

Motivation as a Predictor of Aphasia Treatment Outcomes

A Scoping Review

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Purpose: Motivation is a complex phenomenon that can influence a person's ability to make progress in treatment. We sought to understand how motivation is currently measured and utilized in aphasia rehabilitation by identifying treatment studies that (1) include measurement of motivation and (2) use motivation to predict treatment response. **Method:** A scoping review was conducted by systematically searching PubMed, CINAHL, EBSCO, Ovid MEDLINE, and APA PsycInfo using the following search terms: (measurement OR treatment OR rehabilitation OR predict*) AND (motiv* OR engagement OR adherence OR compliance) AND (aphasia OR dysphasia). **Results:** Two studies met our inclusion criteria. Motivation was measured differently across studies. No studies used motivation to predict treatment outcomes. **Discussion/Conclusions:** Despite the importance of motivation in aphasia rehabilitation success, studies that include its measurement are sparse. Additional research is needed and should include development of measurement tools and evaluation of the predictive value of motivation on treatment outcomes. **Key words:** *adherence, aphasia, engagement, motivation, predictors, stroke*

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ACCORDING to the American Heart Association, more than 795,000 people have a stroke each year (Go et al., 2013, p. e132), with 46% experiencing cognitive deficits and 19% experiencing aphasia up to 6 months later (Go et al., 2013, p. e137). The cognitive and communication deficits associated with stroke are devastating, as evidenced by research demonstrating that, when compared with people without aphasia, people with aphasia (PWA) experience lower quality of life and lower participation in activities that support independence, such as driving and maintaining gainful employment (Hilari, 2011). Negative psychosocial and economic consequences of aphasia need to be considered and addressed for PWA to effectively maximize their ability to regain cognitive and communicative functions that allow them to function as independently as possible and experience a good life quality. In aphasia rehabilitation, "psychological factors, especially the role of *motivation*," are critical components of recovery that create readiness

to engage in aphasia treatment (Shill, 1979, p. 503). In a study of predictors on poststroke aphasia outcomes, Watila and Balarabe (2015) indicated that nonlinguistic cognitive abilities such as family support and motivation likely impact outcomes; yet, these have not been widely studied.

Motivation remains ill-defined and without consensus on what constitutes it. A study of an interdisciplinary rehabilitation team of 32 professionals working on a stroke unit, two of which were speech-language pathologists (SLPs), revealed that all members believed that motivation was an important component of treatment in patients with stroke with or without aphasia, but they endorsed a variety of conflicting beliefs and practices surrounding motivation (Maclean et al., 2002). Inconsistent and imprecise descriptions of motivation lead to inaccurate assumptions about certain observable behaviors, individual factors, and clinical factors and their relationship to motivation and engagement in rehabilitation (Bains et al., 2007). The lack of consensus on what constitutes motivation and differences in the current understanding of motivation may contribute to variability in how motivation is viewed and measured.

Adherence and engagement are commonly used to infer motivation. *Adherence* relates to whether a person acts in the manner recommended by the health care professional (DiMatteo, 2004) and is quantified by completion of elements that are part of a treatment program. Although adherence theorizes that behaviors may be applied to treatment outcomes (Sirur et al., 2009), the underlying motivation for treatment adherence is often not captured. *Engagement* is defined as consisting of “deliberate effort and commitment to working toward the goals of rehabilitation therapy” often quantified through observable behaviors of “how” during the process of *participation*, such as attendance and level or need for encouragement (Lequerica et al., 2009, p. 753).

