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Research Article

Embedding Aphasia-Modified Cognitive Behavioral Therapy in Script Training for Primary Progressive Aphasia: A Single-Case Pilot Study

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Purpose: This study sought to determine the initial feasibility and benefit of a novel intervention that combines speech-language treatment with counseling treatment for an individual with the nonfluent/agrammatic variant of primary progressive aphasia (PPA).
Method: Using a single-case experimental design, we evaluated the utility of modified script training paired with aphasia-modified cognitive behavioral therapy. The study employed a multiple baseline design across scripts for the primary linguistic outcome measure and a mixed methods approach for analyzing counseling outcomes. Psychosocial and communicative functioning scales were administered in conjunction with a phenomenological analysis of semi-structured interviews.
Results: The participant completed all study phases and participated in all treatment components. She met the criterion of 90% correct, intelligible scripted words on all trained scripts through 12 months post-treatment. Treatment outcomes were comparable to a comparison cohort that received script training without counseling (Henry et al., 2018). At post-treatment, the participant demonstrated stability or improvement on all measures of psychosocial and communicative functioning, with stability documented on seven out of 11 scales at follow-ups through 12 months post-treatment. A phenomenological analysis revealed pervasive themes of *loss* and *resilience* at both time points, and emerging themes of *positive self-perception, sense of agency,* and *emotional attunement* following treatment.
Conclusions: Results indicate that script training with aphasia-modified cognitive behavioral therapy is a feasible treatment for an individual with the nonfluent/agrammatic variant of PPA, with immediate and lasting benefits to speech-language production and psychosocial functioning. These findings are the first to support the integration of personal adjustment counseling techniques within a speech-language treatment paradigm for PPA.
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It is well-documented that individuals with aphasia are vulnerable to negative psychosocial repercussions including low mood, social isolation, and clinical depression (Brumfitt, 1993; Simmons-Mackie, 2018; Worrall et al., 2016). The majority of individuals with aphasia are stroke survivors; however, a subset present with aphasia caused by neurodegenerative disease, or primary progressive aphasia (PPA; Gorno-Tempini et al., 2011). Individuals with PPA may experience a compounded susceptibility to threats to their emotional well-being. They face not only a devastating loss of language, but also the knowledge that their aphasia will become significantly more severe over time (Rogalski & Khayum, 2018) and will progress to a global decline in functioning and, ultimately, death. By contrast, individuals with stroke-induced aphasia typically follow a trajectory of stability or even recovery in communicative functioning over time (Demeurisse et al., 1980; Plowman et al., 2012).

Individuals with PPA demonstrate a relatively isolated, progressive deterioration of speech-language functioning (Mesulam, 1982) that evolves to a more global dementia

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syndrome, with associated cognitive, motoric, or behavioral impairments (Harciarek et al., 2014). Clinical consensus criteria for PPA outline three distinct phenotypes: semantic, logopenic, and nonfluent/agrammatic subtypes (Gorno-Tempini et al., 2011). The nonfluent/agrammatic variant (nfvPPA), which is the focus of this study, is associated with the core features of agrammatic language production and/or apraxia of speech (Ash et al., 2010; Gorno-Tempini et al., 2011). Additionally, secondary features of this phenotype include at least two of the following: impaired comprehension of syntactically complex sentences, intact single-word comprehension, and spared object knowledge. Other diagnostic indicators of nfvPPA include neuroimaging findings of prominent left posterior fronto-insular atrophy and tau-positive pathology at autopsy (Gorno-Tempini et al., 2011; Grossman, 2012; Spinelli et al., 2017).

