

Research Article

Intersectionality of Race and Question-Asking in Women After Right Hemisphere Brain Damage

Danai Kasambira Fannin,^a  Jada Elleby,^a Maria Tackett,^b and Jamila Minga^c ^aDepartment of Communication Sciences and Disorders, North Carolina Central University, Durham ^bDepartment of Statistical Science, Duke University, Durham, NC ^cDepartment of Head and Neck Surgery & Communication Sciences and Department of Neurology, Vascular and Stroke Division, Duke University School of Medicine, Durham, NC**ARTICLE INFO**

Article History:

Received June 6, 2022

Revision received August 26, 2022

Accepted October 13, 2022

Editor-in-Chief: Stephen M. Camarata

Editor: Sarah Elizabeth Wallace

https://doi.org/10.1044/2022_JSLHR-22-00327**ABSTRACT**

Purpose: Atypical pragmatic language can impede quality health care access. Right hemisphere brain damage (RHD) results in changes in pragmatic language use; however, little is known about whether there are racial/ethnic influences. Recent research indicated differences in question-asking when RHD survivors were compared with healthy controls, prompting the current examination of question production in women by race/ethnicity and the presence of RHD.

Method: Participants were eight Black and eight White women who sustained a single right hemisphere stroke at least 6 months prior to data collection (2016–2020), and eight Black and eight White control participants from the Right Hemisphere Damage Bank (<https://rhd.talkbank.org>). Videos of informal, first-encounter conversational discourse tasks were transcribed and coded. Analyses were conducted for frequency of questions and question type.

Results: Race/ethnicity had a statistically significant effect on the total number of questions and number of content and polar questions. The mean total of questions, number of content questions, and mean number of polar questions for Black participants was significantly less than White participants. There was less variability in question type for Black participants than White participants, and a tendency for Black participants to ask fewer questions regardless of RHD or control status.

Conclusions: Acquisition of health information and ensuing health care might be less fruitful for Black women communicating with someone who may not know to conduct comprehension checks and be proactive in provision of information. To be culturally responsive to Black patients with communication disorders, providers might apply this awareness of reduced question-asking to their strategies to improve patient–provider communication.

Supplemental Material: <https://doi.org/10.23641/asha.21809475>

People with disabilities experience disparities in health outcomes (Iezzoni, 2011), and among community-dwelling adults surveyed across the United States in 2012, 10% reported a voice, speech, or language disability (Morris et al., 2016). When considering vocational outcomes, Stransky et al. (2018) showed that acquisition and maintenance of employment is more difficult, as evidenced by only 36%–57% of those with communication disabilities being employed, in comparison to 67% of those without

communication disabilities. With communication disabilities comes increased unemployment, which can explain, in part, why up to 25% of U.S. adults with communication disabilities are below the poverty line (Stransky et al., 2018). People with disabilities, in general, have higher rates of multiple chronic conditions (Stransky et al., 2018) that can be compounded by a communication impairment.

Race/Ethnicity and Stroke

Race/ethnicity intersects with several social determinants of health with Black people experiencing poorer health care than White U.S. residents (Chinn et al., 2021;

Correspondence to Danai Kasambira Fannin: dfannin@nccu.edu.

Disclosure: The authors have declared that no competing financial or nonfinancial interests existed at the time of publication.

Davis et al., 2014). When considering stroke, the leading cause of disability in the United States, Black residents are disproportionately affected, constituting a health disparity related to health status and health outcomes (Harris, 2006; Howard et al., 2005). Further, disease processes like diabetes, cardiovascular disease, hypertension, and high cholesterol contribute to stroke and are overly represented in non-Hispanic Black populations, making them twice as likely to have a stroke (Howard & Howard, 2020; Mozaffarian et al., 2016). While emphasis on stroke prevention and treatment has contributed to diminishing stroke mortality rates (Go et al., 2014; Lackland et al., 2014), survivors live with disabling residual impairments such as swallowing and communication disorders (Winstein et al., 2016).

Social Determinants of Disparities

Stroke is highly correlated with communication disability as a result of the brain injury, limiting access to health information and high-quality care (Magwood et al., 2019; Iezzoni, 2011). Though there are several reasons for health disparities, social determinants like race/ethnicity and sex, in combination with communication disabilities, can build cumulative risk for poorer health outcomes, especially since Black U.S. residents experience more severe strokes (Jones et al., 2000), resulting in a higher magnitude of post-stroke disability (Ellis et al., 2015). For instance, Morris et al., (2016) showed that Black participants reported language problems (vs. speech or voice) more often than White respondents, with those with language problems affecting their condition for more days, on average, than those with voice disorders. This infers that Black participants may have been disproportionately burdened by language difficulties. Evidence is also building for the contention that racial/ethnic incongruence between patients and providers predicts a less productive therapeutic relationship, ultimately contributing to health care outcome disparities (Jetty et al., 2022; Mahendra & Spicer, 2014). In fact, racially minoritized people are more likely to face access barriers to speech therapy, may be treated with a lower standard of care, and encounter lasting health disparities (Mahendra & Spicer, 2014).

In addition to race/ethnicity, women with disabilities have limited access to quality health care, as evidenced by significantly lower rates of cancer screenings (Iezzoni et al., 2015, 2016) increased preventable, negative medical events (Bartlett et al., 2008; Sullivan & Harding, 2019), and lower satisfaction ratings of medical care quality than women without disabilities (Hoffman et al., 2005). When comparing poststroke disability outcomes between men and women, Tomita et al. (2015) and Gall et al. (2018) found women to have poorer poststroke disability outcomes and ensuing quality of life (QoL), relative to men. This intersection with Black race/ethnicity makes Black women with right hemisphere brain damage (RHD) a particularly vulnerable population.

For the study of mitigating health disparities, Kilbourne et al. (2006) proposed the Phases of Health Care Disparities model to support research with three phases of (a) detecting (i.e., defining the disparity and underserved population, measuring the disparity, and considering confounding factors), (b) understanding (i.e., identifying patient, clinical encounter, provider, and health care system determinants of disparities), and (c) reducing (i.e., intervening, evaluating, translating, disseminating, and changing policy). The current exploratory study is at the understanding phase (Phase 2) where a specific group of patients (Black women) already detected (Phase 1) in the health disparities literature warrants further understanding of potential communication differences that might help improve communicative interactions (Phase 3: Reducing).