Treatment adherence, participation, engagement, and motivation have been linked to outcomes in various ways. Research in

stroke rehabilitation has revealed that poor treatment participation results in poor functional outcomes and longer lengths of stay (Lenze et al., 2004), whereas higher levels of treatment participation yield greater improvement (Paolucci et al., 2012). When discussing health-related treatment participation, motivation is often discussed as a factor associated with improvement or lack of improvement in treatment (Ryan et al., 2008). However, the cause of low participation, which is not always clear (Paolucci et al., 2012), may relate to the fundamental difference between engagement and participation. The field of positive psychology views engagement as immersion in the task that leads to the experience of flow (Lee Duckworth et al., 2005) and functioning in a positive, optimal, and energized manner (Bonaiuto et al., 2016). Importantly, participation can occur without the positive feelings of immersion that are part of full engagement. Engagement has been identified as having a positive influence on recovery in PWA (Dalemans et al., 2010). However, components of motivation, which may impact both engagement and adherence, need to be directly measured. A theoretically based approach to defining and measuring motivation is critical for understanding the underlying role of motivation in aphasia treatment outcomes.

Motivation has been discussed as a factor in aphasia treatment; however, speech-language clinicians with a variety of clinical experiences “seem to implicitly believe” in a variety of nonclinical influences that impact treatment outcomes, including aspects of motivation (Ebert & Kohnert, 2010, p. 134), which may contribute to difficulty identifying and addressing the true basis of motivational concerns in patients. Theories of motivation from the fields of psychology including achievement motivation (Weiner, 1985), agency (Bandura, 2006), intention (Ajzen, 1991), and satisfying innate needs of competence, relatedness, and autonomy (Ryan & Deci, 2000) can contribute to the knowledge base in aphasia treatment. To discuss motivation as it applies to this article,

we explore two theoretical frameworks that are based on health-related contexts, the self-determination theory (SDT) and the theory of planned behavior (TPB).

SELF-DETERMINATION THEORY

The SDT is a theory of motivation that has been used to understand health-related behaviors. The SDT suggests that motivation is based on a person's ability to experience psychological growth in an environment that satisfies innate needs for competence, relatedness, and autonomy (Ryan & Deci, 2000). As a result of these experiences, a person seeks goals, domains, or relationships that support those needs. *Competence* is experienced in the ability to affect and control aspects of one's environment. *Relatedness* is based on attachment theory, in which secure connections with others can positively influence intrinsic motivation. *Autonomy* combines one's sense of self with ability and desire to act volitionally. Self-determination occurs on a continuum ranging from amotivation, or without motivation, to fully intrinsically driven motivation. This continuum is divided into two major areas: extrinsic motivation regulation, which includes external regulation, introjection, identification, and integration; and intrinsic motivation regulation, which is fully autonomous (Ryan & Deci, 2000). An example of this continuum is illustrated in the context of a PWA with a goal of returning to driving after a stroke. The PWA would like to obtain medical clearance to drive a car. To accomplish this goal, they must improve their language skills to be able to pass the driving test. The PWA attends language rehabilitation treatment, working toward the goal of driving.

External regulation, a type of extrinsic motivation (Ryan & Deci, 2000) is demonstrated when a PWA is completing a task because the clinician or family are directing them to do it. The PWA may be completing the tasks for a tangible reward or to avoid punishment or other contingency. When a PWA is externally regulated, their pursuit of rehabilitation treatment may be in-

fluenced by their family members, who serve as the external driving force for treatment attendance and homework completion, illustrating participation and adherence but not engagement.

Introjection is demonstrated by a PWA who is influenced by extrinsic factors such as their own guilt and shame (Ryan & Deci, 2000). A PWA experiencing introjection may make comments or have thoughts about their own negative self-worth as justification for their behaviors. Although introjection is self-initiated, action at this level is still considered to be extrinsically motivated because any consequences of not completing the task may be related to their sense of value as an individual or as they believe they appear to others.

Identification is the first level of the SDT where the person is engaging in the target behavior autonomously (Chan et al., 2009). At this level of motivation, target behaviors have recognized value and basic internalization but continue to be externally motivated because the perceived benefit of the action is related to its value rather than due to personal satisfaction of the task (Ryan & Deci, 2000). A PWA might demonstrate identification by attending language treatment to work on reading for the driving test; however, because the motivation is the driving test rather than reading enjoyment, the person is still extrinsically motivated.

