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Do social determinants influence post-stroke aphasia outcomes? A scoping review

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ABSTRACT

Purpose: To conduct a scoping review on five individual social determinants of health (SDOHs): gender, education, ethnicity, socioeconomic status, and social support, in relation to post-stroke aphasia outcomes.

Materials and methods: A comprehensive search across five databases was conducted in 2020 and updated in 2022. Twenty-five studies (3363 participants) met the inclusion criteria. Data on SDOHs and aphasia outcomes were extracted and analysed descriptively.

Results: Twenty studies provide information on SDOH and aphasia recovery outcomes. Five studies provide insights on SDOH and response to aphasia intervention. Research on SDOH and aphasia recovery has predominantly focussed solely on language outcomes (14 studies), with less research on the role of SDOH on activity, participation, and quality of life outcomes (6 studies). There is no evidence to support a role for gender or education on language outcomes in the first 3 months post stroke. SDOHs may influence aphasia outcomes at or beyond 12 months post onset.

Conclusions: Research on SDOHs and aphasia outcomes is in its infancy. Given SDOHs are modifiable and operate over a lifetime, and aphasia is a chronic condition, there is a pressing need to understand the role of SDOHs on aphasia outcomes in the long term.

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KEYWORDS

Social determinants of health; aphasia; outcomes; stroke; rehabilitation

> IMPLICATIONS FOR REHABILITATION

- Research on the role of Social Determinants of Health (SDoH) and aphasia outcomes is in its infancy.
- The role of SDOHs has been mainly investigated in relation to language outcomes.
- Little is known about the SDOHs on activity, participation, and quality of life outcomes.
- Rehabilitation professionals should consider the potential influence of individual SDOHs such as gender, education, socioeconomic status, ethnicity, and social support on a person's access to aphasia services and aphasia outcomes long term.



Introduction

It is well known that social factors such as education, income, and socioeconomic status (SES) influence health outcomes and mortality rates globally [1]. For example, people in the USA with high SES live up to 12 years longer than people with low SES status [2]. Education and higher status occupations are similarly protective [3]. Social factors which influence a person's health status and life expectancy are called "social determinants of health" (SDOHs).

Social determinants of health frameworks

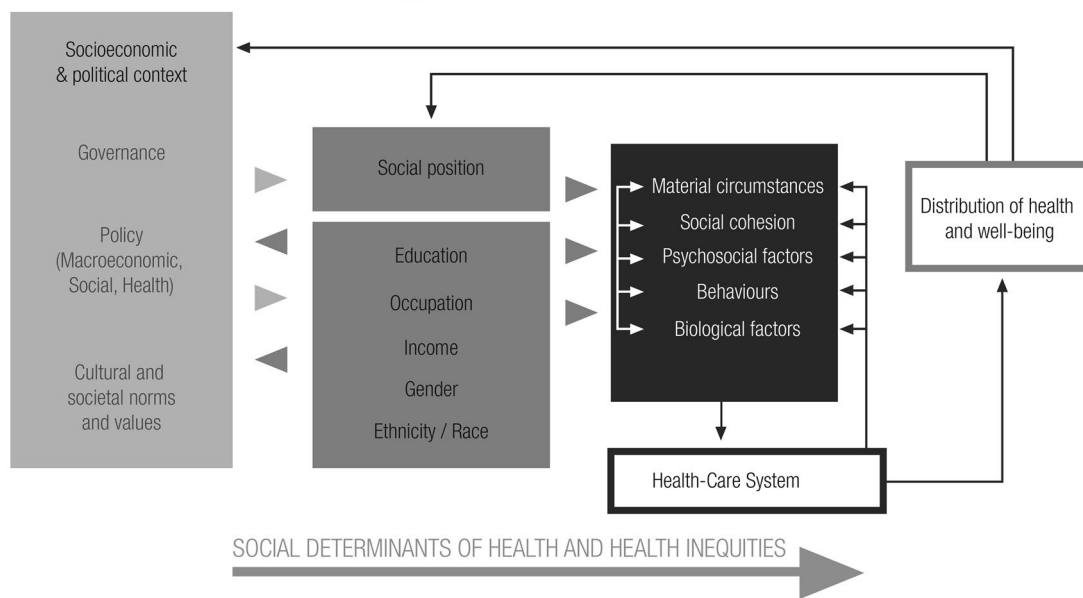
The World Health Organisation (WHO) defines SDOHs as the conditions in which people are born, grow, work, and live, and the ways in which these wider sets of forces and systems shape daily life [4]. There are numerous models that conceptualise how SDOHs operate [5]. Diderichsen et al.' model identified three types of social determinants that drive differences in health outcomes:

early childhood development and education; social position; and causes and consequences of illness [3,6]. This model provided a strong foundation for identifying relevant social factors associated with health, however, it did not address the role of political or cultural factors [7]. The Commission on Social Determinants of Health (CSDH) proposed an alternative conceptual framework, depicted in Figure 1, to illustrate how a broad range of societal, political, and cultural factors also contribute to health inequities [1,8]. This framework depicts the interplay between the socioeconomic and political context (including policies, and cultural and societal values) and an individual's socioeconomic position, and how these influence health and wellbeing. Specifically, it depicts how government policy, and the prevailing cultural and social values influence who (depending on gender, social class, race/ethnicity) gets access to resources such as education, employment, and income, and how this determines a person's socioeconomic position in society. The model also depicts how a person's socioeconomic position influences material circumstances, behaviours, and biological and psychosocial factors, and overall health and

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Figure 4.1 Commission on Social Determinants of Health conceptual framework.**Figure 1.** Commission of Social Determinants of Health conceptual framework for social determinants of health [8]. Reprinted with permission.

wellbeing. The CSDH framework underscores the fact that it is not personal characteristics such as one's gender, race/ethnicity, or social class that cause health inequities, rather it is a country's policies, and social and cultural values that result in differential access for different groups to the resources needed for optimal health and wellbeing. This is why these determinants of health are described as social determinants of health, because they are socially constructed and can therefore be modified.

The relationship between SDOHs and neurorehabilitation

Researchers have begun to examine the role of SDOHs on rehabilitation outcomes in neurological disorders. Frier et al. conducted a systematic review to examine the relationships between SDOHs and attendance, adherence and motivation in neurological rehabilitation [9]. They reported that higher education was related to greater exercise participation, self-reported well-being, and life satisfaction. Being employed and having a higher income were related to greater adherence to rehabilitation schedules and higher self-reported quality of life. High levels of social support and access to transport were also associated with increased rehabilitation participation and improved quality of life [9].

The relationship between SDOHs and stroke has also been investigated. Reshetnyak et al. [10] reviewed the individual participant data of 27 813 individuals in the US to examine the individual and cumulative effects of SDOHs on risk of stroke. The authors concluded that race (identifying as black), having fewer years of education, a lower SES level, no health insurance, and social isolation all contributed to increased incidence of stroke. They also reported a cumulative effect of SDOHs whereby each additional SDOH factor increased risk of stroke [10].

SDOHs may also play an important role in rehabilitation outcomes post-stroke. Trygged et al. [11] investigated the effects of income and educational attainment on the likelihood of younger adults returning to work post-stroke in Sweden. Of the 7081 people aged 40–59 years, discharged from hospital following a first

stroke, individuals with higher premorbid income and higher education had a higher probability of returning to work [11]. This line of enquiry was extended by Della Vecchia et al. [12] who conducted a systematic review of contextual factors on participation post-stroke. Contextual factors included social determinants such as a person's age, gender, marital status, education, ethnicity, income, and occupation. They reported no evidence of an association between marital status, ethnicity or employment status and participation, conflicting evidence for an association between age, gender and participation, and limited evidence for an association between higher education, income, and participation [12].

