed analysis results are presented in Table 3.

5. Discussion

This systematic review included 8 cohort studies and summarized the predictors that aid or fail in the RTW process among post-stroke individuals. The authors of this review found that the predictors of RTW post are a broad concept. Therefore, we decided to further group these into disease, personal, occupational, and psychological factors.

The severity of the stroke, post-stroke duration, affected side, location, type of stroke, and size of the infarct are some of the stroke characteristics that predict RTW.[13,16,18,20,25] Patients diagnosed with cerebral haemorrhage on admission may have a greater functional impairment than those diagnosed with cerebral infarction.[16,20,26,27] This could be due to unresolved edema and hematoma in hemorrhagic stroke, leading to a slower restoration of function and poor recovery.[28,29] Greater impairments result in increased stroke severity, as

recorded by the NIHSS.[18] The lower the NIHSS score, the longer the duration of the hospital stay. This, in turn, contributes to lower RTW.[18,19] These individuals are bound to be dependent on rehabilitation services such as OT and PT for functional recovery, contributing to slower RTW.[19,30] Hence, identifying these factors may aid the early rehabilitation of stroke survivors.

The level of consciousness recorded by the GCS is also a predictor of RTW among stroke survivors.[14,15,19] Individuals with poor GCS scores on admission and poor persistent GCS have been observed to have a slower recovery impacting their RTW.[14,15,19] Poor GCS scores indicate a longer stay in the intensive care unit, which further risks the individual to develop secondary complications. Hence early interventions to improve consciousness, in addition to approaches to prevent secondary complications are warranted for early recovery that could facilitate RTW.

The ability to acquire a job requires an individual to have an intact higher mental function to communicate, perform dual tasks, pay attention, and memorize, to name a few. Impaired mental function with very mild to no motor impairment was negatively associated with RTW among individuals with stroke.[13,15,19] The odds of RTW in occupations that requir more complex communication skills are lower when individuals present with communication disorders like aphasias.[18,31] Intensive cognitive rehabilitation focusing on these defects can facilitate early RTW.

Post-stroke impairments such as persistent cognitive deficits and reduced motor strength can affect an individual's balance and ability to independently perform ADLs.[13–15,18,19,32] Good balance and functional independence are essential for early RTW.[13–15,19,32] In our study, we found that the ability to perform ADLs independently was a positive predictor of RTW. Thus, task-dependent rehabilitation strategies can be used to enhance RTW faster.

Post-stroke, the odds of RTW are higher in younger people.[14,15,19,20,27] This could be attributed to the lower employment security and financial uncertainty among younger individuals.[13,33] However, it is unclear why individuals older than 55 years do not experience the need for RTW after a stroke, whether people are unable to work due to biological factors, whether they genuinely prefer not to work, whether they have different pressures or barriers to RTW, or whether employers discriminate against them.[16,35] We believe a factor that can be considered for individuals within this specific age group, who are not compelled to RTW, may lie in the heightened sense of financial security associated with proximity to the age of retirement.

. Men are typically more likely to experience RTW.[14,15,19,27] Gender disparity may be explained by societal/employer discrimination against females and the societal pressure for males to be the main source of family income.[6,19,34] However, the studies considered in this review are from higher and upper-middle-income countries (HIC/UMIC), wherein dual-income earners within households may not be as pronounced as lower-middle-income countries (LMIC). Further research could provide a nuanced exploration of socio-economic influences on post-stroke outcomes, thereby contributing to a more comprehensive understanding of the multifactorial determinants shaping gender differentials in the aftermath of stroke. As age and sex are non-modifiable factors that influence the recovery of function; hence, age and sex-specific rehabilitation services are essential for RTW.