Integration is the highest level of extrinsic motivation regulation on the continuum toward intrinsically driven motivation. At this level, the PWA exhibits integration of the behavior to the self (Chan et al., 2009; Ryan & Deci, 2000) and will accept and acknowledge the importance of the treatment. Although it is this understanding of importance that serves to promote the behavior, the task has not yet become incorporated into the individual's values or needs.

Intrinsic regulation occurs when a person is internally motivated to reach their goals. A person not only accepts and acknowledges the importance of the task but the motivation for completing the task is assimilated as part of the person's values and needs as well (Ryan & Deci, 2000). When a person chooses a goal

and works toward achieving the goal for the personal satisfaction, then the goal is intrinsically regulated.

The SDT provides a framework for defining the components of motivation, which may be important for understanding treatment engagement and adherence. A set of defined components allows for direct measurement of motivation prior to treatment engagement rather than analysis of indirect indicators that can only be analyzed after treatment is initiated or completed. Given the importance of understanding motivation prior to treatment initiation, and the potential impact motivation can have on outcomes, it is also relevant to consider elements of behavior change.

THEORY OF PLANNED BEHAVIOR

A discussion of motivation as a predictor would be incomplete without including discussion of a predictive model of behavior change that outlines factors that influence motivation. It also provides a theoretical framework with which to view motivation as a predictor in the current literature. This article explores motivation as a predictor of treatment outcomes, and the TPB is included in our exploration of motivation because it is a *predictive* model based on the concept that *intention* to perform a behavior encompasses the factors that explain motivation (Ajzen, 1991). Importantly, a person's motivation is demonstrated by their level of intention. According to the TPB, intention is related to control, attitude, and subjective norm. It is important to note that the behavior represented by this model, in the case of PWA, is the intent to *attempt* communication rather than actual *ability* to communicate. The PWA has the choice to attempt the behavior, even if they do not have the ability to successfully complete the behavior. Because it is based on intention, rather than ability, the TPB allows for use with people who have incomplete volitional control over therapy outcomes.

Control relates to a person's actual and perceived ability to perform a target behav-

ior, including expectation of success (Ajzen, 1991). For example, the PWA wants to communicate but the presence of aphasia limits their success. If one believes they do not have sufficient control over a behavior, in this case communicating, the person may limit attempts to communicate or participate in therapy. Perceived behavioral control includes the PWA's belief that they can achieve the goal: "I *will* be able to talk like I could before." Importantly, perceived behavioral control combined with intention has the potential to predict achievement (Ajzen, 1991).

Attitude includes the negative or positive view one holds toward the target behavior, and it is expected that a more positive attitude combined with a more favorable subjective norm would positively affect intention (Ajzen, 1991). For example, in rehabilitation, attitude would be related to the value of the behavior. The PWA might express the goal as "I *want* to be able to talk like I could before." It is determined by the individual's assignment of importance to the belief as they apply within a combination of two constructs: behavioral belief and outcome evaluation (Colquhoun & Cramm, 2011). Behavioral belief relates to perceived consequences of the behavior (e.g., being able to talk), and outcome evaluation is the value the PWA places on being able to talk as they did before.

Subjective norm is how one thinks others value the target behavior, including perceptions of support or pressure placed on the individual by another person or entity to behave in a certain manner (Ajzen, 1991). For example, a PWA might demonstrate that they feel talking is important to the family by expressing "My daughter says I need to talk like I used to." The subjective norm is composed of normative beliefs, or the extent to which others want the person to perform the behavior, and motivation to comply with the wishes of others (Colquhoun & Cramm, 2011). This is demonstrated by a PWA who expresses, "My family expects me to talk like I used to" (subjective norm), and "I will practice because it will make my family happy" (motivation to comply).