The relationship between SDOHs and post-stroke aphasia recovery

Approximately one third of individuals post-stroke present with aphasia [13]. Aphasia is a communication disability resulting from an acquired impairment of language modalities caused by focal brain damage, that may affect participation and quality of life of the person with aphasia as well as their family and friends [14]. That is, whilst aphasia is a condition that results in an impairment of language, it may also affect a person's activity, participation, and quality of life. To date, researchers have focussed on identifying factors associated with the recovery of language. Recent reviews of this literature indicate that stroke related factors such as initial severity of language impairment, lesion site, and lesion size are the most important factors associated with language recovery, with SDOHs including age, gender, education, and SES status playing a less influential role [15,16].

Less research has been conducted on the factors associated with other important outcomes including activity, participation, and quality of life. Hilari et al. [17] conducted a review of the literature on the factors associated with aphasia and health-related quality of life (HR QoL). The presence of chronic aphasia was most consistently associated with poorer HR QoL post-stroke [17]. They also reported that age, sex, and social network may be associated

with HR QoL but that the number of studies contributing supporting evidence was limited [17].

Previous reviews of the literature indicate that SDOHs may not play an influential role in language recovery in post-stroke aphasia. However, it remains unclear whether SDOHs contribute to activity, participation, and quality of life outcomes in post-stroke aphasia. Conceptually, the role of SDOHs on activity, participation and quality of life in post-stroke aphasia has been explored in a case study [18]. In this case study, SDOHs appeared to have a negative and cumulative impact on activity, participation, and quality of life over time, suggesting an investigation of the role of SDOH on a broader range of aphasia outcomes is required.

The aims of this review were to: (i) identify the existing literature on SDOHs and outcomes in post-stroke aphasia; (ii) determine which SDOHs and aphasia outcomes have been examined to date and how SDOHs have been measured; (iii) determine the existing evidence for a relationship between SDOH and aphasia outcomes, and (iv) identify gaps in the research literature. This review focussed on five SDOHs that can be measured at the level of the individual: gender, education, race/ethnicity, SES (including occupation and income), and social support. Gender was defined as those characteristics of women and men which are socially constructed [1]. Education was considered as formal schooling at a primary, secondary, or tertiary level. Race was defined as a social construct based on an individual's phenotypic genetic expression, whereas ethnicity was considered a social construct referring to a group of people who share an origin, language and cultural traditions [19]. Socioeconomic status was defined as an individual's access to resources to achieve and maintain good health [20]. Finally, social support was defined broadly to include antecedents of social support, such as the size of one's social network, as well as measures of direct social support [21]. Factors related to governance and policies operating at the level of society rather than the level of the individual were not considered in the current review.

Methods

We adopted a scoping review methodology to enable us to determine the scope and depth of the literature, establish whether there was sufficient research to warrant a systematic review, and examine how SDOHs have been measured in the aphasia literature to date [22]. Given it is not the aim of a scoping review to critically appraise the literature, but rather to map it, articles in the final yield were not evaluated in terms of methodological quality [22,23]. This review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) [24].

Search strategy

Search terms were generated based on the factors identified in the Commission on Social Determinants of Health's model of SDOHs [1]. In addition to search terms directly related to each of the SDOHs, we also included additional search terms indirectly related to socioeconomic status (e.g., residence characteristics, place of residence as regional, rural or metropolitan) to capture any literature in the field. Searches were run using PubMed, Scopus, PsycINFO, CINAHL and Embase in August 2020. An updated search was conducted in February 2022 with date limit set to 2020–2022. Appendix A contains a list of search terms used. Citations were imported into Covidence systematic review software (Veritas Health Innovation). Duplicates were removed and one

reviewer screened the titles and abstracts of each identified citation for studies meeting the eligibility criteria (see below). A second reviewer independently screened the titles and abstracts of a random 25% sample of citations to determine the reliability of the screening process. Reviewers achieved 99% agreement. Disagreement was resolved through discussion with the other authors. Articles known to authors and reference lists of articles were reviewed for relevant studies not captured in the database searches. Studies which passed the initial title and abstract screening underwent full text review by two reviewers independently to confirm inclusion. No conflicts emerged between reviewers at this stage of the review.

Eligibility criteria

Studies published in French or English were included if they (1) included adults with post-stroke aphasia, (2) examined one or more SDOHs including gender, education, ethnicity, SES (including occupation and income), and social support in relation to any aphasia outcome, and (3) included primary analysis of quantitative and/or qualitative data examining outcomes of aphasia at any time post-stroke. At the stage of full text review, the results were examined for any data on the relationship between one or more of the five SDOH and any aphasia outcome. Studies that provided information on the role of biological characteristics on aphasia outcomes were included in this review but interpreted through a social lens. That is, studies on sex difference (a biological construct) and aphasia outcomes were included in the review in order to examine the role of gender—"those characteristics of women and men which are socially constructed" [1,p.33]—on aphasia outcomes. Similarly, studies that provided data on "ethnicity/race" were included to examine the role of "ethnicity/race" as a social construct [25] on aphasia outcomes.

Studies were excluded if they included participants with other neurological disorders in addition to aphasia or included aphasia resulting from non-stroke aetiologies (e.g., traumatic brain injury, primary progressive aphasia). In order to determine the scope and depth of primary research in this area only peer reviewed, published studies providing primary analysis of primary data were included. Therefore, dissertations, published abstracts, research on the secondary analysis of primary data, and reviews were also excluded.

Data extraction

The following data was extracted from each study included in the final yield: authors; year of publication; country of origin; title; study design; number of participants; aphasia type and severity; time post onset; purpose of study; the SDOHs identified and how they were measured; aphasia outcomes classified according to the five domains of Living with Aphasia: A Framework for Outcome Measurement (A-FROM; [26]): (i) language impairment, (ii) activity or participation, (iii) environment, (iv) personal factors, (v) quality of life, and how they were measured; and findings regarding association between SDOHs and aphasia outcome. Study designs were classified based on the National Health and Medical Research Council (NHMRC) levels of evidence [27].

Data synthesis

Where researchers employed quantitative methods to investigate SDOHs, the significant and non-significant results for each SDOH (as reported in each eligible study) were extracted and entered

into the results tables. Where researchers employed qualitative methods, SDOHs identified at the level of a theme were also included in the results tables. For example, in a qualitative study on the factors perceived to support successfully living with aphasia, Grohn et al. identified five themes [28]. Each of the five themes were analysed and any theme that identified one or more of the individual SDOHs as a factor was included in the results table.

Results

Study selection

The PRISMA flowchart depicting study selection is presented in Figure 2. Database searches conducted in August 2020 and February 2022 yielded a total of 4880 studies of which 2830 were duplicates. The titles and abstracts of 2050 studies were screened identifying 46 studies for full text review, of which 25 met the inclusion criteria.

Study characteristics

Table 1 summarises the characteristics of the 25 included studies. In total, studies reported data from 3363 participants, including 2701 with post-stroke aphasia (range 15–381, median 68). Six studies were published before 2000, six between 2000 and 2009, seven between 2010 and 2019, and six since the beginning of 2020. Nine studies were conducted in the USA, with the remaining

16 papers being from UK, Europe, South America, Asia, and Australia. Sixteen studies recruited participants in the acute or subacute phase (less than six months post onset), six in the chronic phase (more than six months post onset), and three studies recruited participants at any time post-stroke.

Measurement of SDOH

All five SDOHs (i.e., gender, education, ethnicity, SES, and social support) have been examined in relation to aphasia outcomes. See Table 2 and Table 3 for details. The SDOHs were measured in different ways. When reported, participant sex or gender was consistently described as either male or female. Education was measured in various ways: as a binary concept, such as primary/secondary [29], high/low [30,31], or as above or below the median number of years of education [32]; on a three-point ordinal scale [33], four-point scale [34,35], or six-point scale [36]; and as number of years of education [37–42]. Two studies that examined race/ethnicity grouped participants into different categories; Hilari et al. [43] reported participants as Asian, Black, or White, whereas Ellis and Peach [44] investigated outcomes for participants in the AphasiaBank dataset who were either Non-Hispanic Black or White.