The presence of co-morbidities is associated with poor RTW among individuals with stroke.[14,35] Diabetes has been studied in this review.[14,35] Although the exact mechanism of diabetes in stroke is unknown, some of the effects might be due to unmeasured co-morbidities or neuronal damage such as poor neuroplasticity during the acute stages of stroke in diabetic patients.[14,36] Smokers were found to RTW slower than non-smokers.[15] Smoking may encourage collateral blood flow and increase the tissue ischemia threshold during vascular blockage. However, when vascular stenosis reaches a threshold level, these compensatory mechanisms stop functioning.[37] Therefore, smoking may influence NIHSS scores when cerebral infarctions are caused by vascular stenosis which worsens over time.[37] When arteries have an entire blockage rather than partial stenosis, neurological impairment is most noticeable, slowing recovery.[37] Awareness and counseling in smoking and diabetes on post-stroke recovery should be made mandatory in hospitals 27% of stroke survivors consume alcohol. However, the effects of ethanol on the cerebral circulation remain unclear. However, research suggests that acute ethanol intoxication increases haemoglobin concentrations, most likely due to ethanol-induced hyperosmolality.[38] A high haematocrit may slow the cerebral blood flow, which encourages the production of thrombi.[38] Thus, alcohol consumption may have an impact on RTW; although it was not statistically significant.[15] Other predictors that were non-significant were the birth country of the stroke survivors.[17] UICs are known to have better access to health care, which may contribute to RTW. This necessitates researchers to compare healthcare systems in UIC and LMIC, evaluating their impact on RTW dynamics pos-stroke However, psychological factors have inconsistent findings. Factors such as depression and anxiety are associated with poor odds of RTW among post-stroke individuals.[13,15,18,19,39] Additionally, RTW is positively predicted by decreased workplace stress.[18,39] Yet, we found that depression was non-significant in two studies.[13,15] In our opinion, along with psychological support, stroke support groups may facilitate the RTW process for stroke survivors by offering a platform for mutual engagement. Through collective interaction, participants may generate adaptive strategies, thereby fostering a supportive environment conducive to successful RTW.

Individuals with higher education levels secure white-collar jobs.[15,27] Most white-collar jobs are less physically demanding than blue-collar jobs. Therefore, we feel vocational rehabilitation could assist post-stroke individuals with RTW by advocating the resources necessary to perform their jobs within their capacity. In addition, modifying a stroke survivor's workplace has also been attributed to RTW.[18,40]

Stroke survivors, who were also the main income earners of the family, were found to RTW faster.[15] This could be attributed to societal pressure. Individuals who earned more than thirty thousand dollars per month and those who could claim insurance were found to RTW faster.[13] Such individuals may be able to access better health care and rehabilitation services, leading to better recovery and faster RTW.

5.1. Strengths

We were mainly interested in answering the question 'Is there any evidence between variables and RTW post-stroke?' and we believe our approach is suitable for answering this question. Further knowledge derived from this review about the ability to perform independent ADL and better cognition can assist therapists in facilitating early RTW. The review included only one type of study design; hence there was homogeneity in the study, and the loss to follow-up rate was low in most studies. This proportion was too small to cause selection bias. This review consisted of good methodological studies.

5.2. Limitations

The main limitation of our study was the studies included extensively conducted in HIC and UMIC whereas research related to LMIC is sparse. Differences in non-modifiable factors, such as age and gender, modifiable factors, disability, retirement benefits, and accessibility to healthcare in HIC and UMIC are most likely to influence RTW. Further, we did not focus on the timeline of RTW within one -year post-stroke. In addition, we also observed differences in the way outcomes were assessed apart from geographical variations in the studies considered in our review which restricted us from pursuing a meta-analysis.

6. Conclusion

RTW is an essential functional goal for individuals with post-stroke to support themselves and their families. This review highlights the

positive, negative, and non-significant predictors of RTW. Poor independence, impaired higher mental function, stroke severity, depression, and poor cognition are predictors that can be overcome using appropriate multidisciplinary measures. Appropriate assistive or environmental modifications can be employed based on predictors such as age and individuals capacity. In addition, vocational rehabilitation should be of equal emphasis for stroke survivors to successfully RTW, based on the individual's capacity. These approaches can enhance RTW faster in stroke patients.

Funding

The authors declare that no funds, grants, or other support was received during the preparation of this manuscript.

Ethical approval

Not applicable.

Authors contribution

RM, AN, DP: conception and design of the study, screening of articles for eligibility, extraction and analysis of data, interpretation of data, participation in risk of bias, quality of evidence assessment, drafting of the article and final approval of the version to be submitted. AM and VKK: Conception and design of the study and coordination of the entire series of systematic reviews. ZKM and SP: proofread the final manuscript for language correction. All authors have read and approved the final manuscript.

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.