Language Production for Right Hemisphere Stroke

Strokes affect either brain hemisphere at almost equal rates, with right hemisphere stroke occurring 46% of the time (Hedna et al., 2013). Yet, there is a medical and research bias toward recognizing the debilitating effects of left hemisphere strokes (Blake, 2017), resulting in a considerable difference in treatment availability based on the hemisphere of damage. This bias exists, in part, because a survivor of a left hemisphere stroke may present with communication impairments that are evident to themselves and communication partners, contrasting the perception of right-sided stroke survivors whose communication problems are not as overtly detected. After a right-hemisphere stroke, most aspects of language production (i.e., syntax, morphology, fluency, intelligibility) are relatively intact, but many experience difficulty exchanging information that is appropriate for the communicative event, environment, or partner, culminating in an apragmatic communication impairment (Blake, 2017; Minga, Sheppard, et al., 2022; Tompkins, 2012). For example, there are subtle differences in language production after RHD when considering affective prosody (Stockbridge et al., 2021), topic coherence at some subdivisional levels, a smaller proportion of on-topic utterances than off-topic/topic-shading utterances (Brady et al., 2003; Mackenzie & Brady, 2008), adherence to social rules of conversation like turn-taking (Barnes et al., 2022; Kennedy et al., 1994), question-asking (Minga, Fromm, et al., 2022), and nonliteral language use, including the determination of figurative meanings (Brownell et al., 1986; Van Lancker & Kempler, 1987). Judging whether and when language is appropriate for a particular situation, setting, listener, or communicative purpose can also be a challenge for RHD survivors (Tompkins, 2012). These pragmatic impairments have a disabling effect on RHD survivors' ability to participate fully in professional, personal, and social activities such as maintaining

relationships with significant others, interviewing for a job, forming and fostering friendships, interfacing with health care providers where one must explain symptoms and ask crucial medical questions (Katz et al., 2007), or communicating with customer service personnel.

Importance of Question-Asking

Successful communication involves the manipulation and use of pragmatic skills to exchange information using functions like asking and answering questions appropriately for the communicative purpose, context, and interlocutor (Leech, 1983). Failure to use questions to request information is one recognized apragmatic behavior with RHD (Kennedy et al., 1994; Minga et al., 2020). Minga, Fromm, et al. (2022) found differences in the question types when compared with controls. Participants with RHD produced fewer questions overall during conversational discourse and used more content questions (questions that elicit information to answer wh-questions: “Where did you attend school?”) and fewer polar questions (questions that elicit yes/no response, e.g., “Are you a student?”), which are more efficient modes of inquiry when gathering information (Minga et al., 2020). Moreover, in a cross-cultural study of 10 different languages, nine of the 10 language samples had 67% of the questions coded as polar, suggesting that polar questions should be common (Stivers et al., 2009). These studies were the first to highlight a difference in question-asking after RHD. However, these types of communication impairments are not readily apparent when the stroke survivor has coherent expressive language (semantics, syntax, lexicon) and understanding of language (semantics, syntax, lexicon). When considering the language domain of pragmatics, the RHD patient may understand what is being said but not understand when it is inappropriate to make a joke or use sarcasm; they may lack the ability to determine timing of interjecting a comment, for example. These impairments are apragmatic (Minga, Sheppard, et al., 2022) and can lead to social isolation and diminished friendships, which are just two interpersonal consequences that can contribute to weakened social connections that mediate community engagement following stroke (Davidson et al., 2008; Kubina et al., 2013). Despite acknowledgements that a disturbance of social networks contributes to social isolation and negatively affects the QoL (Hewetson et al., 2021), there remains a substantial gap in the literature examining communication changes after right hemisphere stroke and the influence of race/ethnicity on those changes.

Cultural Considerations for Black Women’s Health Care

Though health care experiences have improved for Black women in recent decades, there are systemic contributors

to the socioeconomic conditions wherein health inequities persist (Chinn et al., 2021) and, even when socioeconomics are equal, health disparities exist, as evidenced by phenomena like increased Black maternal mortality (Petersen et al., 2019). For Black women who survive a stroke, the functional consequences of a communication impairment may include socioeconomic instability, and reduced ability to fully participate in child rearing and daily social-relational communicative interactions important to health and well-being (Davis et al., 2014; Katz et al., 2007). Previous research has identified four social determinants that impact the cardiovascular health of Black women disproportionately to White women; socioeconomic status, general daily stress, racial discrimination, and stress due to exposure of racial discrimination (Davis et al., 2014). After a stroke, there can be a shift from independence in daily tasks such as housework and personal hygiene to dependence on other people for basic needs. It is important to understand that, although RHD impairment may not be as noticeable as a left hemisphere stroke impairment, the cumulative disadvantages experienced by Black women who are more likely to be heads of households (Morgan et al., 1993) can result in a significantly diminished QoL (Davis et al., 2014). Among their many uses, questions facilitate gathering and confirmation of information for social-relational and medical needs, and effective question-asking can help mitigate the long-term effects of medical bias as a result of the cultural and linguistic mismatches between providers and patients (Curl & Drew, 2008; Schouten & Meeuwesen, 2006). Thus, understanding how racial/ethnic factors influence communication behaviors is necessary to provide appropriate and relevant diagnosis and treatment.

Cultural Influence on Questions

Questions are essential to conversational interactions; a form of communication that transcends nearly every aspect of daily living. Vygotsky’s (1978) theory that cognitive and linguistic development is socially constructed is foundational to the idea that language must be considered within social and cultural contexts and that languages use is culturally variable (Evans & Levinson, 2009). Specifically, researchers have documented how culture is strongly linked to language, ultimately affecting how people understand, answer, and ask questions, as well as how pragmatic conventions like eye-gaze during question-answer interactions differ across cultures (Carter et al., 2005; Enfield et al., 2010; Rossano et al., 2009).

Western cultures are associated with independent orientation and analytic, low-context (Hall, 1989) cognitive patterns and language use characterized by more words. Meanwhile, Asian cultures are associated with a holistic, high-context cognitive pattern of language use that would have fewer words but more gestures to

contextualize verbalizations, along with a collectivist social orientation (Nisbett et al., 2001; Varnum et al., 2010). One can expect to see these differences reflected in question-asking (Yang et al., 2021) and Black American (a vestige of African cultures) culture is considered high context (Hall, 1989). For this reason, racial differences observed in question-asking might reflect inherent cultural traits of language use and social orientation (Yang et al., 2021).

In recognizing the ubiquitous nature of conversational interactions in daily living, language was elicited using the first-encounter conversation task during which time the participants were asked to “get to know” an unfamiliar person. One goal for a first-encounter conversation is to gather information about the conversational partner and this is explicitly achieved by asking questions. Some people with RHD produce questions differently when gathering information in structured “get to know you” tasks (Minga, Fromm, et al., 2022) and, while there is growing evidence that RHD affects question-asking, the influence of race on communication after RHD is less understood. The purpose of this study was to determine whether race influences the frequency of question production and compare question types between Black women with RHD and controls. We tested the hypothesis that race mediates the frequency and types of questions used to meet the task goal. Specifically, we examined the following question: Does race influence question-asking after a right hemisphere stroke?