SES was measured in terms of employment type or status, and income. Participants' employment type was described as belonging to one of two categories [29,30], five categories [34], or eight categories [43]. Participants' employment status was described in terms of one of three categories [45], four categories [43], or seven categories [34]. SES was reported using income

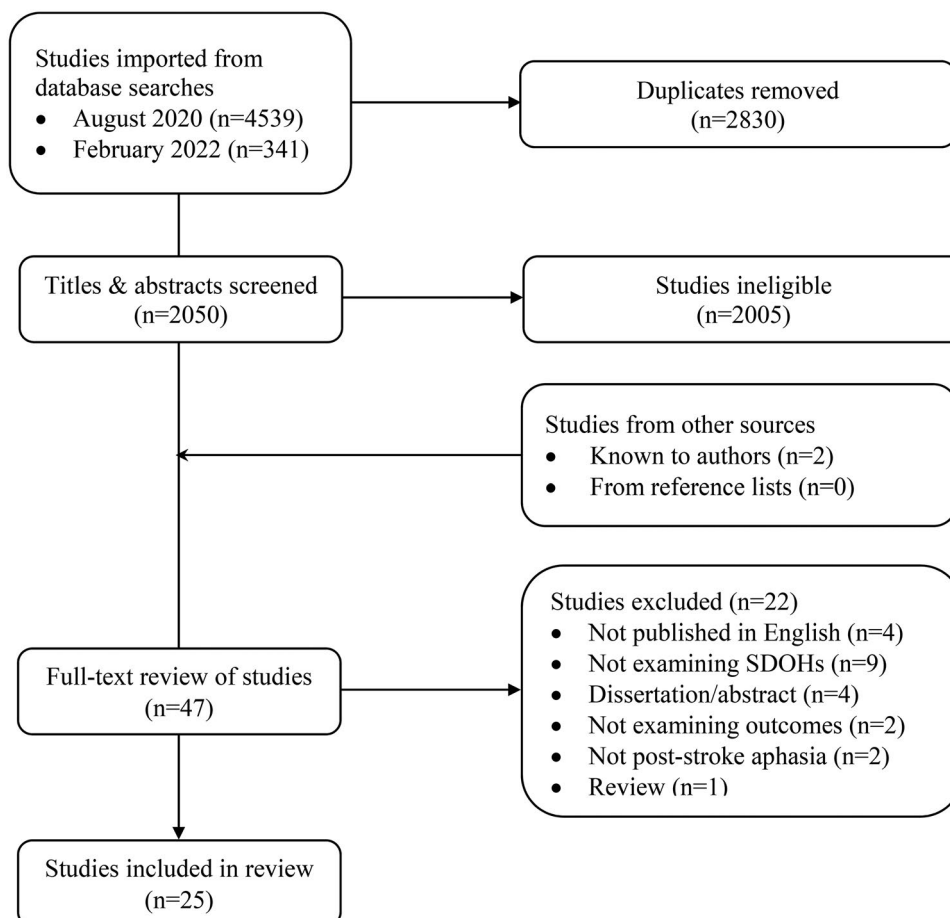


Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analysis flowchart of study selection process.

Table 1. Studies examining SDOHs and aphasia outcomes.

Author (year)	Country	Study design ^a	Total participants (PWA)	Measure used to diagnose aphasia	TPO at assessment	Type of outcome ^b	Outcome measure/s	SDOHs	SDOH categories	Significant effect
Connor et al. (2001)[30]	USA	Retrospective cohort (Level III-3)	39 (39)	BDAE	4 months; 103 months	Language and related impairments	BDAE	Education	High; low	Yes
de Riesthal and Wertz (2004) [42]	USA	Prospective cohort (Level III-1)	34 (34)	PICA	4 weeks; 48 weeks	Language and related impairments	PICA; RFP	Education	High; low	Yes
Ellis and Peach (2017)[44]	USA	Cohort of persons at different stages (Level IV)	381 (381)	WAB-R	5.4 years ± 4.9	Language and related impairments	WAB-R	Ethnicity	Number of years of education	No
Grohn et al. (2012)[28]	Australia	<i>n.a.</i> Qualitative study	15 (15)	WAB-R	3 months	Quality of life	SLARS	Social support	Non-Hispanic black; white.	Yes
El Hachoui et al. (2013)[31]	The Netherlands	Prospective cohort (Level III-1)	130 (130)	ASRS	1 week; 2 weeks; 6 weeks; 52 weeks	Language and related impairments	ASRS	Gender Education	Support of family/friends; support of others	<i>n.a.</i>
Hilari et al. (2003)[43]	UK	Cohort of persons at different stages (Level IV)	83 (83)	FAST	41 months [13 months–250 months]	Quality of life	SAQOL-39;	Gender Ethnicity SES (employment type) SES (employment status) Social support	Male; female Asian; black; white Professional; associate professional; other admin/ clerical; own account non-professional; supervisor/ technician; intermediate; other; never worked Retired; inactive because of stroke; part-time/voluntary work; student	No No No No No No
Hilari and Northcott (2006)[47]	UK	Retrospective cohort (Level III-3)	83 (83)	SLT report	1 year 1 month – 20 years 10 months	Quality of Life	SAQOL-39	Social support	Social Support Survey Overall Perceived Social Support	No No
Johnson et al. (2022) [67]	USA	Retrospective cohort (Level III-3)	224 (224)	WAB	Mean 38.5 months; range 6–212	Language and related impairments	WAB	Gender Education SES (income)	Subscales: Tangible support Emotional support Informational support Social companionship Affectionate support Social network; Size of network Frequency of contact Children Relatives Friends	No No No

(Continued)

Table 1. (Continued)

Author (year)	Country	Study design ^a	Total participants (PWA)	Measure used to diagnose aphasia	TPO at assessment	Type of outcome ^b	Outcome measure/s	SDOHs	SDOH categories	Significant effect
Keenan and Brassell (1974) [45]	USA	Case series (Level IV)	39 (39)	Descriptive scale	10–14 days; variable discharge date	Language and related impairments	Scale: Good; fair; poor	SES (employment status)	Full-time, part-time, unemployed	No
Kim et al. (2019) [35]	Korea	Prospective cohort (Level III-1)	235 (235)	KFAST	7 days; 3 months; 6 months; 12 months; 3–7 days; 3 months	Language and related impairments	KFAST	Education	No formal education; primary education; secondary education; higher education	Yes
Lahiri et al. (2021)[41]	India	Prospective cohort (Level III-1)	163 (163)	BWAB	3–7 days; 3 months	Language and related impairments	BWAB	Gender education	Male; female	No
Lahiri et al. (2021)[39]	India	Prospective cohort (Level III-1)	208 (208)	BWAB	3–7 days	Language and related impairments	BWAB	Gender education	Number of years of education	No
Lazar et al. (2008)[36]	USA	Prospective cohort (Level III-1)	91 (22)	Descriptive scale	24–72 h; 90 days	Language and related impairments	BDAE; WAB-R	Education	Male; female	No
Lee et al. (2015) [46]	Korea	Prospective cohort with case control (Level III-1)	72 (30)	Medical record	29; 1mths [6–81mths]	Quality of life	SAQOL-39	SES (income)	<High school degree; High school degree; Some post-secondary education; College/ university degree; Some post-graduate education; Graduate degree	Yes
Lee et al. (2020) [38]	Korea	Retrospective cohort (Level III-3)	68 (68)	KWAB	< 1 week; 2 weeks; 3 months	Language and related impairments	KWAB	Gender education	Male; female	No
Lendrem and Lincoln (1985) [48]	UK	Prospective cohort (Level III-1)	52 (52)	WAST	4 weeks	Language and related impairments	PICA; FCP; BDAE	Gender	Number of years of education	No
Lwi et al. (2021) [37]	USA	Retrospective cohort (Level III-3)	168 (168)	WAB-R	Mean time between assessments	Language and related impairments	WAB-R	Gender education	Male; female	No
Mazaux et al. (2013)[34]	France	Prospective cohort (Level III-1)	100 (100)	ASRS	42.2 months (SD = 58.4; range 2–284)	Participation	ECVB	SES (employment type)	Number of years of education	Yes
Oliveira and Damasceno (2009)[40]	Brazil	Prospective cohort (Level III-1)	33 (33)	Description of aphasia type	72 h; 12 months	Language and related impairments	Neurological exams	Gender Education	Male; female	No
Pedersen et al. (1995)[51]	Denmark	Prospective cohort (Level III-1)	881 (330)	SSS	12 h	Language and related impairments	ScSS	Gender	Number of years of education	No
Pizzamiglio et al. (1985)[49]	Italy	Prospective cohort (Level III-1)	89 (89)	Language battery	3 months	Language and related impairments	Naming, repetition, phonemic/ semantic discrimination, syntactic comprehension	Gender	Male; female	Yes