Treatment Research in nfvPPA

A growing body of literature supports the utility of speech-language treatment for PPA (Cadório et al., 2017; Carthery-Goulart et al., 2013; Cotelli et al., 2020; Volkmer et al., 2020), with most interventions targeting naming deficits (e.g., Henry et al., 2019; Meyer et al., 2016). Interventions designed to address the nonfluent speech-language profile in nfvPPA include sentence production training to treat grammatical deficits (e.g., Hameister et al., 2017; Machado et al., 2014), multisyllabic word production training to target motor speech impairment (Henry et al., 2013), and script training to address both the linguistic and motor speech deficits that are core features of this variant (Henry et al., 2018). Video-Implemented Script Training for Aphasia (VISTA) is a script training program that has been primarily used with individuals with PPA (Henry et al., 2018; Mahendra & Tadokoro 2020; Schaffer et al., 2020), but has also been used in an individual with stroke-induced aphasia (Grasso et al., 2019). This intervention is designed to promote speech production and fluency via structured, clinician-guided intervention sessions and daily unison speech production (or "speech entrainment;" Fridriksson et al., 2012) home practice. In PPA, VISTA has been observed to result in significant improvement in the production of correct, intelligible scripted words as well as increased grammatical complexity, mean length of utterance (MLU), and speech rate, and a reduction in fluency disruptions for trained scripts (Berstis, 2020; Henry et al., 2018). Additionally, results indicate generalized benefit to untrained scripts, with improved intelligibility and a reduction in fluency disruptions at post-treatment (Berstis, 2020; Henry et al., 2018).

Counseling in Aphasia/PPA

Despite a growing literature base supporting speech-language interventions for PPA, research investigating effective counseling interventions that address the emotional sequelae of this disorder is lacking. The presence of either low mood or depression within the context of PPA/aphasia is important to address through counseling, as this may interact subtly or clearly with communication. Communication-centered counseling falls within the purview of speech-language pathologists (American Speech-Language-Hearing Association, 2016) and includes both informational counseling, wherein the speech-language pathologist educates the patient regarding their disorder, and personal adjustment counseling, which addresses a patient's thoughts, feelings, and behaviors surrounding their disorder (Luterman, 2020). Given that counseling within speech-language pathology is not a single, uniform entity, research examining the application of different counseling techniques is needed to provide empirical support for evidence-based practice in the context of specific clinical diagnoses. To this end, a modest body of research exists pertaining to counseling for individuals with aphasia more broadly. These papers primarily take a survey approach (i.e., gauging clinicians' counseling competency when treating individuals with aphasia; Lawton et al., 2018; Northcott et al., 2017), a "commentary approach" (i.e., offering general counseling guidelines; Holland & Nelson, 2007), or comprise counseling tutorials within the discipline of psychotherapy (provided by licensed psychologists; Kneebone, 2016a). However, to our knowledge, studies that examine counseling as a direct adjuvant to speech-language treatment in this population are limited (Simmons-Mackie & Damico, 2011), with only one study describing the use of CBT for individuals with severe stroke-induced aphasia and their care partners, in the context of communication activities (Akabogu et al., 2019).

The literature is even further constrained for PPA, with only two studies to date describing interventions that incorporate speech-language and counseling components. Rogalski et al. (2016) describe the Communication Bridge web application for progressive aphasia, which includes restitutive and compensatory speech-language intervention along with counseling and care partner training. The counseling component of this treatment includes informational counseling regarding diagnosis and prognosis, as well as application of general counseling skills (e.g., listening, demonstrating empathy, and validating emotions; Rogalski & Khayum, 2018) by the treating clinician. Results from this pilot study confirmed the intervention's feasibility and showed statistically significant gains in communication confidence for participants with PPA. In another study, Jokel et al. (2017) piloted a group intervention for individuals with PPA and their care partners, which included informational counseling provided by multidisciplinary health care experts and breakout sessions targeting lexical retrieval intervention for individuals with PPA. Following treatment, participants with PPA demonstrated significant improvements in quality of communication, PPA knowledge, and coping abilities compared to a control group that did not receive treatment.

Compounding the limited evidence base for counseling techniques in aphasia is a lack of counseling training for speech-language pathologists. While many speech-language pathologists regard counseling as a valuable component of treatment, they often report reduced confidence in delivering these services (Holland & Nelson, 2007). Northcott

et al. (2017) found that 58% of licensed speech-language pathologists who treated individuals with aphasia reported reduced confidence in attending to their patients' psychological needs. Limited training at the graduate school level likely contributes to clinicians' perceived lack of expertise in this area. Survey results indicate that approximately half of speech-language pathology master's programs offer a dedicated counseling course, which is often optional (Luterman, 2020). Likewise, only 20% of clinicians report that they completed counseling coursework in their master's program (Phillips & Mendel, 2008). When provided, speech-language pathology graduate coursework emphasizes informational counseling, but provides limited or no didactic training on personal adjustment counseling that addresses the emotional consequences of living with a communication impairment (Luterman, 2020).