Method

Participants

Participants were 16 adult women (eight identified as Black and eight White) who sustained a single right hemisphere stroke at least 6 months prior to data collection (as evidenced by a radiology report). Cognitive-linguistic performance was similar between the groups (see Table 1). Sixteen additional participants (eight Black and eight White women) also from the RHDBank (<https://rhd.talkbank.org>, Minga et al., 2021) qualified as controls, having not experienced a stroke or neurologic disorder (by

self-report). All participants were right-handed English speakers with no history of alcohol or drug abuse or learning disability, with functional hearing and vision, and a high school diploma or equivalent. The institutional review board of North Carolina Central University approved this study.

Procedure

Questions were extracted from language produced during the first-encounter conversational discourse task (Kennedy et al., 1994) of the RHDBank Discourse Protocol (Minga et al., 2021). For this task, participants were asked to “get to know an unfamiliar person” during an informal conversation. Conversational partners were all female graduate students. As outlined in the RHDBank administration protocol, students were not given a list of questions nor were the participants instructed to ask questions to meet the task goal (see Minga et al., 2021, for task administration details). Elicited language was video-recorded and orthographically transcribed using the Codes for the Human Analysis of Transcripts format (MacWhinney, 2000). Automated coding and analysis of the transcripts was completed using dimensions of Enfield et al.’s (2010) Question-Response Coding Scheme within the Computerized Language Analysis programs (MacWhinney, 2000). Utterances characterized as questions were coded as one of three different types: polar questions (e.g., “Do you live in North Carolina?” or “Didn’t you live in Chicago?”), content questions (e.g., may contain or elicit responses to “what,” “how,” “who,” “when,” “where,” and “why”; e.g., “Where did you attend college?”), or alternative questions (e.g., “Are you from the north or the south?”). Two different trained researchers independently coded each transcript. See a sample transcript in Supplemental Material S1. Questions were also coded for whether the question was started, but not finished. For example, “Can you...what is it made of?” would be coded once for “Can you...” being incomplete and “. . .what is it made of?” being a completed question. Discrepancies in coding were discussed to reach a consensus. Interrater reliability for coding was calculated by dividing the total agreements by the sum of agreements and disagreements and multiplying by 100. Interrater reliability was initially 98% and 100% after discussion.

Data Analysis

The primary analysis objective was to understand differences in the number and types of questions produced based on race and the presence of RHD. We began by using descriptive statistics. Visualizations were used to better understand the participants in the sample and for an initial exploration of associations between race, group, and question production. Next, we conducted two-sample

Table 1. Right hemisphere brain damage participant assessment.

Assessment	Black (n = 8)	White (n = 8)
	M (SD)	M (SD)
Executive function	25.62 (6.02)	30.38 (4.34)
Attention	184.38 (19.73)	199.88 (11.97)
Memory	165.00 (18.19)	173.12 (8.63)
Composite severity	3.62 (0.36)	3.92 (0.15)
Neglect (no. with neglect)	3	0

inference for the difference in number of questions between groups defined based on race and group. Due to the small sample size and nonnormal distribution of the counts, we used Wilcoxon signed-ranks tests for the two-sample analysis. To adjust for multiple comparisons, we used a threshold of .008, based on a Bonferroni correction, to determine statistically significant differences.

In addition to the two-sample comparisons, we used negative binomial regression to model the association between the number of questions produced, race, and group after adjusting for the additional covariates age and years of education. Poisson and zero-inflated Poisson regression models were also considered; however, we chose the negative binomial regression models based on comparisons of the Akaike information criterion for each model. This was further supported by goodness-of-fit tests that concluded the negative binomial model was a good fit for the data given the overdispersion in the distribution of number of questions asked. The models have the form $Y = \beta_0 + \beta_1age + \beta_2education + \beta_3race + \beta_4group$ where Y is the expected number of questions, and .05 was used to determine which variables were statistically significant in the model.

The two-sample inference and regression models were conducted using total questions asked, then separate analyses were done for question type: content and polar questions. Alternative questions were included as part of the total question results but, as shown in Table 2, there were too few alternative questions asked for a separate analysis of questions of this type. We only included complete questions in the analysis to ensure consistency in what was defined as a “question” in the results. All statistical analyses were done using the statistical programming language R (R Core Team, 2021).

Results

The mean age for participants in the Black control subset was 38.2 years old, which was younger than participants in the other subsets. Given the large standard

deviation, however, this difference is not statistically significant. There were no notable differences in the years of education across the subsets of race and group. On average, 95% of the participants’ questions in each group were complete, with one participant in the White control group having 75% of her questions complete. Otherwise, all participants completed at least 85% of their questions. There was an equal number of participants in each subset defined by race and group. Descriptive statistics for the subsets are shown in Table 2.

Figure 1 displays the number of questions for participants with RHD versus the controls, and Figure 2 displays a more detailed view of the number of questions by type for each subset defined by race and group. From these graphs and the descriptive statistics in Table 2, we observe that the participants with RHD tend to produce fewer questions than the controls. The median number of questions for the control group is approximately equal with the 75th percentile for the RHD group (see Figure 1). Additionally, there is also much less variability in the number of questions produced among participants with RHD than among the controls.

Black participants generally produced fewer questions than White participants, regardless of group. For example, the mean number of questions produced by Black participants in the control group is 10 compared with 20 for the White participants in the control group. There is less variability in the number of questions among Black participants than White participants across all question types. We examine these differences further in the two-sample and regression analyses.

Two-Sample Analysis

Group

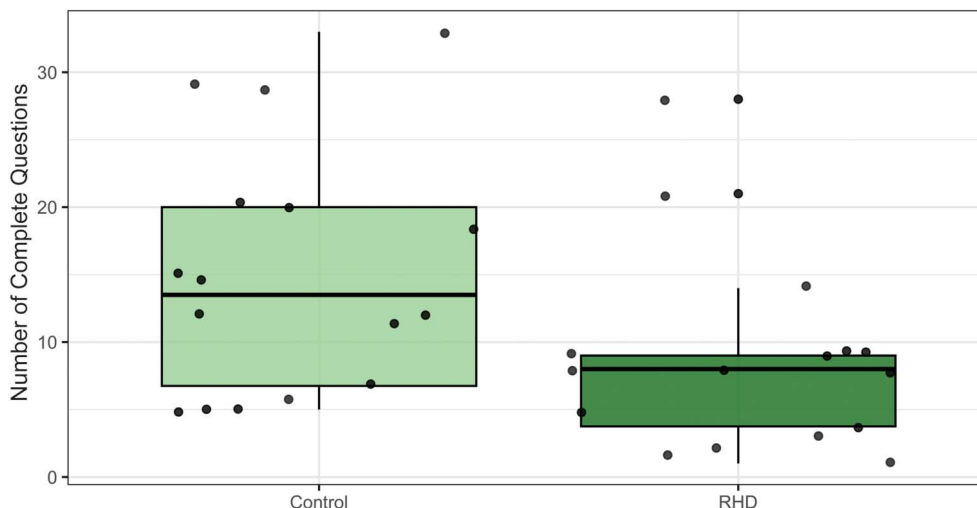
The results in Table 3 show the total number of questions asked by each participant in the control group versus those with RHD. On average, those in the control group asked six more questions in total, than those with RHD (15 vs. nine). For question type, controls produced 1.2 more content questions (5.5 vs. 4.3), and 4.6 more

Table 2. Demographic and question summary statistics.