(Continued)

Table 1. (Continued)

Author (year)	Country	Study design ^a	Total participants (PWA)	Measure used to diagnose aphasia	TPO at assessment	Type of outcome ^b	Outcome measure/s	SDOHs	SDOH categories	Significant effect
Ribeiro Lima et al. (2021) [32]	Brazil	Pre/post cohort without control (Level IV)	26 (26)	BDAE-SF	Median 8 months (range 6–28); 12 weeks post	Quality of life	SAQOL-39	Gender Education SES (income) Social support	Male; female Years Median split <2 or >2 people residing in household; presence or absence of a carer Gender Primary; secondary Labour; businessmen, professionals, housewives Male; female	Yes No No Yes
Sarno et al. (1970)[29]	USA	Cohort of persons at different stages (Level IV)	31 (31)	FCP	3 months	Language and related impairments	Pre- Post- testing: pre-reading; writing; understanding; speaking. FCP; BDAE: Word fluency, token test subtests	Gender education SES (employment type)	Gender Primary; secondary Labour; businessmen, professionals, housewives Male; female	No No No No
Sarno et al. (1985)[50]	USA	Prospective cohort non-randomised (Level III-2)	60 (60)	Description of aphasia type	4–6 months; 1–2.5 years	Language and related impairments	FCP; BDAE: Word fluency, token test subtests	Gender	Male; female	No
Worrall et al. (2017)[33]	Australia	Prospective cohort (Level III-1)	58 (58)	WAB-R	3 months; 6 months; 9 months; 12 months	Language and related impairments; Participation; Personal factors; Environment; Quality of life	ALA	Gender Education SES (income) Social support (marital status) Social Support (social network size)	Male; female High school; graduate/post-graduate Low; below median; above median Single; married/de facto; divorced/separated; widower/ widowed ≤10; 11–20; 21–30; ≥31	Yes for participation Yes for participation Yes for language impairment & participation No Yes for participation

Notes: ALA: Assessment for Living with Aphasia; ASHA FACS: ASHA Functional Assessment of Communication Skills in Adults; ASRS: Aphasia Severity Rating Scale; Bi: Barthel Index; BDAE: Boston Diagnostic Aphasia Examination; BDAE-SF: Boston Diagnostic Aphasia Examination-Short Form; BWAB: Bengali Western Aphasia Battery; ECB: Echelle de Communication Verbale de Bordeaux; FAST: Frenchay Aphasia Screening Test; FCP: Functional Communication Profile; KFAST: Korean Frenchay Aphasia Screening Test; KWAB: Korean version of the Western Aphasia Battery; n.a.: Not applicable; NHMRC: National Health and Medical Research Council; PICA: Porch Index of Communicative Ability; PWA: people with aphasia; RFP: Rating of Functional Performance; SAQOL-39: Stroke and Aphasia Quality of Life-39; SCSS: Scandinavian Stroke Scale; SLARS: Successfully Living With Aphasia Rating Scale; SDHs: social determinants of health; SSS: Stroke Severity Scale; TPO: Time post onset of aphasia; WAB: Western Aphasia Battery; WAB-R: Western Aphasia Battery-Revised; WAST: Whurr Aphasia Screening Test.

^aIntervention studies were classified according to the NHMRC intervention levels of evidence hierarchy. Non-intervention studies were classified according to the NHMRC Prognosis levels of evidence hierarchy [27].

^bOutcome measures classified according to the Living with Aphasia: A Framework of Outcome Measures [55].

^cNeurological exam includes subtests for attention; visual, phonemic perceptions; spontaneous speech; fluency; repetition; naming; comprehension; automatic speech; praxis.

Table 2. Aphasia recovery, SDOHs, aphasia outcomes, and time post onset.

TPO	Author (year)	Country	Gender	Education	Ethnicity	SES	Social support
			Language				
≤ 1 week	Pedersen et al. (1995)[51]	Denmark	□	–	–	–	–
	Lahiri et al. (2021)[39]	India	□	□	–	–	–
≤ 3 M TPO	Sarno et al. (1970)[29]	USA	□	□	–	□	–
	Lendrem and Lincoln (1985)[48]	UK	□	–	–	–	–
	Lazar et al. (2008)[36]	USA	–	□	–	–	–
	Lahiri et al. (2020) [41]	India	□	□	–	–	–
	Lee et al. (2020)[38]	Korea	□	□	–	–	–
≤ 12 M TPO	Oliveira et al. (2009)[40]	Brazil	□	□	–	–	–
	El Hachoui et al. (2013)[31]	The Netherlands	□	□	–	–	–
	Worrall et al. (2017)[33]	Australia	□	□	–	■	□ □
	Kim et al. (2019)[35]	Korea	–	■	–	–	–
> 12 M TPO	Connor et al. (2001)[30]	USA	–	■	–	■	–
	Ellis and Peach (2017)[44]	USA	–	–	■	–	–
	Lwi et al. (2021) ^a [37]	USA	□	■	–	–	–
	Johnson et al. (2022) ^a	USA	□	□	–	□	–
			Participation				
≤ 12 M TPO	Mazaux et al. (2013)[34]	France	□	□	–	■	–
	Worrall et al. (2017)[33]	Australia	■	■	–	■	■
			Environment				
≤ 12 M TPO	Worrall et al. (2017)[33]	Australia	□	□	–	□	□
			Personal factors				
≤ 12 M TPO	Worrall et al. (2017)[33]	Australia	□	□	–	□	□
			Quality of life				
≤ 3 M TPO	Grohn et al. (2012)[28]	Australia	–	–	–	–	■ ^b
≤ 12 M TPO	Worrall et al. (2017)[33]	Australia	□	□	–	□	□ □
> 12 M TPO	Hilari et al. (2003)[43]	UK	□	–	□	□	□
	Hilari and Northcott (2006)[47]	UK	–	–	–	–	■ □ ■
	Lee et al. (2015) [46]	Korea	–	–	–	■	–

Notes: ■: Significant finding; □: non-significant finding; □□: multiple measures of SDOH used; SES: socio-economic status; M: month; TPO: time post onset.

^aStudies recruited participants >6months post-onset however mean TPO >12M.

^bQualitative study.

and described as low, average or high [33,46], or as above or below the median family income [32]. Social support was determined in different ways; in terms of a person's perceived level of social support [47], living situation [28,32], marital or carer status [32,33,43], the size of a person's social network [33,47], or frequency of contact [47].

Measurement of aphasia outcomes

As indicated in Table 2, most of the studies identified provide information on SDOHs and aphasia outcomes in relation to recovery of language [30,31,33,35,36,40–42,44,45,48–51]. Pioneering work by Sarno et al. in the 1970s and 1980s [29,50] was published on the relationship between SDOHs and participation in post-stroke aphasia, and since the introduction of the WHO International Classification of Functioning, Disability and Health [ICF;52] increasing attention has been paid to the intersection between SDOHs and a broader range of aphasia outcomes. These include participation [33,34,42], the environment [33], personal factors [33], and quality of life (QOL) [28,33,43,46,47]. Table 4 lists the outcome measures used in the included studies classified according to the A-FROM.

SDOHs and aphasia outcomes

The relationship between SDOHs and aphasia outcomes have been investigated in two ways; i) in relation to aphasia recovery at different time points post-stroke, detailed in Table 2, and ii) in response to aphasia intervention, detailed in Table 3. As indicated in Table 2 and Table 3, there is limited research on SDOHs and aphasia outcomes post-stroke. The following sections provide a descriptive analysis of the existing evidence.