Cognitive Behavioral Therapy

Among existing psychotherapeutic methodologies, cognitive behavioral therapy (CBT) is the most widely investigated (Chand et al., 2020; Hoffman et al., 2013). CBT in both its traditional and modified forms has proven efficacious in a variety of diagnoses (e.g., Butler et al., 2006; Cully et al., 2017; Hassiotis et al., 2013), and has been utilized in neurodegenerative disorders such as Alzheimer's disease (e.g., Spector et al., 2012; Stanley et al., 2013; Teri & Gallagher-Thompson, 1991). CBT emphasizes the interconnectedness among thoughts, feelings, and behaviors (A. T. Beck, 1964), training individuals to identify, assess, and respond to maladaptive or unhelpful thoughts in order to optimize mood and behavior. Notably, Kneebone (2016a) created a modified CBT framework for use by psychologists, intended for individuals presenting with an emotional disorder status post-stroke, including individuals with aphasia. Kneebone's CBT framework recommends that more modifications to traditional CBT are needed with increased severity of an individual's post-stroke cognitive or communication challenges.

Current Study

Although counseling falls within the speech-language pathology scope of practice, studies that evaluate treatment paradigms combining speech-language and counseling interventions are limited. This underscores the need for evidence-based counseling interventions in PPA to address this important gap in the literature and to guide best practice for clinicians.

In the current single-case pilot study, we examined the feasibility and utility of a novel intervention that combined script training (VISTA) with aphasia-modified CBT (hereafter labeled as VISTA+C to denote VISTA plus counseling) for an individual with mild nfvPPA. Our research questions and hypotheses were: (1) Will an intervention that combines aphasia-modified CBT with speech-language treatment be feasible? We predicted that the treatment would be feasible, as measured by intervention compliance with both speech-language and counseling procedures and study completion through follow-up at 1 year post-treatment. (2) Will the participant respond positively to speech-language treatment and will the magnitude of treatment response be comparable to a comparison cohort that received VISTA treatment without a counseling component (Henry et al., 2018)? We hypothesized that the participant would demonstrate a positive treatment response, as indicated by significant improvement on the primary language outcome measure at post-treatment and follow-up assessments through 1 year post-treatment. Additionally, we predicted that the participant's treatment response would be comparable to an existing VISTA cohort that received the speech-language intervention in isolation. This finding would confirm that the addition of counseling procedures does not negatively affect speech-language treatment response. (3) Will this participant demonstrate improved psychosocial functioning following the intervention, as measured quantitatively (using psychosocial and communicative functioning scales) and qualitatively (using pre- and post-treatment interviews)? We predicted that the participant would demonstrate improved quantitative and qualitative psychosocial outcomes. Specifically, we predicted improved numerical ratings on psychosocial and communicative functioning scales in areas not already near ceiling at baseline, as well as an increase in positive-themed responses related to navigating life with PPA at post-treatment.

Method

Participant

Study procedures were approved by the institutional review board at The University of Texas at Austin and the participant gave informed written consent to participate. The participant was a 78-year-old monolingual English-speaking female with 16 years of formal education (see Table 1). A retired real estate agent, she was diagnosed with nfvPPA 1 year prior to enrollment in the study. The initial diagnosis was made by a neurologist subsequent to neurological, neuropsychological, and speech-language testing. At the time of the study, the participant presented with a 5-year history of a slowly progressive decline in speech and language skills.[1] Pre-treatment speech, language, and cognitive

[1]This participant demonstrated an interest in participating in research with our lab 2 years prior to enrolling in this treatment study, before she was formally diagnosed with PPA. At that time, her deficits were very mild and she was diagnosed with mild cognitive impairment. Thus, the participant did not qualify for participation in ongoing PPA treatment studies with our lab. Instead, she participated in a script-based home practice program, wherein she engaged in unison speech production with training videos on a weekly basis and then recited scripts from memory during once weekly meetings held with the researcher. The participant was not provided with any explicit VISTA training (targeting articulation, speech fluency, or grammatical production) during these sessions. She was, however, familiar with unison speech production practice prior to enrolling in the current study. For the current study, new script topics were developed relative to this early home practice program.