Variable	Black women		White women	
	Control (<i>n</i> = 8)	RHD (<i>n</i> = 8)	Control (<i>n</i> = 8)	RHD (<i>n</i> = 8)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Age	38.12 (11.63)	50.50 (8.23)	50.75 (4.53)	53.12 (8.37)
Education	17.12 (4.09)	15.88 (3.14)	18.38 (1.85)	18.12 (3.72)
Total questions	10.00 (5.53)	5.50 (4.63)	20.25 (9.41)	12.00 (8.04)
Content questions	3.62 (2.20)	2.62 (1.85)	7.38 (2.88)	6.00 (5.37)
Polar questions	6.00 (4.31)	2.75 (2.82)	11.50 (7.17)	5.62 (3.25)
Alternative questions	0.38 (0.74)	0.12 (0.35)	1.38 (1.51)	0.38 (0.52)

Note. RHD = right hemisphere brain damage.

Figure 1. Number of complete questions produced based on group. RHD = right hemisphere brain damage.



polar questions (8.8 vs. 4.2). Based on the results from the Wilcoxon signed-ranks test, the differences in the total number of questions and number of polar questions are not statistically significant at the .008 threshold determined by the Bonferroni correction (p values = .03 and .02, respectively). There was not a statistically significant difference in the number of content questions between participants with RHD and healthy controls.

Race

We observe more substantial differences in the comparisons by race shown in Table 3. On average, White participants asked eight more total questions (16 vs. eight), 3.6 more content questions (6.7 vs. 3.1), and 4.2

more polar questions (8.6 vs. 4.4). Based on the results from the Wilcoxon signed-ranks test, the difference in the number of polar questions is not statistically significant at the .008 threshold (p value = .03); however, the differences in the total number of questions and the number of content questions are statistically significant at this threshold (p values = .008 and .005, respectively). The results from the two-sample tests confirm that the patterns observed from the descriptive statistics are significant (see Table 4).

Regression Analysis

Next, we use the results from the negative binomial regression model to understand differences by race and

Figure 2. Number of each question type produced based on race and group. Side-by-side box plots are shown for each question type to compare the number of questions for each combination of race and group. Within a single box plot, the minimum value, 25th percentile, median, 75th percentile, and maximum value are shown. Points on the plot indicate outliers. RHD = right hemisphere brain damage.

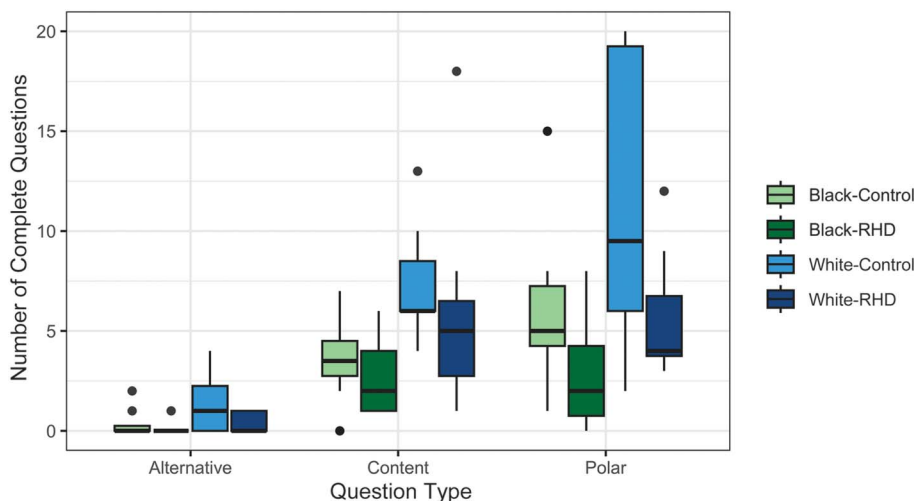


Table 3. Number of questions by group.

Question	Control (<i>n</i> = 16)	RHD (<i>n</i> = 16)	<i>p</i> value ^a
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Total questions	15.12 (9.14)	8.75 (7.17)	.031
Content questions	5.50 (3.14)	4.31 (4.25)	.11
Polar questions	8.75 (6.38)	4.19 (3.29)	.019

Note. RHD = right hemisphere brain damage.

^aWilcoxon rank sum test.

group after adjusting for the covariates age and education. The output for each model is shown in Table 5. Age has a statistically significant association with the total number of questions and number of content questions. For each question type, the mean number of questions produced decreased for each additional year in the participant age. Education did not have a statistically significant effect on question production based on the models.

Group

The results from the model are consistent with the two-sample analysis in Table 3. Based on the model, individuals with RHD are expected to ask about 35% fewer questions (incidence rate ratio [IRR] = 0.65, 95% confidence interval [CI] [0.45, 0.96]) than those without, after adjusting for age, education, and race. Similarly, individuals with RHD are expected to ask about 45% fewer polar questions (IRR = 0.55, 95% CI [0.33, 0.89]) than those without RHD. There was not a statistically significant difference in the number of content questions between the control and RHD groups.

Race

Race has a statistically significant effect on the total number of questions produced, as well as the number of content and polar questions. Adjusting for age, education, and group, the mean total number of questions produced by Black participants is about 59% less (IRR = 0.41, 95% CI [0.25, 0.65]) than the mean for White participants. Similarly, the mean number of content questions produced by Black participants is about 61% less

Table 4. Number of questions by race.

Question	White (<i>n</i> = 16)	Black (<i>n</i> = 16)	<i>p</i> value ^a
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Total questions	16.12 (9.46)	7.75 (5.45)	.008
Content questions	6.69 (4.22)	3.12 (2.03)	.005
Polar questions	8.56 (6.17)	4.38 (3.90)	.033

^aWilcoxon rank sum test.