Gender

Sixteen studies provided data on the relationship between gender and aphasia outcomes. As depicted in Table 2 and Table 3, 13 studies investigated gender and aphasia recovery, with 11 providing evidence specifically on language recovery. All 11 studies reported non-significant findings. Only three studies provided information on gender and aphasia recovery related to other aphasia outcomes. Worrall et al. [33] investigated how gender related to aphasia recovery across all domains of the A-FROM at 12-months post-stroke for 58 people with aphasia. They found that women rated participation on The Assessment for Living with Aphasia (ALA) 5.03 points higher than men ($p=0.004$), concluding that women had better participation than men. The two remaining studies did not report significant findings.

Three studies provided information on gender and response to aphasia treatment (Table 3). A study of 89 people with aphasia reported that women with global aphasia ($n=15$) made more improvement in auditory-verbal comprehension, including semantic comprehension [$F(2, 82) = 8.78, p<0.01$] and syntactic comprehension [$F(2, 82) = 7.68, p<0.01$], following three months of treatment than age-matched male counterparts ($n=19$) [49]. In contrast, Sarno et al. [50] did not report significant relationships between gender and language or participation outcomes. Finally, in a group therapy study evaluating QoL outcomes for 26 people with aphasia, Ribeiro Lima et al. [32] found that women demonstrated significantly greater change in scores on the communication subtest of the SAQOL-39 compared to men (scores changed from 2.32 to 3.18, $p=0.021$) indicating that women reported better communication related QoL than men following group treatment.

In summary, whilst research does not support a relationship between gender and language recovery up to 12 months post-stroke, there is very limited research on gender and language recovery beyond 12 months. The research that has been conducted

Table 3. Response to aphasia intervention, SDOHs, aphasia outcomes, and time post onset.

TPO	Author (year)	Country	Gender	Education	Ethnicity	SES	Social support
Language outcomes							
≤3M TPO	Keenan and Brassell (1974)[45]	USA	–	–	–	□	–
≤12M TPO	Pizzamiglio et al. (1985)[49]	Italy	■	–	–	–	–
	de Riesthal and Wertz (2004)[42]	USA	–	□	–	–	–
>12M TPO	Sarno et al. (1985)[50]	USA	□	–	–	–	–
Participation outcomes							
>12M TPO	Sarno et al. (1985)[29]	USA	□	–	–	–	–
Quality of life outcomes							
>12M TPO	Ribeiro Lima et al. (2021)[32]	Brazil	■	□	–	□	■ ■

Notes: ■: Significant finding; □: non-significant finding; □□: multiple measures of SDOH used; SES: socio-economic status; M: month; TPO: time post onset.

suggests gender may play a role in participation outcomes and might influence how people respond to treatment. More evidence is needed to determine whether gender plays a role in aphasia outcomes in the long term.

Education

Fifteen studies investigated relationships between education and aphasia outcomes. Thirteen studies examined the role of education on aphasia recovery (Table 2) with 12 of these studies providing data on language recovery. Two studies provided information on education and response to aphasia treatment (see Table 3). Four of the thirteen studies on education and aphasia recovery reported significant relationships.

Kim et al. [35] followed 235 people with aphasia from acute onset (day 7) until one year later. Education was one factor included in multivariate analysis that explained change in scores over time on the Korean version of the Frenchay Aphasia Screening Test (K-FAST); people with higher levels of education improved more over this time than people with lower levels of education ($\beta = 1.776$, $p = 0.001$).

In a group of 44 people with aphasia whose recovery was tracked over a range of time periods (2–284 months), Lwi et al. [37] found that years of education was associated with improvement on several Western Aphasia Battery (WAB) subtest scores: Yes/no questions ($\beta = 0.16$, $p = 0.041$), single-word recognition ($\beta = 0.22$, $p = 0.003$), sequential commands ($\beta = 0.27$, $p < 0.001$), overall auditory comprehension ($\beta = 0.25$, $p < 0.001$).

In a group of 39 people with post-stroke aphasia, Connor et al. [30] reported a significant correlation between the level of educational attainment and aphasia severity as measured on the Boston Diagnostic Aphasia Examination (BDAE) at two timepoints (median 4 months and 103 months post onset), with lower education associated with more severe aphasia. However, there were no differences in the rate of recovery over this time period for participants with different levels of education.

Worrall et al. [33] did not find any significant relationships between education and language, environment, personal, or QoL factors however they did report that graduate and postgraduate levels of education were negatively associated with participation domain scores on the ALA (–7.75 points, $p = 0.008$). The authors suggested the possibility that “the central role of language and communication in the lives of people with graduate or postgraduate education makes the loss of this core skill particularly devastating” [33, p.239].

In summary, there is no evidence to support a role for education and language outcomes before 12 months post-stroke. However, the very limited research available with people with aphasia at or beyond 12 months indicates education may play a role in language and participation outcomes over time. There is insufficient research to draw any conclusions on the role of education in response to treatment on any aphasia outcomes.

Race/ethnicity

The relationship between race/ethnicity and aphasia outcomes was the least researched SDOH of the five SDOHs investigated in this scoping review. Only two studies were identified that have examined the role of race/ethnicity on aphasia outcomes [43,44]. In a large study of 381 people with aphasia from the AphasiaBank dataset [53], Ellis and Peach [44] found that non-Hispanic black participants ($n = 42$) had lower scores than white participants ($n = 339$) on three WAB-R subtests: word fluency (5.5 vs 7.6; $p = 0.015$, auditory word recognition (49.3 vs 53.3; $p = 0.02$, and comprehension of sequential commands (43.7 vs 53.2; $p = -0.017$). In contrast, Hilari et al. [43] found no significant impact of race/ethnicity on QoL following stroke.

Socioeconomic status

Nine studies provided evidence for the impact of SES on aphasia outcomes, seven on aphasia recovery (Table 2) and two on response to treatment (Table 3). Five studies used employment status as the measure of SES and three used income. Five of the seven studies on SES and aphasia recovery reported significant findings, two related to language outcomes, two related to participation and one with QoL.

Connor et al. [30] found that participants who were employed in higher status jobs prior to stroke, as determined by the Hollingshead Socioeconomic Status Scale [54] showed significantly less impairment on the BDAE at median 4 months and median 103 months post-stroke but that changes over time were not different between higher and lower status occupation groups. Worrall et al. [33] reported that participants with higher income self-rated their aphasia 2.6 points higher (i.e., as less of a problem) on the ALA compared with participants with lower income ($p = 0.006$).

Participants with higher income reported better participation on the ALA participation domain scores with scores 6.7 points higher than participants whose household income was lower ($p = 0.004$) [33]. Similarly, a survey of 100 people with aphasia conducted within 1 month of aphasia onset and again 12–18 months later, found that those with higher pre-morbid employment status and type reported greater participation as measured on a communication participation questionnaire [55] compared to those with lower employment status and type ($p = 0.0002$) [34]. However, after accounting for initial stroke and aphasia severity, there were no differences between groups. Finally, in a study of 30 people who had been living with aphasia for at least six months, Lee et al. [46] found that household monthly income was positively correlated with total score on the SAQOL-39 ($r = 0.417$, $p < 0.05$) [46]. SES has not been identified as a factor that influences response to treatment in the two studies that were identified [32,45].

In sum, whilst there has been very little research on the role of SES on aphasia outcomes, the majority of this research (8/9 studies) has been conducted with people with aphasia at or

Table 4. Classification of aphasia outcome measures in included studies ($n=25$).