Table 1. Demographics for the VISTA+C participant and the original VISTA cohort (Henry et al., 2018; $n = 10$).

Demographics	VISTA+C Participant	VISTA cohort
Age	78	*M* (*SD*): 67.7 (5.5)
Gender	F	4 M; 6 F
Education (years)	16	*M* (*SD*): 15.6 (2.1)
Handedness	Right	Right (all participants)

Note. VISTA = Video-Implemented Script Training for Aphasia; VISTA+C = VISTA plus counseling; M = male; F = female.

testing, conducted by the treating speech-language pathologist, supported the nfvPPA diagnosis per clinical consensus criteria (Gorno-Tempini et al., 2011). The participant presented with mild motor speech impairment (apraxia of speech and dysarthria) characterized by reduced prosody, slow rate, inconsistent speech sound errors (particularly on multisyllabic words and consonant clusters), and articulatory imprecision, as well as mild agrammatism in connected speech and written language. In accordance with nfvPPA diagnostic criteria, she exhibited intact single-word comprehension and spared object knowledge.

Results of standardized speech, language, and cognitive testing are presented in Table 2, alongside the mean performance of the comparison cohort (VISTA without counseling, $n = 10$; Henry et al., 2018). The participant demonstrated intact cognition, with a score of 30/30 on the Mini-Mental State Examination (MMSE; Folstein et al., 1975), and mildly impaired performance on the Western Aphasia Battery–Revised (WAB-R; Kertesz, 2006; see Supplemental Material S1 for WAB-R subtest scores at each time point), the Motor Speech Examination (MSE; Wertz et al., 1984), and the Northwestern Anagram Test (NAT; Thompson et al., 2012). The participant's MLU in words during the WAB-R picture description task was 8.60 and her MLU during her initial script development probe was 10.00. Despite relatively spared utterance length, she exhibited occasional agrammatic productions during connected speech (e.g., "We did a tour of Van Gogh exhibit.") and writing (e.g., "The boy is standing on a stool which about to tip over."). The participant demonstrated a high level of accuracy during oral reading tasks, achieving 97.22% accuracy on single words and 94.44% accuracy on single pseudowords on a modified version of the Arizona Battery for Reading and Spelling (Beeson et al., 2010), and 98.44% accuracy on oral reading of The Grandfather Passage (Van Riper, 1963).

The participant met inclusion criteria for enrollment in VISTA, based on the following guidelines that were also applied in the comparison VISTA study (Henry et al., 2018): an nfvPPA diagnosis, an MMSE score of ≥ 15, and intact repetition of at least three syllables on the WAB-R Repetition

Table 2. Speech, language, and cognitive assessments at pre-treatment, post-treatment, and follow-up time points.

Assessment	Time point	VISTA+C participant	*M* (*SD*) from VISTA cohort
Western Aphasia Battery–Revised Aphasia Quotient (out of 100)	Pre	96.6	84.3 (6.4)
	Post	95.8	85.7 (6.1)
	3-month	96.8	81.7 (8.3)
	6-month	96.8	79.9 (8.9)
	12-month	92.5	75.5 (11.9)
Mini-Mental State Examination (out of 30)	Pre	30	26.8 (2.3)
	Post	30	27.3 (1.8)
	3-month	29	27.0 (2.4)
	6-month	30	26.5 (2.1)
	12-month	30	23.3 (5.9)
MSE Apraxia of Speech rating* (0 = *none*, 7 = *profound*)	Pre	2	3.7 (1.3)
	Post	2	4.3 (1.3)
	3-month	2	4.9 (1.3)
	6-month	2	4.9 (1.1)
	12-month	2	5.4 (.9)
MSE Dysarthria rating* (0 = *none*, 7 = *profound*)	Pre	1	2.9 (1.7)
	Post	1	3.1 (1.9)
	3-month	1	3.3 (2.7)
	6-month	1	3.4 (2.5)
	12-month	2	3.1 (2.5)
Northwestern Anagram Test (% out of 30 items)	Pre	90.0	63.7 (21.5)
	Post	86.7	74.3 (20.0)
	3-month	96.7	66.5 (27.1)
	6-month	86.7	54.3 (34.3)
	12-month	86.7	42.6 (37.6)