(IRR = 0.39, 95% CI [0.24, 0.61]), and the mean number of polar questions is about 58% less (IRR = 0.23–0.75). The estimates are all approximately equal, reflecting the general tendency for Black participants to ask fewer questions. Question asking in Black participants is not dependent on the question type.

Discussion

Knowing that language use has a cultural basis (Carter et al., 2005; Rossano et al., 2009), this study adds to the sparse knowledge base of the intersectionality of race, RHD, and question asking in women. Patients with communication disabilities have reported difficulty communicating with their health care providers and feeling underestimated, disregarded, or ignored (Balandin et al., 2007; Morris et al., 2016; Murphy, 2006; Nordehn et al., 2006). These studies could be situated in Phase 1 Detecting (defining a disparity and underserved population) of the Phases of Health Care Disparities model (Kilbourne et al., 2006), as they have detected a health disparity in the communication quality between providers and patients with communication disabilities (i.e., underserved population). When considering those with communication disabilities as an underserved population and the intersection of the social determinant of race/ethnicity, Black women who have RHD and its accompanying communication disabilities become an especially underserved population. Thus, by describing the characteristics of question-asking in Black women with RHD, this study contributes to the Understanding Phase 2 (identifying patient, clinical encounter, provider, and health care system determinants of disparities) of the Phases of Health Care Disparities model by providing specificity concerning a potential patient social determinant (race/ethnicity) that could influence communicative interactions and, perhaps, a clinical encounter. Effective question-asking may facilitate more productive clinical encounters, but there remains a dearth of knowledge on whether question asking in stroke patients may differ by race/ethnicity. These data, therefore, complement the concerted effort to identify potential contributors to lower quality communication experiences with providers.

Question-Asking and RHD

There is growing evidence suggesting that question-asking after RHD is different from question-asking of those who have not sustained a right hemisphere stroke (Minga et al., 2020; Minga, Fromm, et al., 2022), and these studies corroborate the current data showing that right hemisphere stroke influences the amount and type of questions asked. The current analyses show that 35%

Table 5. Regression model for race and group.

Variable	Total questions		Content questions		Polar questions	
	IRR	SE	IRR	SE	IRR	SE
(Intercept)	47.8***	1.02	16.0**	1.02	31.2**	1.29
Age	0.98*	0.012	0.97*	0.012	0.98	0.015
Education	1.02	0.032	1.04	0.031	1.01	0.041
Black American	0.41***	0.232	0.39***	0.239	0.42**	0.295
RHD	0.65*	0.199	0.92	0.187	0.55*	0.251

Note. IRR = incidence rate ratio; SE = standard error; RHD = right hemisphere brain damage.

* $p < .05$. ** $p < .01$. *** $p < .001$.

fewer questions overall and 45% fewer polar questions are reasonable expectations for adults with RHD. These findings may lend themselves nicely to the development of criteria for a diagnostic measure specific to question-asking, once substantiated by studies with larger sample sizes.

Question-Asking and Race

Black participants produced more than 50% fewer questions than White participants, irrespective of whether brain damage was present. Perhaps this is evidence of typical cultural differences by race/ethnicity, as it is consistent with previous research characterizing Black communication style as high context with fewer words produced (i.e., fewer questions asked; Hall, 1989; Yang et al., 2021). Stivers et al. (2009) found that polar questions are the most frequently used (67%) question type in the conversations of 90% of the languages examined. Thus, the study findings do suggest intersectional relationship between race and RHD. The pattern of performance is consistent with a conceptual framework for question asking put forth by Minga et al. (2021). Given the many facets of life wherein questions are important, this finding is significant and warrants further inquiry in order to inform those describing language production in RHD for future treatment plans.

Age appears to mitigate observed differences in question asking. Black controls were younger than Black participants with RHD, and with increasing age, question-asking was less. This finding may relate to the fact that more older participants had brain damage or, perhaps, intercultural age factors when considering conversational partners. Specifically, most of the conversational partners in this study were young, White female students training to be speech-language pathologists. This is a realistic situation for most of our patients, as the field of speech-language pathology is approximately 92% White women (American Speech-Language-Hearing Association, 2019). A dyad of mixed ages and race/ethnicity may, therefore, not experience as easy a conversation, and the phenomenon of patient–physician racial discordance has been documented (Jetty et al., 2022).

Clinical Implications

Communicative interactions can be more difficult for women with communication disorders, and use of questions to acquire information might be more difficult for Black women overall, and Black women with RHD more extensively. The impact of pragmatic impairment on conversation can lead to diminished health outcomes and maintenance among Black women that ultimately affects their daily living needs such as being the head of the household, working, and caregiving. These preliminary data suggest that communicative partners, including health care practitioners providing patient-facing services may need to consider differences in question asking through a lens of cultural humility in order to ensure that Black women are receiving information pertinent to optimal health outcomes. Proactive provision of information using multimodal forms of communication may mitigate reduced question asking.

Limitations

The study sample was relatively small. While participants were all women, it is possible that the age and racial background of the conversational partner influenced the language elicited, with conversational partners sometimes being considerably younger and/or not Black. Thus, further inquiry exploring question asking when conversational partners are in racial concordance with Black participants is in order. Despite these limitations, this body of work provides a signal for future studies to expand inquiry that considers sex and race as important social determinants for communication characteristics after right hemisphere stroke.

Conclusions

Because the conversational discourse deficits in RHD are more subtle than the language deficits perceived with left hemisphere strokes, the impact of RHD on patients can be overlooked, justifying the need for more research on the characteristics of the RHD language

production. Question asking is foundational to learning and social engagement (Yang et al., 2021), so reduced or inadequate question asking can have a negative impact on the RHD patient's QoL, as gathering information is essential to social, occupational, caregiving, and health care interactions. Due to innate traits of certain cultures, however, like the tendency for those of African descent to use more context in language interactions (Hall, 1989), we must consider whether language styles consisting of a lower quantity of words will carry over into how RHD presents for different groups. To our knowledge, this study is the first to examine the influence of race/ethnicity on language production after RHD, and this pilot sample portends further investigation because, what we understand as a nondisordered, high-context language style (e.g., fewer words) prestroke might explain, in part, why fewer questions were asked by the Black women. However, as Blake (2017) notes, if clients have brain damage, they may not realize their deficits or their need to ask more clarifying questions, thereby putting the onus on clinicians to provide more information rather than relying on "Any questions?" as the only check for understanding. Rather than making cultural adaptations after assessments and interventions are designed, understanding cultural influences in the formative stage of explaining characteristics of question use (Minga, Fromm, et al., 2022) is a more proactive way to design inclusive methods targeting cognitive-communication impairments in RHD.