Language impairments
Assessment for Living With Aphasia ^a
Boston Diagnostic Aphasia Examination
Frenchay Aphasia Screening Test (multiple versions)
Neurosensory Centre Comprehensive Examination for Aphasia
Porch Index of Communicative Ability
Western Aphasia Battery (multiple versions)
Scandinavian Stroke Scale
Researcher-developed batteries
Activity and participation
Assessment for Living with Aphasia ^a
Echelle de Communication Verbale de Bordeaux
Functional Communication Profile
Rating of Functional Performance
Personal identity, attitudes and feelings
Assessment for Living with Aphasia ^a
Environmental factors
Assessment for Living with Aphasia ^a
Quality of life
Assessment for Living with Aphasia ^a
Stroke and Aphasia Quality of Life Scale-39
Successfully Living with Aphasia Rating Scale

Note: Some studies examined multiple outcomes.

^aThe Assessment for Living with Aphasia was used by Worrall et al. [33] to assess outcomes across all A-FROM domains [26].

beyond 12 months post-stroke. Five of these studies have reported a significant relationship between SES and aphasia outcomes.

Social support

Of the 25 studies included in this scoping review, only five provide data on social support and aphasia outcomes [28,32,33,43,47]. Although Worrall et al. [33] did not find a relationship between social support and language outcomes, they did report that the mean participation score on the ALA was 4.88 points higher for people who had a large social network size (≥ 31 people) compared with those who had a small social network size (≤ 10 people) ($p=0.006$) indicating that greater social support may be important for increased participation in long term recovery.

In semi-structured interviews with 15 people with aphasia within three months of aphasia onset, Grohn et al. [28] identified that social support from family and friends, and from other people recovering from stroke is important for overall QoL in the early stages of stroke recovery. This finding was supported by Hilari and Northcott [47]. They measured social support in three ways: perceived social support, social network, and frequency of contact, in their investigation of the relationship between social support and health related quality of life in people with chronic aphasia 12 months or more post stroke. Whilst no significant relationship was reported between overall perceived social support (as measured by the Medical Outcome Study Social Support Survey) and QoL, they did find significant relationships between two subtypes of perceived social support: informational support and social companionship. No significant relationship existed between size of social network and QoL, however there was a significant relationship between frequency of contact, where people with aphasia who reported the same frequency of contact with children or relatives as prior to the stroke reported better QoL than those who reported more or less contact compared with prior to the stroke. In contrast, there was no relationship between frequency of contact with friends and QoL. No significant relationship between social support and QoL was found by Worrall et al. (as measured by social network size and marital status) [33] or Hilari et al. (as measured by the Sherbourne Social Support Survey) [43]

in quantitative studies with people living with aphasia at 12 months and beyond.

Only Ribeiro Lima et al. [32] have investigated the role of social support on response to treatments aimed at improving QoL. They found social support influenced scores on the communication domain of the SAQOL-39, as measured by having more than two people residing in the household (scores changed from 2.70 to 3.44, $p=0.013$) and the presence of a carer (2.59 to 3.43, $p=0.006$).

There is insufficient research to draw any meaningful conclusions on the role of social support on aphasia outcomes or in response to treatment. However, the one qualitative study on this topic indicates that this is perceived to be important by people with aphasia [28] and it has been identified as a factor in relation to participation, some QoL outcomes, and in response to treatment directed at QoL outcomes, and therefore warrants further investigation.

Discussion

The aim of this scoping review was to critically examine the literature on the relationship between five individual SDOHs (gender, education, ethnicity, SES, and social support) and aphasia outcomes as described by the A-FROM [26]. We identified 25 articles which suggests that research on SDOHs and aphasia outcomes is in its infancy.

One reason for the small yield may be the lack of routine data collection and/or reporting of SDOHs in aphasia research. This suggestion is supported by the findings of a recent, large meta-synthesis of aphasia interventions conducted by the RELEASE Collaboration, who noted that while sex/gender was typically reported (90.8%), other SDOHs such as education (48.3%), ethnicity (13.8%), SES (2.3%), and living context (as a measure of social support) (12.1%) were not [56]. Similar findings have also been reported in a scoping review of research participants in U.S. research [57]. The DESCRIBE project has recently established international, multidisciplinary expert consensus on minimum participant characteristic reporting standards for aphasia research [58]. This research has paired a minimum set of participant characteristics with standard response options to aid consistency of reporting. Amongst the minimum set are characteristics directly or indirectly related to SDOHs: years of education, biological sex, primary language, and languages used, for people with aphasia; and biological sex and relationship to the person with aphasia for communication partners (see www.aphasiatrials.org/describe). Consideration of these characteristics in study design, analysis, and reporting may improve our understanding of the SDOH that influence aphasia outcomes.

The majority of research that was identified in this scoping review provides data on the relationship between two SDOHs; gender and education and on one aphasia outcome; language recovery. Despite the focus on these SDOHs, this review found no supporting evidence of a relationship between gender and language recovery at any time post-stroke, and very limited evidence for a relationship between education and language recovery. Where a relationship was found it was present in studies that reported on aphasia outcomes at or beyond 12 months post-stroke. There is a marked lack of evidence on the relationship between the other SDOHs: ethnicity, SES, or social support, on language outcomes at any time post-stroke. Interestingly, the very few studies that have been published, indicate that if these SDOHs do play a role in language recovery, it may only become evident at or beyond 12 months post-stroke.

Similarly, very little literature was identified to explore SDOHs and aphasia recovery with aphasia outcomes beyond language. Five studies collectively provide evidence on SDOH and aphasia recovery related to participation, environment, personal factors and QoL outcomes at any time post-stroke. This is particularly striking given that people with lived experience of aphasia value participation outcomes more than any others [59].

Interestingly, all the quantitative studies that provided evidence on SDOH and participation, the environment, personal factors and QoL outcomes were conducted with people with aphasia up to or beyond 12 months post-stroke. Whilst the evidence is very limited, gender, education, SES, and social support were all identified in at least one study as significantly associated with at least one of these aphasia outcomes.

Overall, SDOHs were only reported as significantly associated with aphasia recovery at or beyond 12 months post-stroke. This finding is consistent with the fact that SDOHs impact health outcomes slowly, persistently and cumulatively over the life course [1]. That is, if SDOHs do play a role in aphasia recovery, then their effect would only become evident over time. This suggests that research on SDOH and aphasia recovery needs to be designed so that participants can be followed up to and beyond 12 months post onset.

In this scoping review, we focussed on five individual SDOHs (related to an individual's socioeconomic position) and how they might influence aphasia outcomes. However, the CSDH framework indicates that SDOHs operate much more broadly than this: from the socioeconomic and political context through to housing quality and the delivery of healthcare [1]. The potential avenues of enquiry for aphasia research that become available through the lens of SDOHs are many and varied. For example, at a research policy level, a SDOH lens helps focus attention on whether participants in aphasia research reflect the diversity of the community. Nguy et al. investigated whether participants in aphasia treatment studies conducted in the U.S between 2009 and 2019 represented stroke survivor estimates in terms of age, gender and race/ethnicity [57]. They found that aphasia research participants were significantly more likely to be younger, male and White compared with the total population of stroke survivors [57]. It is also common practice for researchers to exclude people with aphasia who do not speak the same language as the researcher. Whilst this does reduce the complexity of conducting aphasia research, it does limit our capacity to investigate the relationship between SDOH related to race/ethnicity and aphasia outcomes. These practices call in to question the applicability of aphasia research results to people with aphasia not typically represented in aphasia research. Research such as Nguy et al. should be replicated in other countries and could be extended to include other SDOH such as education, SES, race/ethnicity where people speak languages other than English, and social support. If research indicates that there is a systematic underrepresentation of some groups of people in aphasia research, then researchers could develop specific strategies to ensure greater equity in future studies.

Other factors in the CSDH framework also need to be considered. For example, recent research has found that people living in regional Australia are less likely to receive some aspects of acute stroke care compared with people living in metropolitan areas, although no differences in survival rates or self-reported QoL were found at six months post stroke [60]. It is likely that people with aphasia living in regional or remote areas have less access to speech pathology services however the impact of this on aphasia outcomes is not known. Finally, the CSDH framework also highlights the healthcare system itself, as a social determinant of health. Depending on a country's healthcare system, SDOH

may unfairly influence the cost of accessing healthcare services [61] and result in differential access to aphasia assessments and treatments [62], all of which may also result in differences in aphasia outcomes.