Note. Mean scores and standard deviations from the Video-Implemented Script Training for Aphasia (VISTA) cohort reported in Henry et al. (2018) are included for comparison. Unstandardized difference tests (Crawford & Garthwaite, 2005) comparing the VISTA plus counseling (VISTA+C) participant to the VISTA-only cohort showed no significant differences in magnitude of change from pre-treatment to subsequent time points. MSE = Motor Speech Examination.

*From Wertz et al. (1984).

subtest. Additionally, the participant was deemed an appropriate candidate for this intervention given that she endorsed and demonstrated emotional distress in the context of her PPA diagnosis. Prior to enrollment, the participant became tearful during phone calls with the clinician and stated that her communication challenges had a negative impact on her overall quality-of-life.

Experimental Design

The VISTA+C intervention, which comprised both speech-language treatment (VISTA) and counseling (aphasia-modified CBT), included treatment sessions and daily homework (see Table 3 for treatment regimen). Sessions were held twice weekly for 6 weeks. Each session included VISTA training (45 min to 1 hr) and the additional counseling procedures were included every other session (approximately 30 min). Treatment was conducted by the first author, a licensed speech-language pathologist who had completed graduate-level coursework in family-centered counseling and CBT in adults.

All stages of treatment were conducted remotely, via telerehabilitation, as the participant did not live in close proximity to the research site. Telerehabilitation has increasingly become an accepted alternative to face-to-face treatment in speech-language pathology. Outcomes from VISTA were found to be comparable when treatment was delivered remotely versus in person for individuals with PPA (Dial et al., 2019) and telerehabilitation in aphasia and/or apraxia of speech caused by stroke has also shown promise (Furnas & Edmonds, 2014; Goldberg et al., 2012; Lasker et al., 2010). Of note, half of the participants in the comparison VISTA cohort also received treatment via telerehabilitation (Henry et al., 2018). In the current study, treatment procedures mirrored those in the comparison cohort, with the exception of the additional counseling component. We will briefly describe the speech-language treatment, which is described in depth elsewhere (Grasso et al., 2019; Henry et al., 2018), and then outline the novel complementary CBT procedures in greater detail.

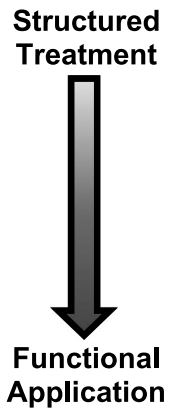
Speech-Language Intervention

For VISTA, a multiple baseline design across scripts was utilized. During pre-treatment, the participant identified topics that were functional and meaningful in her life. Six scripts were then developed via a collaborative process between the participant and clinician. Scripts were designed to be challenging yet attainable, with sentences constructed to be a few words longer than the participant's MLU (mean MLU [in words] across scripts was 11.47) and with multisyllabic words included sparingly. During the initial probe, the participant was prompted to speak at length about each of her selected topics. This probe informed the content that would be included in the script and also provided the clinician with samples of the participant's word choice, so that the scripts were both natural and personalized.

Table 3. Video-Implemented Script Training for Aphasia plus counseling (VISTA+C) treatment regimen, adapted from Henry et al. (2018) and J. S. Beck (2011).

Probing: Participant completes trained and untrained script probes at the start of each session. If criterion is met (during Sessions 1 and 2 for a given script) on primary linguistic outcome measure and participant successfully engages in unison speech production for trained script, then speaking rate of VISTA video is increased by 10% for home practice.

VISTA Treatment Steps:



1. Recall/ recognize	Participant chooses each correct script sentence from four foil sentences
2. Organize/ construct	Participant puts script sentences in order
3. Read	Participant reads script aloud
4. Respond to questions in scripted order	Participant produces scripted sentences from memory in response to questions (in order of script)
5. Produce script from memory	Participant recites entire script
6. Respond to questions with scripted sentences	Participant responds to questions with scripted sentences (not in order of script)

Structured conversation: During the second treatment session for each script, participant engages in unscripted conversation with a naïve communication partner regarding the script topic.