Despite the availability of definitions and theoretical frameworks, the term “motivation” is still largely addressed indirectly or through related concepts in the literature and this extends to motivation measurement for PWA. Indeed, a study that aimed to identify measurement instruments developed or tested with PWA identified 143 unique test instruments, with none identifying measurement of motivation as the primary purpose (Wallace et al., 2022). However, it is important to consider motivation when quantifying adherence, engagement (Ebert & Kohnert, 2010), or whether a person is prepared to change behaviors if necessary to achieve their goals (Behrman, 2006; van Leer et al., 2008). The SDT and the TPB provide frameworks for understanding behaviors and factors that influence behavioral change, providing insights into the role of motivation for PWA undergoing rehabilitation. Although motivation likely plays a role in all aphasia treatments, we contend that the importance of understanding and measuring motivation is underscored by the development of new service delivery models that may require higher levels of motivation than traditional aphasia treatment. For example, there has been increased interest in aphasia self-management by many stakeholders in aphasia rehabilitation (Harrison et al., 2020; Nichol, Wallace, Pitt, Rodriguez, Diong, et al., 2021; Nichol, Wallace, Pitt, Rodriguez, & Hill, 2021; Nichol et al., 2022; Wray et al., 2021), as well as accumulating support for more intensive treatment approaches (Brady et al., 2022). In addition, the push to identify variables that help individualize and optimize treatment outcomes in aphasia (Crosson et al., 2019) further underscores the need for understanding how motivation is currently being measured and whether it is being evaluated as a personal factor that predicts treatment response.

AIMS

Given the importance of motivation for treatment success, this scoping review was conducted to explore current understanding

of motivation in aphasia rehabilitation. Specifically, the review sought to:

1. Investigate existing aphasia literature for treatment studies that include measurements of motivation; and
2. Examine use of motivation as a predictor in existing aphasia treatment studies.

METHOD

A scoping review was deemed the appropriate method for our exploration of motivation in PWA, given the limited literature in this area of research and the need to identify gaps and available evidence (Arksey & O'Malley, 2005; Munn et al., 2018). We conducted a systematized literature review using standardized methods described as follows.

Literature review

Design

We followed the scoping review methodological framework described by Arksey and O'Malley (2005). This framework takes the researcher through the process of identifying research question(s), identifying and selecting relevant studies, and data management and reporting. In addition, to guide our review and reporting, we used the PRISMA extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018).

Identifying the research question

Our objective was to understand current state with respect to evaluation of motivation in aphasia rehabilitation. The overarching research question that guided our review was as follows: “In aphasia rehabilitation, how is motivation measured and is it used to predict treatment response in PWA?”

Identifying relevant studies

An electronic database search was selected as the source for this review. Five databases were searched on November 5, 2021, including PubMed, CINAHL, EBSCO, Ovid MEDLINE, and APA PsycInfo. The earliest publication dates available in each

database through November 5, 2021 were included in the search, with the earliest dating to 1840. On the basis of preliminary research and discussions among members of the research team, we identified the need for search terms designed to capture motivation as well as concepts frequently associated with motivation. Thus, the following search terms were used: (measurement OR treatment OR rehabilitation OR predict*) AND (motiv* OR engagement OR adherence OR compliance) AND (aphasia OR dysphasia).

Selecting studies

Our review and screening process was guided by the PRISMA-ScR checklist and systematically tracked using Microsoft Excel. A

flow diagram detailing the process of identification, screening, eligibility, and inclusion is provided in Figure 1 (Liberati et al., 2009). Items returned in the database searches were initially screened by the first two authors for eligibility based on the study inclusion and exclusion criteria. Articles that met eligibility criteria were selected for full-text screening and read by the first two authors. Independent decisions were made by each reviewer regarding inclusion or exclusion. Disagreements were discussed with the senior author and either included or excluded on the basis of consensus.