References

1. Feigin VL, Stark BA, Johnson CO, et al. Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019 [Internet] *Lancet Neurol*. 2021;20(10):795–820. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1474442221002520 [cited 2024 Jan 2]1.
2. Béjot Y, Delpont B, Giroud M. Rising stroke incidence in young adults: more epidemiological evidence [Internet]. More Questions to Be Answered *J Am Heart Assoc.*; 2016 May, 11:5(5) [cited 2023 Jul 6];5:e003661. Available from: https://www.ahajournals.org/doi/10.1161/JAHA.116.003661.
3. Wafa HA, Wolfe CDA, Emmett E, Roth GA, Johnson CO, Wang Y. Burden of stroke in Europe: thirty-year projections of incidence, prevalence, deaths, and disability-adjusted life years [Internet] *Stroke*. 2020 Aug;51(8):2418–2427. Available from: https://www.ahajournals.org/doi/10.1161/STROKEAHA.120.029606 [cited 2023 Jul 22].
4. Di Carlo A. Human and economic burden of stroke [Internet] *Age Ageing*. 2008 Jan; 138(1) [cited 2023 Jul 6]:4–5. Available from: https://academic.oup.com/ageing/article-lookup/doi/10.1093/ageing/afn282.
5. Rajsic S, Gothe H, Borba HH, et al. Economic burden of stroke: a systematic review on post-stroke care [Internet] *Eur J Health Econ*. 2019 Feb 7;20(1):107–134. Available from: http://link.springer.com/10.1007/s10198-018-0984-0 [cited 2023 Jul 22].
6. Edwards JD, Kapoor A, Linkewich E, Swartz RH. Return to work after young stroke: a systematic review [Internet] *Int J Stroke*. 2018 Apr;13(3):243–256. Available from: http://journals.sagepub.com/doi/10.1177/1747493017743059 [cited 2023 Jul 6].
7. Cumming TB, Marshall RS, Lazar RM. Stroke, cognitive deficits, and rehabilitation: still an incomplete picture [Internet] *Int J Stroke*. 2013 Jan;8(1):38–45. Available from: http://journals.sagepub.com/doi/10.1111/j.1747-4949.2012.00972.x [cited 2023 Jul 27].
8. Hendricks HT, Van Limbeek J, Geurts AC, Zwarts MJ. Motor recovery after stroke: a systematic review of the literature [Internet] *Arch Phys Med Rehabil*. 2002;83(1), 1629–37. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0003999302002630 [cited 2023 Jul 27].
9. [Internet]. *NHS Stroke Action Will Save Hundreds of Lives*; 2019 Jul. Available from: https://www.england.nhs.uk/2019/05/nhs-stroke-action-will-save-hundreds-of-lives/#:~:text=As%20well%20as%20being%20devastating,productivity%2C%20disability%20and%20informal%20care.
10. Horppu R, Martimo KP, MacEachen E, Lallukka T, Viikari-Juntura E. Application of the theoretical domains framework and the behaviour change wheel to understand physicians' behaviors and behavior change in using temporary work modifications for return to work: a qualitative study [Internet] *J Occup Rehabil*. 2018;28(1): 135–146. Available from: http://link.springer.com/10.1007/s10926-017-9706-1 [cited 2023 Jul 6].
11. Ntsiea M, Van Aswegen H, Lord S, Olorunju SS. The effect of a workplace intervention programme on return to work after stroke: a randomised controlled trial [Internet] *Clin Rehabil*. 2015;29(7), 663–73. Available from: http://journals.sagepub.com/doi/10.1177/0269215514554241 [cited 2023 Jul 27].
12. Demain S, Burridge J, Ellis-Hill C, et al. Assistive technologies after stroke: self-management or fending for yourself? A focus group study [Internet]. *BMC Health Serv Res.*; 2013 Aug [cited 2023 Jul 27];22;13:334. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-13-334.
13. Wozniak MA, Kittner SJ, Price TR, Hebel JR, Sloan MA, Gardner JF. Stroke location is not associated with return to work after first ischemic stroke [Internet]. *Stroke*. 1999 Dec;30(12) [cited 2023 Jul 6];30:2568–73. Available from: https://www.ahajournals.org/doi/10.1161/01.STR.30.12.2568.
14. Busch MA, Coshall C, Heuschmann PU, McKevitt C, Wolfe CDA. Sociodemographic differences in return to work after stroke: the South London Stroke Register (SLSR) [Internet] *J Neurol Neurosurg Psychiatry*. 2009;80(8), 888–93. Available from: https://jnnp.bmj.com/lookup/doi/10.1136/jnnp.2008.163295 [cited 2023 Jul 6]1.
15. Hackett ML, Glozier N, Jan S, Lindley R [Internet]. In: Minnerup J, ed. *Returning to Paid Employment after Stroke: The Psychosocial Outcomes in StrokE (POISE) Cohort Study*. PLoS ONE; 2012 [cited 2023 Jul 6]25;7(7):e41795. Available from: https://dx.plos.org/10.1371/journal.pone.0041795.