Author Contributions

Danai Kasambira Fannin: Conceptualization (Equal), Writing – original draft (Lead), Writing – review & editing (Lead). **Jada Elleby:** Writing – original draft (Equal), Writing – review & editing (Supporting). **Maria Tackett:** Formal analysis (Lead), Writing – original draft (Supporting). **Jamila Minga:** Conceptualization (Lead), Data curation (Lead), Funding acquisition (Lead), Investigation (Lead), Methodology (Lead), Project administration (Lead), Writing – original draft (Equal), Writing – review & editing (Equal).

Data Availability Statement

Data are available upon request from the authors or from the Right Hemisphere Damage Bank, <https://rhd.talkbank.org>.

Acknowledgments

This work is supported in part by Grants NIH/NIDCD 3R01-DC008524-11S1 and NIH 2 K12-HD043446-16

both awarded to Jamila Minga, NIH-NIMHD-RCMI 5U54MD012392-03 awarded to Deepak Kumar, and the Duke Whitehead Scholar Foundation. The authors would like to extend a note of gratitude to the survivors of right hemisphere stroke who volunteered their time and language samples to the Right Hemisphere Damage Bank.

References

- American Speech-Language-Hearing Association.** (2019). *Demographic profile of ASHA members providing bilingual services, year-end 2018*. <https://www2.asha.org/uploadedFiles/Demographic-Profile-Bilingual-Spanish-Service-Members.pdf>
- Balandin, S., Hemsley, B., Sigafos, J., & Green, V.** (2007). Communicating with nurses: The experiences of 10 adults with cerebral palsy and complex communication needs. *Applied Nursing Research, 20*(2), 56–62. <https://doi.org/10.1016/j.apnr.2006.03.001>
- Barnes, S., Beeke, S., & Bloch, S.** (2022). How is right hemisphere communication disorder disabling? Evidence from response mobilizing actions in conversation. *Disability and Rehabilitation, 44*(2), 261–274. <https://doi.org/10.1080/09638288.2020.1766123>
- Bartlett, G., Blais, R., Tamblyn, R., Clermont, R. J., & MacGibbon, B.** (2008). Impact of patient communication problems on the risk of preventable adverse events in acute care settings. *Canadian Medical Association Journal, 178*(12), 1555–1562. <https://doi.org/10.1503/cmaj.070690>
- Blake, M. L.** (2017). "I'm fine. I don't need help with my speech." *The ASHA Leader, 22*(2), 42–43. <https://doi.org/10.1044/leader.OTP.22022017.42>
- Brady, M., Mackenzie, C., & Armstrong, L.** (2003). Topic use following right hemisphere brain damage during three semi-structured conversational discourse samples. *Aphasiology, 17*(9), 881–904. <https://doi.org/10.1080/02687030344000292>
- Brownell, H. H., Potter, H. H., Bihle, A. M., & Gardner, H.** (1986). Inference deficits in right brain-damaged patients. *Brain and Language, 27*(2), 310–321. [https://doi.org/10.1016/0093-934x\(86\)90022-2](https://doi.org/10.1016/0093-934x(86)90022-2)
- Carter, J. A., Lees, J. A., Murira, G. M., Gona, J., Neville, B. G. R., & Newton, C. R. J. C.** (2005). Issues in the development of cross-cultural assessments of speech and language for children. *International Journal of Language & Communication Disorders, 40*(4), 385–401. <https://doi.org/10.1080/13682820500057301>
- Chinn, J. J., Martin, I. K., & Redmond, N.** (2021). Health equity among Black women in the United States. *Journal of Women's Health, 30*(2), 212–219. <http://doi.org/10.1089/jwh.2020.8868>
- Curl, T. S., & Drew, P.** (2008). Contingency and action: A comparison of two forms of requesting. *Research on Language and Social Interaction, 41*(2), 129–153. <https://doi.org/10.1080/08351810802028613>
- Davidson, B., Howe, T., Worrall, L., Hickson, L., & Togher, L.** (2008). Social participation for older people with aphasia: The impact of communication disability on friendships. *Topics in Stroke Rehabilitation, 15*(4), 325–340. <https://doi.org/10.1310/tsr1504-325>
- Davis, S. K., Gebreab, S., Quarells, R., & Gibbons, G. H.** (2014). Social determinants of cardiovascular health among Black and White women residing in Stroke Belt and Buckle regions of the South. *Ethnicity & Disease, 24*(2), 133–143.
- Ellis, C., Boan, A. D., Turan, T. N., Ozark, S., Bachman, D., & Lackland, D. T.** (2015). Racial differences in poststroke rehabilitation utilization and functional outcomes. *Archives of Physical Medicine and Rehabilitation, 96*(1), 84–90.e1. <https://doi.org/10.1016/j.apmr.2014.08.018>