Eligibility criteria

For this scoping review, intervention or treatment was defined as the standard level

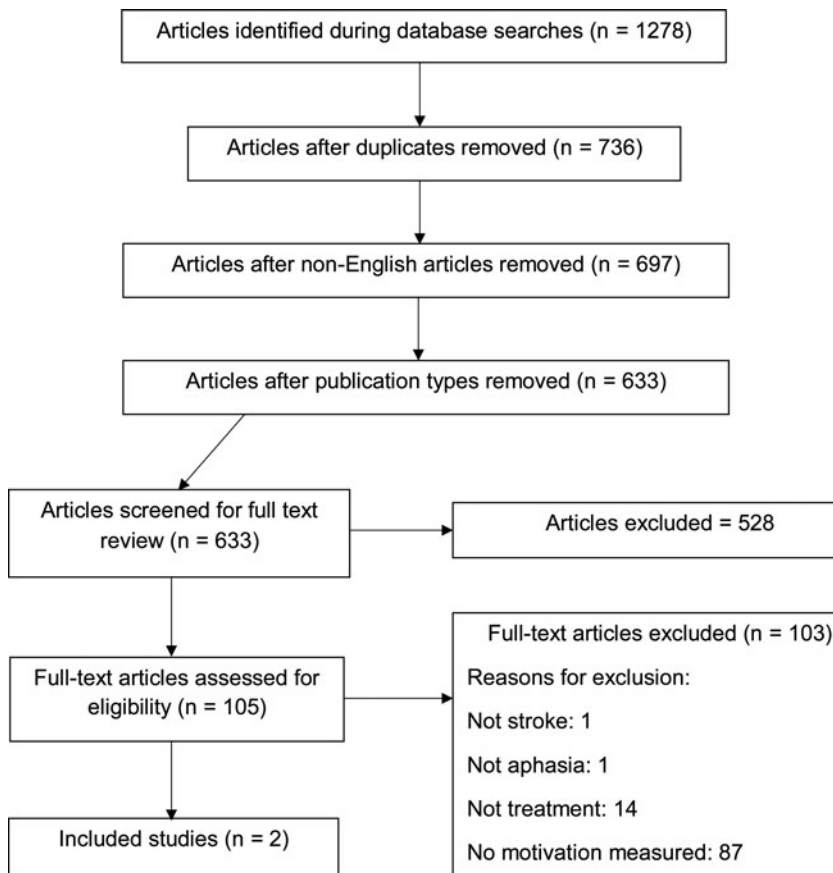


Figure 1. PRISMA flow diagram for study selection.

of care required for skilled service, including treatment requiring the skills and training of a speech-language pathology clinician. Based on skilled requirement, articles discussing treatments taking place via non-SLP community or family-led support groups or activities were not included. Studies that included treatment of participants with multiple types of diagnoses were included under the condition that the treatment results for those with stroke were reported separately from the results for those with other diagnoses. Whether accomplished via one question or a full instrument, studies were required to have explicitly identified a quantifiable measure of motivation with the primary purpose of assessing motivation such as a specific item in an instrument or questionnaire.

Study inclusion criteria:

- Studies in English
- Studies in full-text journal articles
- Studies reporting on aphasia intervention/treatment
- Studies with adult participants (older than 18 years)

Study exclusion criteria:

- Studies not reporting on stroke
- Studies not measuring motivation

Charting the data

The articles identified for inclusion in the scoping review are collated in Table 1, which reports study author(s), year of publication, aim(s), design, participants, description of treatment, measurement method including component of the SDT or TPB measured, and use of motivation to predict treatment outcome.

Collating, summarizing, and reporting results

To address Aim 1, we asked the question, “How is motivation measured in the study?” which included the method or measure used. For Aim 2, we asked the question, “Is motivation used to predict treatment outcome(s)?” and recorded “yes” or “no.”

RESULTS

Literature search results

The database searches resulted in 1,278 articles before additional filtering was applied through the screening process to select studies targeted for full-text review. After removing duplicates, 736 studies remained. Studies published in languages other than English and without an available English translation were removed, resulting in 697 remaining studies. Nonjournal publications such as book chapters were removed, resulting in the selection of 633 studies for initial and secondary title and abstract screening by the first two authors. After screenings were completed, 105 studies qualified for full-text review. During full-text review, 103 articles were eliminated on the basis of the following exclusions:

- Not stroke
- Not aphasia
- Not treatment
- No measure of motivation

Ultimately, a total of two studies met the criteria for inclusion in this review.