The challenges of understanding the role of SDOHs on aphasia outcomes is further complicated by the likely bidirectional and interdependent nature of any relationships. Whilst SDOH may influence aphasia outcomes, there is research evidence that the presence of aphasia influences SDOHs. For example, previous research has shown that the presence of aphasia has a profound effect on a person's social network (social support) [63] and employment status [64]. Therefore, just as SDOHs have a cumulative effect on the incidence of stroke [10] (and potentially aphasia), having aphasia may increase a person's vulnerability to the loss of SDOHs such as employment, income, and social support thus creating a vicious cycle where people with aphasia become increasingly vulnerable to other poor health outcomes over time [18]. The interrelationship between SDOHs and aphasia also need to be investigated. For example, gender and social support interact in relation to health outcomes [65], and it is likely that these and other SDOHs interact to influence aphasia outcomes as well.

Despite these challenges, understanding the role of SDOH on aphasia outcomes might be critically important for several key reasons. First, aphasia is a chronic health condition. Whilst people who acquire aphasia post-stroke improve their language and communication abilities over time, most people with aphasia live with this disability for the rest of their lives [66]. Understanding the role of SDOHs on aphasia recovery over time and in rehabilitation is imperative if we are to support people with aphasia to live as well as possible.

Understanding how social determinants operate on aphasia outcomes compared with other health outcomes might provide new insights into social determinants as well. For example, a greater number of years of education is typically associated with better health [1], however Worrall et al. [33] found that greater educational achievement was associated with poorer participation in aphasia. Similarly, on a global scale, being female is associated with poorer health [1], but appeared to be a protective factor when considering participation long term [33] and in response to treatment directed at improving QoL [32]. Research on the role of SDOH on aphasia recovery and rehabilitation may not only contribute to our understanding of the factors that influence aphasia outcomes but may offer critical insights into the differential impact of SDOH on different health conditions.

Despite the interesting findings of this scoping review, it is subject to the limitations of much aphasia research and our method. We used three concepts to direct our search of the aphasia literature. These were SDOH, aphasia, and recovery. It is possible that the inclusion of the term "recovery" may have resulted in the exclusion of relevant papers. Furthermore, in accordance with scoping review methods if relevant information was not available in the title or abstract then the paper was not included in full text review. It is also possible that relevant research was missed this way. Finally, only literature published in French or English was included in this analysis and there may be important research published in other languages that could contribute to our findings. As described earlier, this review only investigated SDOHs that could be measured at the individual level, however social determinants that operate above the level of the individual such as government policies related to health and social support also need to be considered.

The role of SDOH on aphasia recovery and rehabilitation has been a neglected area of research. A better understanding of SDOH may raise important ethical and moral questions about the

kinds of aphasia services that are offered, when and to whom. Further enquiry into SDOH also has the potential to open up a range of new interventions directed at the socio-cultural-political environment that have the potential to improve the lives of all people living with aphasia for the rest of their lives.

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References

- Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the commission on social determinants of health. Geneva: World Health Organization; 2008.
- Chetty R, Stepner M, Abraham S, et al. The association between income and life expectancy in the United States, 2001–2014. *JAMA*. 2016;315(16):1750–1766.
- Diderichsen F, Andersen I, Manuel C, et al. Health inequality-determinants and policies. *Scand J Public Health*. 2012;40(8_suppl):12–105.
- Marmot M. Achieving health equity: from root causes to fair outcomes. *Lancet*. 2007;370(9593):1153–1163.
- Lucyk K, McLaren L. Taking stock of the social determinants of health: a scoping review. *PLoS One*. 2017;12(5):e0177306.
- Diderichsen F, Evans T, Whitehead M. The social basis of disparities in health. In: Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M, editors. *Challenging inequities in health: from ethics to action*. New York (NY): Oxford University Press; 2001. p. 12–23.
- Hosseini Shokouh SM, Arab M, Emamgholipour S, et al. Conceptual models of social determinants of health: a narrative review. *Iran J Public Health*. 2017;46:435–446.
- Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social determinants of health discussion paper 2 (policy and practice). Geneva: World Health Organization; 2010.
- Frier A, Barnett F, Devine S. The relationship between social determinants of health, and rehabilitation of neurological conditions: a systematic literature review. *Disabil Rehabil*. 2017;39(10):941–948.
- Reshetnyak E, Ntamatungiro M, Pinheiro LC, et al. Impact of multiple social determinants of health on incident stroke. *Stroke*. 2020;51(8):2445–2453.
- Trygged S, Ahacic K, Kareholt I. Income and education as predictors of return to working life among younger stroke patients. *BMC Public Health*. 2011;11:742.
- Della Vecchia C, Viprey M, Haesebaert J, et al. Contextual determinants of participation after stroke: a systematic review of quantitative and qualitative studies. *Disabil Rehabil*. 2021;43(13):1786–1798.
- Flowers HL, Skoretz SA, Silver FL, et al. Poststroke aphasia frequency, recovery, and outcomes: a systematic review and meta-analysis. *Arch Phys Med Rehabil*. 2016;97(12):2188 e8–2201 e8.
- Berg K, Isaksen J, Wallace SJ, et al. Establishing consensus on a definition of aphasia: an e-Delphi study of international aphasia researchers. *Aphasiology*. 2022;36(4):385–400.
- Watila MM, Balarabe SA. Factors predicting post-stroke aphasia recovery. *J Neurol Sci*. 2015;352:12–18.
- Plowman E, Hentz B, Ellis C Jr. Post-stroke aphasia prognosis: a review of patient-related and stroke-related factors. *J Eval Clin Pract*. 2012;18(3):689–694.
- Hilari K, Needle JJ, Harrison KL. What are the important factors in health-related quality of life for people with aphasia? A systematic review. *Arch Phys Med Rehabil*. 2012;93(1):S86.e4–S95.e4.
- O'Halloran R, Carragher M, Foster A. The consequences of the consequences: the impact of the environment on people with aphasia over time. *Top Lang Disord*. 2017;37(1):85–100.
- Ford ME, Kelly PA. Conceptualizing and categorizing race and ethnicity in health services research. *Health Serv Res*. 2005;40(5 Pt 2):1658–1675.
- Shavers V. Measurement of socioeconomic status in health disparities research. *J Natl Med Assoc*. 2007;99:1013–1020.
- Langford CP, Bowsher J, Maloney JP, et al. Social support: a conceptual analysis. *J Adv Nurs*. 1997;25(1):95–100.
- Munn Z, Peters MDJ, Stern C, et al. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. 2018;18(1):143.
- Aromataris E, Munn Z. *JBI manual for evidence synthesis 2020* [cited 2022 Mar 30]. Available from: <https://synthesismanual.jbi.global>
- Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–473.
- Krieger N. Refiguring “race”: epidemiology, racialized biology, and biological expressions of race relations. *Int J Health Serv*. 2000;30(1):211–216.
- Kagan A, Simmons-Mackie N, Rowland A, et al. Counting what counts: a framework for capturing real-life outcomes of aphasia intervention. *Aphasiology*. 2008;22(3):258–280.
- Merlin T, Weston A, Tooher R. Extending an evidence hierarchy to include topics other than treatment: revising the Australian 'levels of evidence'. *BMC Med Res Methodol*. 2009;9(1):34.
- Grohn B, Worrall LE, Simmons-Mackie N, et al. The first 3-months post-stroke: what facilitates successfully living with aphasia? *Int J Speech Lang Pathol*. 2012;14(4):390–400.
- Sarno M, Silverman M, Levita E. Psychosocial factors and recovery in geriatric patients with severe aphasia. *J Am Geriatr Soc*. 1970;18(5):405–409.
- Connor LT, Obler LK, Tocco M, et al. Effect of socioeconomic status on aphasia severity and recovery. *Brain Lang*. 2001;78(2):254–257.