- Enfield, N. J., Stivers, T., & Levinson, S. C. (2010). Question-response sequences in conversation across ten languages: An introduction. *Journal of Pragmatics*, 42(10), 2615–2619. <https://doi.org/10.1016/j.pragma.2010.04.001>
- Evans, N., & Levinson, S. C. (2009). The myth of language universals: Language diversity and its importance for cognitive science. *Behavioral and Brain Sciences*, 32(5), 429–448. <https://doi.org/10.1017/S0140525X0999094X>
- Gall, S., Phan, H., Madsen, T. E., Reeves, M., Rist, P., Jimenez, M., Luchtman, J., Dong, L., & Lisabeth, L. D. (2018). Focused update of sex differences in patient reported outcome measures after stroke. *Stroke*, 49(3), 531–535. <https://doi.org/10.1161/STROKEAHA.117.018417>
- Go, A. S., Mozaffarian, D., Roger, V. L., Benjamin, E. J., Berry, J. D., Blaha, M. J., Dai, S., Ford, E. S., Fox, C. S., Franco, S., Fullerton, H. J., Gillespie, C., Hailpern, S. M., Heit, J. A., Howard, V. J., Huffman, M. D., Judd, S. E., Kissela, B. M., Kittner, S. J., . . . Turner, M. B. (2014). Heart disease and stroke statistics—2014 update: A report from the American Heart Association. *Circulation*, 129(3), e28–e292. <https://doi.org/10.1161/01.cir.0000441139.02102.80>
- Hall, E. T. (1989). *Beyond culture* (Anchor Books ed.). Anchor Books.
- Harris, J. L. (2006). Snapshots of older African Americans: Implications for audiologists and speech-language pathologists. *SIG 15 Perspectives on Gerontology*, 11(2), 9–13. <https://doi.org/10.1044/gero11.2.9>
- Hedna, V. S., Bodhit, A. N., Ansari, S., Falchook, A. D., Stead, L., Heilman, K. M., & Waters, M. F. (2013). Hemispheric differences in ischemic stroke: Is left-hemisphere stroke more common? *Journal of Clinical Neurology*, 9(2), 97–102. <https://doi.org/10.3988/jcn.2013.9.2.97>
- Hewetson, R., Cornwell, P., & Shum, D. H. K. (2021). Relationship and social network change in people with impaired social cognition post right hemisphere stroke. *American Journal of Speech-Language Pathology*, 30(2S), 962–973. https://doi.org/10.1044/2020_ajslp-20-00047
- Hoffman, J. M., Yorkston, K. M., Shumway-Cook, A., Ciol, M. A., Dudgeon, B. J., & Chan, L. (2005). Effect of communication disability on satisfaction with health care. *American Journal of Speech-Language Pathology*, 14(3), 221–228. [https://doi.org/10.1044/1058-0360\(2005\)022](https://doi.org/10.1044/1058-0360(2005)022)
- Howard, G., & Howard, V. J. (2020). Twenty years of progress toward understanding the Stroke Belt. *Stroke*, 51(3), 742–750. <https://doi.org/10.1161/strokeaha.119.024155>
- Howard, V. J., Cushman, M., Pulley, L., Gomez, C. R., Go, R. C., Prineas, R. J., Graham, A., Moy, C. S., & Howard, G. (2005). The reasons for geographic and racial differences in stroke study: Objectives and design. *Neuroepidemiology*, 25(3), 135–143. <https://doi.org/10.1159/000086678>
- Iezzoni, L. I. (2011). Eliminating health and health care disparities among the growing population of people with disabilities. *Health Affairs*, 30(10), 1947–1954. <https://doi.org/10.1377/hlthaff.2011.0613>
- Iezzoni, L. I., Kurtz, S. G., & Rao, S. R. (2015). Trends in mammography over time for women with and without chronic disability. *Journal of Women's Health*, 24(7), 593–601. <https://doi.org/10.1089/jwh.2014.5181>
- Iezzoni, L. I., Kurtz, S. G., & Rao, S. R. (2016). Trends in colorectal cancer screening over time for persons with and without chronic disability. *Disability and Health Journal*, 9(3), 498–509. <https://doi.org/https://doi.org/10.1016/j.dhjo.2016.02.003>
- Jetty, A., Jabbarpour, Y., Pollack, J., Huerto, R., Woo, S., & Petterson, S. (2022). Patient-physician racial concordance associated with improved healthcare use and lower healthcare expenditures in minority populations. *Journal of Racial and Ethnic Health Disparities*, 9(1), 68–81. <https://doi.org/10.1007/s40615-020-00930-4>
- Jones, M. R., Horner, R. D., Edwards, L. J., Hoff, J., Armstrong, S. B., Smith-Hammond, C. A., Matchar, D. B., & Oddone, E. Z. (2000). Racial variation in initial stroke severity. *Stroke*, 31(3), 563–567. <https://doi.org/10.1161/01.STR.31.3.563>
- Katz, M. G., Jacobson, T. A., Veledar, E., & Kripalani, S. (2007). Patient literacy and question-asking behavior during the medical encounter: A mixed-methods analysis. *Journal of General Internal Medicine*, 22(6), 782–786. <https://doi.org/10.1007/s11606-007-0184-6>
- Kennedy, M. R., Strand, E. A., Burton, W., & Peterson, C. (1994). Analysis of first-encounter conversations of right-hemisphere-damaged adults. *Clinical Aphasiology*, 22, 67–80.
- Kilbourne, A. M., Switzer, G., Hyman, K., Crowley-Matoka, M., & Fine, M. J. (2006). Advancing health disparities research within the health care system: A conceptual framework. *American Journal of Public Health*, 96(12), 2113–2121. <https://doi.org/10.2105/ajph.2005.077628>
- Kubina, L. A., Dubouloz, C. J., Davis, C. G., Kessler, D., & Egan, M. Y. (2013). The process of re-engagement in personally valued activities during the two years following stroke. *Disability and Rehabilitation*, 35(3), 236–243. <https://doi.org/10.3109/09638288.2012.691936>
- Lackland, D. T., Roccella, E. J., Deutsch, A. F., Fornage, M., George, M. G., Howard, G., Kissela, B. M., Kittner, S. J., Lichtman, J. H., Lisabeth, L. D., Schwamm, L. H., Smith, E. E., & Towfighi, A. (2014). Factors influencing the decline in stroke mortality: A statement from the American Heart Association/American Stroke Association. *Stroke*, 45(1), 315–353. <https://doi.org/10.1161/01.str.0000437068.30550.cf>
- Leech, G. (1983). *Principles of pragmatics*. Routledge.
- Mackenzie, C., & Brady, M. (2008). Communication difficulties following right-hemisphere stroke: Applying evidence to clinical management. *Evidence-Based Communication Assessment and Intervention*, 2(4), 235–247. <https://doi.org/10.1080/17489530802615336>
- MacWhinney, B. (2000). The CHILDES Project: Tools for analyzing talk: The database (3rd ed.). Erlbaum.
- Magwood, G. S., Ellis, C., Nichols, M., Burns, S. P., Jenkins, C., Woodbury, M., & Adams, R. (2019). Barriers and facilitators of stroke recovery: Perspectives from African Americans with stroke, caregivers and healthcare professionals. *Journal of Stroke and Cerebrovascular Diseases*, 28(9), 2506–2516. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.06.012>
- Mahendra, N., & Spicer, J. (2014). Access to speech-language pathology services for African-American clients with aphasia: A qualitative study. *SIG 14 Perspectives on Communication Disorders and Sciences in Culturally and Linguistically Diverse (CLD) Populations*, 21(2), 53–62. <https://doi.org/10.1044/cds21.2.53>
- Minga, J., Fromm, D., Jacks, A., Stockbridge, M. D., Nelthropp, J., & MacWhinney, B. (2022). The effects of right hemisphere brain damage on question-asking in conversation. *Journal of Speech, Language, and Hearing Research*, 65(2), 727–737. https://doi.org/10.1044/2021_jslhr-21-00309
- Minga, J., Fromm, D., Williams-DeVane, C., & MacWhinney, B. (2020). Question use in adults with right-hemisphere brain damage. *Journal of Speech, Language, and Hearing Research*, 63(3), 738–748. https://doi.org/10.1044/2019_jslhr-19-00063
- Minga, J., Johnson, M., Blake, M. L., Fromm, D., & MacWhinney, B. (2021). Making sense of right hemisphere discourse using RHDBank. *Topics in Language Disorders*, 41(1), 99–122. <https://doi.org/10.1097/TLD.0000000000000244>