Aphasia-modified CBT: Clinician-guided hierarchy conducted every other session.

1. Mood check	Establish frequency, duration, and intensity of overriding mood that week
2. Review previous homework	Ensure that homework was attainable and conducted appropriately
3. Prioritize the agenda	Collaboratively select most concerning communication problem to address
4. Aphasia-modified CBT skills training	Clinician guides participant through CBT techniques to respond in a more helpful manner to maladaptive communication-centered thoughts
5. Create new homework	Collaboratively create tailored daily homework
6. Session summary and feedback	Clinician summarizes session and participant provides feedback

Weekly phone call: On a nontreatment day, participant engages in structured conversation pertaining to script-in-training for 5–10 min with clinician.

Homework: 1. Participant engages in daily unison speech production home practice with script-in-training. 2. Participant completes tailored CBT homework.

Note. CBT = cognitive behavioral therapy.

Linguistically balanced scripts were created and presented to the participant for her approval before treatment began. Four scripts were randomly selected for training and two scripts remained untrained (see Supplemental Material S2 for linguistic parameters and Supplemental Material S3 for the participant's script characteristics).

After scripts were finalized, videos were created for home practice. Videos featured a healthy female adult speaker (with only mouth and lower face visible) producing scripted content using exaggerated articulatory gestures to provide salient visual targets for production (see Supplemental Material S4 for script rate details). After scripts were finalized but before treatment began, two baseline probes were collected, wherein the participant was given the prompt, "Tell me about (specific topic)." After baseline probing, the participant engaged in preliminary unison speech production practice, consisting of prompts to watch and listen to the mouth model while attempting to speak in unison. Subsequently, the participant was provided with a home practice video for the first script, with instructions to practice unison speech production for at least 30 min daily. Frequency and duration of home practice were recorded throughout the study via a computer tracking system (Qualtrics).

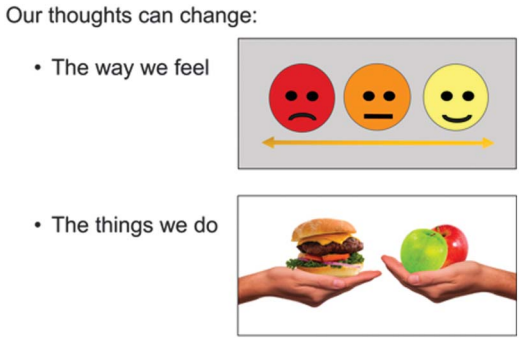
One script was trained per VISTA session, with each script trained for a total of three sessions (see Table 3 for treatment regimen). During VISTA sessions, the clinician provides visual, verbal, and phonetic placement cues, as needed, to address articulatory, grammatical, and word choice errors. With this participant, visual and verbal cues targeting articulatory and word selection errors were used most frequently. As with the original VISTA cohort, generalization tasks (see Table 3) were integrated as a complement to structured speech-language procedures.

At the end of the formal treatment phase, the participant was provided with a home practice link that included all four trained script videos. Like participants in the original VISTA cohort, she was encouraged to engage in ongoing unison speech practice in order to promote maintenance of treatment gains.

Counseling Intervention

As a complementary treatment component, aphasia-modified CBT was formally incorporated during every other treatment session. The frequency of counseling was intended to approximate an ecologically valid proportion of time that a speech-language pathologist could feasibly engage in counseling in a standard clinical setting. Additionally, if the participant demonstrated emotional distress during speech-language treatment, aphasia-modified CBT techniques were employed as teachable counseling moments. The CBT intervention was designed to be "aphasia-modified" in that communication-centered challenges were addressed and aphasia-friendly written and visual materials (for an example, see Figure 1) were used to maximize comprehension of key CBT concepts. During the first counseling session, the participant was provided with psychoeducation about the core tenets of CBT (i.e., the connectedness among thoughts, feelings, and behaviors) in relation to communication. This was followed by goal-setting with the clinician, to tailor the intervention toward a specific area of change that the participant deemed important to address. This participant's stated goal was "to think about myself and my communication in a more positive way."