Study characteristics

Compiled data for included studies are provided in Table 1. Results are presented in chronological order. Characteristics of included studies are detailed in the following sections.

Year of publication

The year of publication for the articles that met final inclusion criteria spanned from 2006 to 2019.

Sample size

The overall number of participants included was eight adults with aphasia due to stroke. The studies had relatively small experimental groups of three to five participants.

Participant chronicity

Both studies included participants who were considered to have chronic aphasia,

Table 1. Summary of articles measuring motivation in aphasia treatment

Author(s) and Year of # Publication	Aim(s)	Design	Participants	Description of Treatment	How Is Motivation Measured in the Study?	Is Motivation Used to Predict Treatment Outcome(s)?
1 Macauley (2006)	<ol style="list-style-type: none"> To determine whether speech-language AAT is effective for persons with aphasia To determine whether AAT is less effective, more effective, or equally effective as traditional clinic-based therapy To determine whether the participants were more motivated to attend therapy during AAT than during traditional therapy 	Crossover	N = 3; TPO = 4-7 years	Individual traditional—30 min/week × 12 weeks AAT—30 min/week × 12 weeks	Client satisfaction questionnaire (unnamed) presented in between traditional therapy and AAT and again after AAT: "I was motivated to attend the therapy sessions" using a 1-10 rating scale SDT component measured: Autonomy TPB component addressed: Attitude	No. Motivation to attend AAT vs. traditional therapy was compared
2 Ballard et al. (2019)	<ol style="list-style-type: none"> To calculate ASR accuracy vs. clinician judgment To assess word production accuracy when practice was completed independently using the app and ASR-based feedback To survey the level of engagement and satisfaction of patients with this type of app and therapy approach 	Multiple baseline	N = 5; TPO >6 months poststroke	Word Trainer app; four sessions of 100 practice trials per week x 4 weeks; one session per week clinician-directed, remainder of the sessions completed independently	Participant Satisfaction and Software Usability Questionnaire "How motivating did you find the therapy sessions?" using a 5-point Likert scale SDT component measured: Autonomy TPB component addressed: Attitude	No

Note. AAT = animal-assisted therapy; ASR = automatic speech recognition; SDT = self-determination theory; TPB = theory of planned behavior; TPO = time post onset.

with onset dates of more than 6 months. Ballard et al. (2019) included four participants more than 6 months postonset and did not specify time postonset for an additional participant.

Study aims

Each of the two studies included one aim that addressed a direct or indirect aspect of motivation. Ballard et al. (2019) assessed level of engagement as a study aim. Macauley (2006) was the only study that explicitly used the term “motivation” in the study aims.

Methodology

The studies represented a range of experimental designs. Macauley (2006) utilized a crossover design comparing two treatments. A randomized, multiple baseline design was used by Ballard et al. (2019).

Outcome measures

Data on motivation were collected via quantitative means. Each study was examined for inclusion of a formal measurement of motivation, whether it was an entire assessment tool or a single measurable question. At least one question that used the word “motivation” was present for each of the studies examined. A single item on a client satisfaction questionnaire asked the participant to provide a rating of 1-10 on the question, “I was motivated to attend the therapy sessions” in the Macauley (2006) study. Ballard et al. (2019) asked their participants to provide a rating of the question, “How motivating did you find the therapy sessions?” on a 5-point Likert scale on the Participant Satisfaction and Software Usability Questionnaire. Neither of the articles translated the results of their respective motivation measures into predictions of aphasia treatment outcomes.

DISCUSSION

Motivation is a complex phenomenon that can influence a person’s ability to make progress in treatment. Nevertheless, relatively little research is focused on motivation in

PWA. This scoping review addressed the question, “In aphasia rehabilitation, how is motivation measured and is it used to predict treatment response in PWA?” We explored existing published literature for aphasia treatment studies that included measures of motivation of PWA.