- Minga, J., Sheppard, S., Johnson, M., Hewetson, R., Cornwell, P., & Blake, M. (2022). Apragmatism: The renewal of a label for communication disorders associated with right hemisphere brain damage. *International Journal of Language and Communication Disorders*. Advance online publication. <https://doi.org/10.1111/1460-6984.12807>
- Morgan, S. P., McDaniel, A., Miller, A. T., & Preston, S. H. (1993). Racial differences in household and family structure at the turn of the century. *American Journal of Sociology*, 98(4), 799–828. <https://doi.org/10.1086/230090>
- Morris, M. A., Meier, S. K., Griffin, J. M., Branda, M. E., & Phelan, S. M. (2016). Prevalence and etiologies of adult communication disabilities in the United States: Results from the 2012 National Health Interview Survey. *Disability and Health Journal*, 9(1), 140–144. <https://doi.org/10.1016/j.dhjo.2015.07.004>
- Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., Das, S. R., de Ferranti, S., Després, J. P., Fullerton, H. J., Howard, V. J., Huffman, M. D., Isasi, C. R., Jiménez, M. C., Judd, S. E., Kissela, B. M., Lichtman, J. H., Lisabeth, L. D., Liu, S., . . . Turner, M. B. (2016). Heart disease and stroke statistics—2016 update: A report from the American Heart Association. *Circulation*, 133(4), e38–e360. <https://doi.org/10.1161/cir.0000000000000350>
- Murphy, J. (2006). Perceptions of communication between people with communication disability and general practice staff. *Health Expectations*, 9(1), 49–59. <https://doi.org/10.1111/j.1369-7625.2006.00366.x>
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review*, 108(2), 291–310. <https://doi.org/10.1037/0033-295x.108.2.291>
- Nordehn, G., Meredith, A., & Bye, L. (2006). A preliminary investigation of barriers to achieving patient-centered communication with patients who have stroke-related communication disorders. *Topics in Stroke Rehabilitation*, 13(1), 68–77. <https://doi.org/10.1310/5k2w-p6cd-efdf-8hg4>
- Petersen, E. E., Davis, N. L., Goodman, D., Cox, S., Syverson, C., Seed, K., Shapiro-Mendoza, C., Callaghan, W. M., & Barfield, W. (2019). Racial/ethnic disparities in pregnancy-related deaths—United States, 2007–2016. *Morbidity and Mortality Weekly Report*, 68(35), 762–765. <https://doi.org/10.15585/mmwr.mm6835a3>
- R Core Team. (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing. <https://www.R-project.org/>
- Rossano, F., Brown, P., & Levinson, S. C. (2009). Gaze, questioning, and culture. In J. Sidnell (Ed.), *Conversation analysis: Comparative perspectives* (pp. 187–249). Cambridge University Press. <https://doi.org/10.1017/CBO9780511635670.008>
- Schouten, B. C., & Meeuwesen, L. (2006). Cultural differences in medical communication: A review of the literature. *Patient Education and Counseling*, 64(1–3), 21–34. <https://doi.org/10.1016/j.pec.2005.11.014>
- Stivers, T., Enfield, N. J., Brown, P., Englert, C., Hayashi, M., Heinemann, T., Hoymann, G., Rossano, F., De Ruiter, J. P., Yoon, K. E., & Levinson, S. C. (2009). Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences*, 106(26), 10587–10592. <https://doi.org/10.1073/pnas.0903616106>
- Stockbridge, M., Sheppard, S., Keator, L., Murray, L., & Lehman Blake, M. (2021). Aprosodia subsequent to right hemisphere brain damage: A systematic review and meta-analysis. *Journal of the International Neuropsychological Society*, 1–27. <https://doi.org/10.1017/S1355617721000825f>
- Stransky, M. L., Jensen, K. M., & Morris, M. A. (2018). Adults with communication disabilities experience poorer health and healthcare outcomes compared to persons without communication disabilities. *Journal of General Internal Medicine*, 33(12), 2147–2155. <https://doi.org/10.1007/s11606-018-4625-1>
- Sullivan, R., & Harding, K. (2019). Do patients with severe post-stroke communication difficulties have a higher incidence of falls during inpatient rehabilitation? A retrospective cohort study. *Topics in Stroke Rehabilitation*, 26(4), 288–293. <https://doi.org/10.1080/10749357.2019.1591689>
- Tomita, H., Hagii, J., Metoki, N., Saito, S., Shiroto, H., Hitomi, H., Kamada, T., Seino, S., Takahashi, K., Baba, Y., Sasaki, S., Uchizawa, T., Iwata, M., Matsumoto, S., Shoji, Y., Tanno, T., Osanai, T., Yasujima, M., & Okumura, K. (2015). Impact of sex difference on severity and functional outcome in patients with cardioembolic stroke. *Journal of Stroke and Cerebrovascular Diseases*, 24(11), 2613–2618. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2015.07.016>
- Tompkins, C. A. (2012). Rehabilitation for cognitive-communication disorders in right hemisphere brain damage. *Archives of Physical Medicine and Rehabilitation*, 93(1), S61–S69. <https://doi.org/10.1016/j.apmr.2011.10.015>
- Van Lancker, D. R., & Kempler, D. (1987). Comprehension of familiar phrases by left- but not by right-hemisphere damaged patients. *Brain and Language*, 32(2), 265–277. [https://doi.org/10.1016/0093-934x\(87\)90128-3](https://doi.org/10.1016/0093-934x(87)90128-3)
- Varnum, M. E. W., Grossmann, I., Kitayama, S., & Nisbett, R. E. (2010). The origin of cultural differences in cognition: Evidence for the social orientation hypothesis. *Current Directions in Psychological Science*, 19(1), 9–13. <https://doi.org/10.1177/0963721409359301>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Winstein, C. J., Stein, J., Arena, R., Bates, B., Chorney, L. R., Cramer, S. C., Deruyter, F., Eng, J. J., Fisher, B., Harvey, R. L., Lang, C. E., MacKay-Lyons, M., Ottenbacher, K. J., Pugh, S., Reeves, M. J., Richards, L. G., Stiers, W., & Zorowitz, R. D. (2016). Guidelines for adult stroke rehabilitation and recovery: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, 47(6), e98–e169. <https://doi.org/10.1161/STR.0000000000000098>
- Yang, J., Morris, M., Teevan, J., Adamic, L., & Ackerman, M. (2021). Culture matters: A survey study of social Q&A behavior. *Proceedings of the International AAAI Conference on Web and Social Media*, 5(1), 409–416. <https://doi.org/10.1609/icwsm.v5i1.14095>