Figure 1. An example of aphasia-friendly written and visual content utilized during aphasia-modified CBT training.



Aphasia-modified CBT sessions closely resembled the format of traditional CBT sessions (J. S. Beck, 2011), and included activities such as a mood check, homework setting and review, CBT training to evaluate and respond to communication challenges, session summary, and elicitation of participant feedback (see Table 3; for a mock CBT clinician/patient sample, see Supplemental Material S5). The ultimate goal in this process was for the participant to observe maladaptive or unhelpful thoughts as they arose, notice how these thoughts related to her emotions and behaviors, and work toward responding to this triad of thoughts, feelings, and behaviors more adaptively. To tailor the intervention to the unique needs of a person living with a progressive disorder, treatment addressed maladaptive thoughts, while promoting acceptance of the reality of life with PPA. This involved creating ways to frame one's mindset to think realistically, yet in a more adaptive manner. For example, if the participant identified an automatic unhelpful thought of "I can't speak," through collaborative CBT training, this statement may shift to "I can't speak as well as I used to, but I can still try my best." Additionally, homework was collaboratively developed each session as a natural extension of discussions that took place during the session. Daily homework included activities such as writing down "Thought Records" that outlined communication-centered situations along with associated thoughts, feelings, and behaviors; reading positive mantras regarding communication; and completing behavioral engagement tasks for activities that were previously avoided by the participant (e.g., speaking on the phone).

Follow-Up Testing

In addition to pre- and post-treatment evaluations, the participant engaged in speech, language, cognitive, and psychosocial assessment at 3, 6, and 12 months following

treatment in order to evaluate longitudinal stability of treatment outcomes. During follow-up assessments, the participant was also asked to produce trained and untrained scripts from memory.

Outcome Measures and Statistical Analyses

Treatment Feasibility

In order to address Research Question 1, to determine the feasibility of the VISTA+C intervention, we measured the participant's intervention compliance and completion of study phases. Intervention compliance was defined as engaging in all aspects of the intervention, including speech-language and counseling components during telerehabilitation sessions as well as homework. Study completion was defined as participating in all phases of the study, including pre-treatment, during treatment, post-treatment, and 3-, 6-, and 12-month follow-ups.

Speech-Language Treatment Outcomes

To answer the first part of Research Question 2, regarding the participant's response to speech-language intervention (VISTA), we calculated percent correct, intelligible scripted words for each script during probes. Two probes were conducted at pre-treatment and post-treatment, and a single probe was conducted at each follow-up time point. Consistent with the original VISTA cohort, criterion performance on a trained script was established as production of 90% correct and intelligible scripted words. Statistical comparisons were derived from simulated distributions (Dial & Martin, 2017) to assess the significance of changes from pre- to posttreatment and each subsequent follow-up time point. For the simulation analyses, random sampling was conducted item-by-item, using probabilities of correct and incorrect responses to create simulated data sets that mirrored the actual data. Each simulation was run 10,000 times to generate 10,000 simulated distributions of performance per time point (two pre-treatment probes, two post-treatment probes, and a single probe at 3-, 6-, and 12-month follow-ups) for trained and untrained scripts. To calculate p values, the distributions from two time points within a trained or untrained condition were compared. Bonferroni correction was used to control for familywise error ($p < .0125$). Additionally, the simulated data were used to obtain difference scores to determine 95% confidence intervals (CIs).

The second part of Research Question 2 aimed to establish whether the participant's treatment response on the primary linguistic outcome measure was comparable to an existing VISTA cohort that did not receive counseling (Henry et al., 2018). Specifically, we sought to confirm that VISTA+C is equally efficacious from a speech-language perspective relative to VISTA alone. To do so, we compared the magnitude of change in performance in our participant from pre-treatment to post-treatment and each subsequent follow-up time point (i.e., 3, 6, and 12 months) to the magnitude of change in the comparison group using unstandardized difference tests (Crawford & Garthwaite, 2005). This test evaluates whether the change in score differs significantly in a single individual relative to the distribution of differences found in controls. Importantly, the procedure controls Type I error rate, even with a small comparison group ($n = 10$).