16. Endo M, Sairenchi T, Kojimahara N, et al. Sickness absence and return to work among Japanese stroke survivors: a 365-day cohort study [Internet] *BMJ Open*. 2016 Jan;6(1), e009682. Available from: https://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2015-009682 [cited 2023 Jul 6]1.
17. Glader E-L, Jonsson B, Norrving B, Eriksson M. Socioeconomic factors' effect on return to work after first stroke [Internet] *Acta Neurol Scand*. 2017;135(6), 608–13. Available from: https://onlinelibrary.wiley.com/doi/10.1111/ane.12639 [cited 2023 Jul 6].
18. Van Der Kemp J, Kruithof WJ, Nijboer TCW, Van Bennekom CAM, Van Heugten C, Visser-Meily JMA. Return to work after mild-to-moderate stroke: work satisfaction and predictive factors [Internet] *Neuropsychol Rehabil*. 2019;29(4):638–653. Available from: https://www.tandfonline.com/doi/full/10.1080/09602011.2017.1313746 [cited 2023 Jul 6]21.
19. Sen A, Bisquera A, Wang Y, et al. Factors, trends, and long-term outcomes for stroke patients returning to work: the South London Stroke Register [Internet] *Int J Stroke*. 2019 Oct;14(7):696–705. Available from: http://journals.sagepub.com/doi/10.1177/1747493019832997 [cited 2023 Jul 6].
20. Saar K, Tolvanen A, Poutiainen E, Aro T. Returning to work after stroke: associations with cognitive performance, motivation, perceived working ability and barriers [Internet] *J Rehabil Med*; 2023 [cited 2023 Jul 6];55:jrm00365. Available from: https://medicaljournalssweden.se/jrm/article/view/2576.
21. Schwarz B, Claros-Salinas D, Streibelt M. Meta-synthesis of qualitative research on facilitators and barriers of return to work after stroke [Internet] *J Occup Rehabil*. 2018 Mar;28(1):28–44. Available from: http://link.springer.com/10.1007/s10926-017-9713-2 [cited 2023 Jul 6].
22. Moher D. Preferred reporting Items for systematic reviews and meta-analyses: the PRISMA statement [Internet] *Ann Intern Med*. 2009 Jul;6(7), e1000097. Available from: http://annals.org/article.aspx?doi=10.7326/0003-4819-151-4-200908180-00135 [cited 2023 Oct 7];21.
23. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews [Internet] *Syst Rev*. 2016 Dec 5;5(1):210. Available from: http://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-016-0384-4 [cited 2023 Jul 6].
24. Barker TH, Stone JC, Sears K, et al. Revising the JBI Quantitative Critical Appraisal Tools to Improve Their Applicability: An Overview of Methods and the Development Process [Internet] *JBI Evid Synth*. 2023 Mar 1;21(3), 478–93. Available from: https://journals.lww.com/10.11124/JBIES-22-00125 [cited 2023 Jul 6].
25. Jørgensen HS, Nakayama H, Raaschou HO, Olsen TS. Intracerebral hemorrhage versus infarction: stroke severity, risk factors, and prognosis: hemorrhage versus Infarction [Internet] *Ann Neurol*. 1995;38(1):45–50. Available from: https://onlinelibrary.wiley.com/doi/10.1002/ana.410380110 [cited 2023 Jul 27].
26. Geraghty JR, Lara-Angulo MN, Spegar M, Reeh J, Testai FD. Severe cognitive impairment in aneurysmal subarachnoid hemorrhage: predictors and relationship to functional outcome [Internet] *J Stroke Cerebrovasc Dis*. 2020;29(9), 105027. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1052305720304456 [cited 2023 Jul 27].
27. Hannerz H, Holbaek Pedersen B, Poulsen OM, Humle F, Andersen LL. A nationwide prospective cohort study on return to gainful occupation after stroke in Denmark 1996-2006 [Internet] *BMJ Open*. 2011 Jan 1;1(2). e000180–e000180. Available from: https://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2011-000180 [cited 2023 Jul 27].
28. Caplan L. Caplans Stroke: A Clinical Approach. fourth ed...
29. Unnithan AKA, Das J M, Mehta P. Hemorrhagic stroke. StatPearls [Internet]. In: *Treasure Island (FL): StatPearls Publishing*; 2023 [cited 2023 Jul 27]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK559173/.
30. Lock S, Jordan L, Bryan K, Maxim J. Work after stroke: focusing on barriers and enablers [Internet] *Disabil Soc*. 2005 Jan;20(1):33–47. Available from: http://www.tandfonline.com/doi/abs/10.1080/0968759042000283629 [cited 2023 Jul 27].