For this review, we defined motivation based on the SDT, in which one seeks to meet inherent needs of competence, relatedness, and autonomy. We also proposed that the TPB provides a framework for understanding intention, which influences one’s level of motivation. Although these are separate theories, they contain important overlap that can inform our understanding of motivation in PWA. Thus, the results of our scoping review are interpreted in the context of the SDT and TPB.

Aim 1: Investigate existing aphasia literature for treatment studies that include measurements of motivation

Although a number of articles made mention, inferred, or implied motivation, only two explicitly measured motivation in the context of aphasia treatment. The studies in these two articles were primarily conducted in the chronic phase using a variety of designs, which is broadly consistent with the aphasia rehabilitation literature. Although the literature search for this review study spanned up to 181 years of research, studies that met requirements for inclusion were published in 2006 and 2019. This suggests a recent increased interest in measurement, discussion, and understanding of motivation in PWA undergoing treatment. Items used to measure motivation mapped to elements of the SDT and TPB or both.

Macauley (2006) used a 10-point rating scale on an unnamed client satisfaction questionnaire asking participants to indicate level of agreement on 21 client satisfaction items. The questionnaire was administered at two time points, between traditional and animal-assisted phases of treatment. Four items were used to determine whether participants were more motivated to participate

in animal-assisted aphasia therapy versus traditional aphasia therapy. One item specifically used the term “motivation”: “I was motivated to attend the therapy sessions,” which relates to autonomy (SDT) and attitude (TPB).

Ballard et al. (2019) measured motivation related to a computer-based treatment using an item from the Participant Satisfaction and Software Usability Questionnaire. Using a 5-point scale, participants rated the item “How motivating did you find the therapy sessions?” Responses to this question can inform the autonomy aspect of the SDT as well as the TPB concept of attitude. There was also free-text space for participants to express likes and dislikes of the treatment exercises and to provide additional comments. The authors also included an indirect indicator of motivation by measuring adherence to the treatment program through log-ins and number of words produced during the treatment (TPB intention).

Aim 2: Examine use of motivation as a predictor in existing aphasia treatment studies

Neither of the studies reviewed used measurements of motivation to predict treatment outcomes or progress. Macauley (2006) compared motivation to attend animal-assisted therapy sessions versus traditional treatment without a link to outcomes. Ballard et al. (2019) used data from their motivation question as a means for promoting increased engagement with a tablet-based communication treatment. Although these studies provide information regarding current use of motivation data in aphasia treatment studies, the absence of treatment outcome prediction highlights an important gap in research.

Additional considerations related to motivation

Many studies mention motivation but do not use a specific instrument designed to measure motivation in PWA. Studies that underwent full-text review but did not qualify for inclusion in our scoping review used quality-of-life scales, functional out-

come scales, and disability questionnaires. Although not direct measures of motivation, some items on these instruments may relate to the SDT or TPB and thus have the potential to infer motivation. These include questionnaires related to disability ratings (Evans et al., 2021; Romani et al., 2018; Thiel et al., 2016, 2017), quality-of-life measurements (Bruns et al., 2021; Hough, 2010; Kendall et al., 2015; Pitt et al., 2019), and measurement of mood or emotion (Gallée et al., 2020; Tamplin et al., 2013; Tsvetkova, 1980). Further consideration of these measures and identification of components that may inform our understanding of motivation is warranted. Other studies included judgments of motivation based on qualitative data. A study by Fogg-Rogers et al. (2016) used semistructured qualitative interviews comprising eight baseline probe questions and 25 follow-up questions to identify experiences and choice to participate in choral singing therapy. It is important to note that although these authors studied “choice to participate,” it was interpreted as “motivation” because they explicitly examined *why* the PWA participated but did not quantify it. Fogg-Rogers et al. (2016) evaluated motivation to participate in choral therapy but did not correlate it with progress or outcomes. Harrison et al. (2020) conducted a secondary analysis of a mixed-methods randomized controlled trial. In their self-managed computer-based treatment program, Harrison et al. (2020) used qualitative interviews to identify two indirect indicators of motivation, engagement and adherence.