- [31] El Hachoui H, Lingsma HF, van de Sandt-Koenderman MW, et al. Long-term prognosis of aphasia after stroke. *J Neurol Neurosurg Psychiatry*. 2013;84(3):310–315.
- [32] Ribeiro Lima R, Rose M, Lima HN, et al. Socio-demographic factors associated with quality of life after a multicomponent aphasia group therapy in people with Sub-acute and chronic post-stroke aphasia. *Aphasiology*. 2021;35(5):642–657.
- [33] Worrall L, Hudson K, Khan A, et al. Determinants of living well with aphasia in the first year poststroke: a prospective cohort study. *Arch Phys Med Rehabil*. 2017;98(2):235–240.
- [34] Mazaux JM, Lagadec T, de Seze MP, et al. Communication activity in stroke patients with aphasia. *J Rehabil Med*. 2013;45(4):341–346.
- [35] Kim KA, Lee JS, Chang WH, et al. Changes in language function and recovery-related prognostic factors in first-ever left hemispheric ischemic stroke. *Ann Rehabil Med*. 2019;43(6):625–634.
- [36] Lazar RM, Speizer AE, Festa JR, et al. Variability in language recovery after first-time stroke. *J Neurol Neurosurg Psychiatry*. 2008;79(5):530–534.
- [37] Lwi SJ, Herron TJ, Curran BC, et al. Auditory comprehension deficits in post-stroke aphasia: neurologic and demographic correlates of outcome and recovery. *Front Neurol*. 2021;12:680248.
- [38] Lee S, Na Y, Tae W-S, et al. Clinical and neuroimaging factors associated with aphasia severity in stroke patients: diffusion tensor imaging study. *Sci Rep*. 2020;10:1–12.
- [39] Lahiri D, Dubey S, Ardila A, et al. Factors affecting vascular aphasia severity. *Aphasiology*. 2021;35(5):633–641.
- [40] Oliveira F, Damasceno B. Short-term prognosis for speech and language in first stroke patients. *Arq Neuro-Psiquiatr*. 2009;67(3b):849–855.
- [41] Lahiri D, Dubey S, Ardila A, et al. Determinants of aphasia recovery: exploratory decision tree analysis. *Lang Cogn Neurosci*. 2021;36(1):25–32.
- [42] de Riesthal M, Wertz R. Prognosis for aphasia: relationship between selected biographical and behavioural variables and outcome and improvement. *Aphasiology*. 2004;18(10):899–915.
- [43] Hilari K, Wiggins R, Roy P, et al. Predictors of health-related quality of life (HRQL) in people with chronic aphasia. *Aphasiology*. 2003;17(4):365–381.
- [44] Ellis C, Peach RK. Racial-ethnic differences in word fluency and auditory comprehension among persons with poststroke aphasia. *Arch Phys Med Rehabil*. 2017;98(4):681–686.
- [45] Keenan J, Brassell E. A study of factors related to prognosis for individual aphasic patients. *J Speech Hear Disord*. 1974;39(3):257–269.
- [46] Lee H, Lee Y, Choi H, et al. Community integration and quality of life in aphasia after stroke. *Yonsei Med J*. 2015;56(6):1694–1702.
- [47] Hilari K, Northcott S. Social support in people with chronic aphasia. *Aphasiology*. 2006;20(1):17–36.
- [48] Lendrem W, Lincoln N. Spontaneous recovery of language in patients with aphasia between 4 and 34 weeks after stroke. *J Neurol Neurosurg Psychiatry*. 1985;48(8):743–748.
- [49] Pizzamiglio L, Mammucari A, Razzano C. Evidence of sex differences in brain organization in recovery of aphasia. *Brain Lang*. 1985;25(2):213–223.
- [50] Sarno M, Buonaguro A, Levita E. Gender and recovery from aphasia after stroke. *J Nerv Ment Dis*. 1985;173(10):605–609.
- [51] Pedersen PM, Jorgensen HS, Nakayama H, et al. Aphasia in acute stroke: incidence, determinants, and recovery. *Am Neurol Assoc*. 1995;38:659–666.
- [52] World Health Organization. International classification of functioning, disability and health (ICF); 2001. Available from: <https://www.who.int/classifications/international-classification-of-functioning-disability-and-health>
- [53] MacWhinney B, Fromm D, Forbes M, et al. AphasiaBank: methods for studying discourse. *Aphasiology*. 2011;25(11):1286–1307.
- [54] Hollingshead A. Four-factor index of social status. New Haven (CT): Yale University; 1975.
- [55] Kagan A, Simmons-Mackie N, Victor JC, et al. Assessment of living with aphasia. Toronto, ON: Aphasia Institute; 2011.
- [56] Release Collaboration. Communicating simply, but not too simply: reporting of participants and speech and language interventions for aphasia after stroke. *Int J Speech Lang Pathol*. 2020;22:302–312.
- [57] Nguy B, Quique YM, Cavanaugh R, et al. Representation in aphasia research: an examination of U.S. treatment studies published between 2009 and 2019. *Am J Speech Lang Pathol*. 2022;31(3):1424–1430.
- [58] Wallace SJ, Isaacs M, Ali M, et al. Establishing reporting standards for participant characteristics in post-stroke aphasia research: an international e-Delphi exercise and consensus meeting. 2023;37(2):199–214.
- [59] Worrall L, Sherratt S, Rogers P, et al. What people with aphasia want: their goals according to the ICF. *Aphasiology*. 2011;25(3):309–322.
- [60] Dwyer M, Francis K, Peterson GM, et al. Regional differences in the care and outcomes of acute stroke patients in Australia: an observational study using evidence from the Australian Stroke Clinical Registry (AuSCR). *BMJ Open*. 2021;11(4):e040418.
- [61] Ellis C, Peach R, Hardy R, et al. The influence of race on SLP utilisation and costs among persons with aphasia. *Aphasiology*. 2017;31(12):1433–1440.
- [62] Scimeca M, Abdollahi F, Penalzoza C, et al. Clinical perspectives and strategies for confronting disparities in social determinants of health for Hispanic bilinguals with aphasia. *J Commun Disord*. 2022;98:106231.
- [63] Northcott S, Marshall J, Hilari K. What factors predict who will have a strong social network following a stroke? *J Speech Lang Hear Res*. 2016;59(4):772–783.
- [64] Graham J, Pereira S, Teasell R. Aphasia and return to work in younger stroke survivors. *Aphasiology*. 2011;25(8):952–960.
- [65] Caetano S, Silva C, Vettore M. Gender differences in the association of perceived social support and social network with self-rated health status among older adults: a population-based study in Brazil. *BMC Geriatrics*. 2013;13:122.
- [66] Engelter ST, Gostynski M, Papa S, et al. Epidemiology of aphasia attributable to first ischemic stroke: incidence, severity, fluency, etiology, and thrombolysis. *Stroke*. 2006;37(6):1379–1384.
- [67] Johnson L, Nemati S, Bonilha L, et al. Predictors beyond the lesion: health and demographic factors associated with aphasia severity. *Cortex*. 2022;154:375–389.

Appendix A. Search terms

1. ("education" OR "educational status") AND aphasia AND (prognosis OR predict* OR recover*)
2. ("socioeconomic" AND aphasia AND (prognosis OR predict* OR recover*))
3. ("employment" OR "income" OR "occupation" AND aphasia AND (prognosis OR predict* OR recover*))
4. ("gender identity" OR "gender" OR "sex" AND aphasia AND (prognosis OR predict* OR recover*))
5. ("continental population groups" OR "ethnic groups" OR ethnicity AND aphasia AND (prognosis OR predict* OR recover*))
6. ("depression" AND aphasia AND (prognosis OR predict* OR recover*))
7. ("social support" OR "social network" AND aphasia AND (prognosis OR predict* OR recover*))
8. ("residence characteristics" AND aphasia AND (prognosis OR predict* OR recover*))
9. ("health care" AND aphasia AND (prognosis OR predict* OR recover*))
10. ("rural" OR "remote" OR "metro" AND aphasia AND (prognosis OR predict* OR recover*))
11. ("community" AND aphasia AND (prognosis OR predict* OR recover*))