31. Graham JR, Pereira S, Teasell R. Aphasia and return to work in younger stroke survivors [Internet] *Aphasiology*. 2011;25:952–960. https://doi.org/10.1080/02687038.2011.563861.
32. Peters GO, Buni SG, Oyeyemi AY, Hamzat TK. Determinants of return to work among Nigerian stroke survivors [Internet] *Disabil Rehabil*. 2013 Mar 1;35(6), 455–9. Available from: http://www.tandfonline.com/doi/full/10.3109/09638288.2012.697251 [cited 2023 Jul 27].
33. Westerlind E, Persson HC, Eriksson M, Norrving B, Sunnerhagen KS. Return to work after stroke: a Swedish nationwide registry-based study [Internet] *Acta Neurol Scand*. 2020;141(1):56–64. Available from: https://onlinelibrary.wiley.com/doi/10.1111/ane.13180 [cited 2023 Jul 27].
34. Saeki S, Toyonaga T. Determinants of early return to work after first stroke in Japan [Internet] *J Rehabil Med*. 2010 Mar 1;42(3), 254–8. Available from: https://medicaljournalssweden.se/jrm/article/view/17810 [cited 2023 Jul 27].
35. Pan X, Wang Z, Yao L, Xu L. The reasons for not returning to work and health-related quality of life among young and middle-aged patients with stroke: a cross-sectional study [Internet] *Front Neurol*; 2023 [cited 2023 Jul 27];14:1078251. Available from: https://www.frontiersin.org/articles/10.3389/fneur.2023.1078251/full.
36. Ergul A, Abdelsaid M, Fouda AY, Fagan SC. Cerebral neovascularization in diabetes: implications for stroke recovery and beyond [Internet] *J Cerebr Blood Flow Metabol*. 2014;34(4):553–563. Available from: http://journals.sagepub.com/doi/10.1038/jcbfm.2014.18 [cited 2023 Jul 7].
37. Weng W-C, Huang W-Y, Chien Y-Y, et al. The impact of smoking on the severity of acute ischemic stroke [Internet] *J Neurol Sci*. 2011 Sept 15;308(1–2), 94–7. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0022510X1100308X [cited 2023 Jul 18].
38. Hillbom M, Kaste M. Does ethanol intoxication promote brain infarction in young adults? [Internet] *Lancet*; 1978 Dec 2 [cited 2023 Jul 26];(8101):1181–3. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0140673678921608.
39. McCluskey A, Vratsistas-Curto A, Schurr K. Barriers and enablers to implementing multiple stroke guideline recommendations: a qualitative study [Internet] *BMC Health Serv Res*. 2013 Aug 19;13(1):323. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-13-323 [cited 2023 Jul 27].
40. Balasooriya-Smeekens C, Bateman A, Mant J, De Simoni A. Barriers and facilitators to staying in work after stroke: insight from an online forum [Internet] *BMJ Open*. 2016 Apr 6;6(4), e009974. Available from: https://bmjopen.bmj.com/lookup/doi/10.1136/bmjopen-2015-009974 [cited 2023 Jul 27].