The importance of motivation of stakeholders other than PWA who are involved in the therapeutic process also appeared in the literature (Wielandt et al., 2015). Wielandt et al. (2015) used a measurement of communication partners’ effort in Partners of Aphasic clients Conversation Training (PACT) as a post hoc explanatory variable for adherence. Indeed, the communication partner can have a strong influence as a motivator for PWA. In the SDT, a PWA seeks relatedness through positive relationships with others

and a communication partner may fill this need. In addition, a communication partner meets the role of the subjective norm, influencing the PWA in the predictive value in the TPB. Future research could explore how motivation of various stakeholders impacts aphasia treatment outcomes.

Engagement and adherence, common themes from the broader literature review, are often used to infer motivation from retrospective observations and measurements. Engagement, as measured by participation, does not adequately address the levels of intrinsic and extrinsic motivation in the SDT. Choe et al. (2010) measured participation by recording time spent in treatment practice, which formed the basis for assumptions about differences in motivation to participate in computer-based versus augmentative and alternative communication treatment practice. However, without complete information about why participants spent more time practicing in one type of treatment versus the other, it is not possible to fully understand their motivation. A similar problem was noted in a study that measured PWA adherence to an assigned homework plan (Beeson et al., 2019). Based on a 90% completion rate, Beeson et al. noted the PWA's "persistent commitment" and deemed them highly motivated. Although completion of homework did provide information related to adherence, completion rate alone does not fully address patient motivation. Studies of engagement or adherence that make inferences about motivation should include direct measurement of concepts related to motivation.

Limitations

We acknowledge that our study has a number of limitations. First, our inclusion criteria were narrow. We only included treatment studies that specifically administered quantitative measurements of motivation and included skilled treatment provided to adults with stroke-induced aphasia. A broader set of inclusion criteria, including inclusion of qualitative research, may have yielded more studies. In addition, the studies that met

inclusion criteria had a small number of participants and used varying and limited measures of measurement, further limiting the findings. Our definition of motivation was presented within the frameworks of the SDT and TPB; however, we did not use search terms related to their components, which may have limited the number of articles returned. Finally, the review process required subjective interpretation, which may bias results.

Future directions

Our literature search revealed that motivation is considered important, even if the specific term "motivation" is not used. Inferences about motivation, or expressions related to motivation that are not linked to a definition, can result in ambiguity in clinician understanding and practices. More consistent use of theoretical frameworks such as the SDT for understanding motivation and the TPB for prediction of behavior will help reduce that ambiguity and allow researchers to address the current gaps in measurement of motivation and its clinical application. Additional research that explores use of motivation as a predictor for treatment outcomes via qualitative means can add to the knowledge base. Utilizing a motivation assessment that incorporates aspects of the SDT and TPB may elucidate potential barriers to full engagement and, when administered early in the treatment process, serve as a framework for the clinician to maximize engagement using motivational influences. In addition, measurement of motivation prior to treatment initiation may allow for prediction of therapeutic outcomes. Thus, further research should be conducted to create an aphasia-friendly motivation measurement tool that combines the motivation elements of the SDT and the predictive elements of the TPB. Such a tool will open the possibility for elucidating the optimal time to initiate treatment and for supporting patient motivation throughout treatment, providing a means for impacting patient outcomes

through a method other than direct treatment intervention.

CONCLUSIONS

Motivation is recognized as an important factor in aphasia rehabilitation by clinicians and researchers, though there is no consensus about how to best define or quantify it. As the field of aphasia rehabilitation moves

toward treatment approaches that require increasingly higher levels of patient motivation, and treatment personalization, the ability to measure motivation and understand its predictive value is crucial. Our findings suggest that additional research on motivation in PWA is warranted, including development of measurement tools and development of methods for evaluating the predictive value of motivation on treatment outcomes.

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