Psychosocial Outcomes

To address Research Question 3, evaluating psychosocial status before and after treatment, we used mixed methods analyses to comprehensively capture the VISTA+C treatment response. These analyses included both quantitative (participant and family-reported ratings on psychosocial and communicative functioning measures) and qualitative (phenomenological analysis of pre- and post-treatment interview transcripts) data. Psychosocial and communication scales or subscales were administered by the treating clinician at pre-treatment, post-treatment, and each follow-up. As a general screen for depression and anxiety, the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) and the Generalized Anxiety Disorder (GAD-7; Spitzer et al., 2006) scales were administered. The Positive and Negative Affect Scale (PANAS; Watson et al., 1988) was administered to evaluate emotional state. While there are no dedicated psychosocial scales for use in PPA, stroke or aphasia scales or relevant subscales were administered to the participant. These included the Adaptive/Full Length Aphasia Communication Outcome Measure (ACOM; Hula et al., 2015), the Communication, Social Relationships, and Positive and Negative Feelings subscales of the Burden of Stroke Scale (BOSS; Doyle et al., 2004), and the Communication and Psychosocial subdomains of the Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39; Hilari et al., 2003). Finally, perception of mood was rated by the participant's daughter via the Stroke Aphasia Depression Questionnaire (SADQ-21; Sutcliffe & Lincoln, 1998) at pre- and post-treatment.

A phenomenological research approach was used to qualitatively analyze pre- and post-treatment semi-structured interview transcripts (Creswell & Poth, 2017). The participant engaged in a 15- to 20-min interview with the clinician, responding to open-ended questions pertaining to thoughts, feelings, and behaviors associated with the experience of living with PPA. The interviews were transcribed and then independently coded by two researchers with training in qualitative research, using phenomenological procedures. With this approach, individuals' lived experiences of a concept or phenomenon are examined, so that the core essence of that experience can be uncovered (Creswell & Poth, 2017). The transcript data were analyzed via horizonalization (identifying significant statements within the discourse data) and theme generation (creating distinct clusters of meaning from observing general trends in the significant statements). The two researchers reviewed their preliminary themes and reconciled any discrepancies in the analytic coding process via discussion and re-examination of significant statements in order to reach consensus on finalized themes.

Interrater Reliability and Treatment Fidelity

Interrater reliability was established for the primary linguistic outcome measure (correct, intelligible scripted words)

by the treating clinician and a trained undergraduate research assistant. The treating clinician recorded the participant's performance during all assessment (i.e., pre-treatment, post-treatment, and follow-up time points) and treatment sessions, while the research assistant observed video recordings and recorded performance data while blinded to treatment condition (trained vs. untrained scripts). The research assistant viewed video probes from 25% of assessment and treatment sessions, transcribed the participant's response to probes, and marked each word as intelligible or unintelligible relative to the script target. Interrater reliability was measured using point-by-point agreement, wherein the total number of agreements was divided by the total number of agreements and disagreements and the sum was multiplied by 100 (Kazdin, 1982). Interrater reliability was high, at 98.88%.

Treatment fidelity was assessed by two trained undergraduate research assistants, who viewed session recordings and indicated the clinician's consistency in following each step of the treatment protocol. The research assistants independently watched 33.33% of randomly selected treatment sessions. Fidelity was high, at 99%.

Results

Treatment Feasibility

With regard to Research Question 1, the participant attended all scheduled treatment sessions and consistently participated in both speech-language and counseling intervention components. Regarding intervention completion, the participant completed all phases of the study, from pre-treatment through the 12-month follow-up. During the treatment phase, she engaged in 19.42 hr of unison speech production home practice, as well as daily counseling homework. She missed 7 days of home practice due to personal reasons. After treatment concluded, the participant continued to engage in periodic practice with her videos through the 12-month follow-up, completing an additional 14.15 hr of home practice.

Speech-Language Response to Treatment

To address the first part of Research Question two, pertaining to speech-language outcomes, we measured the participant's performance on the primary linguistic outcome measure of percent correct, intelligible scripted words across all time points. The participant reached the 90% criterion for this measure on all trained scripts through 12-months posttreatment (see Figure 2). Simulation analyses indicated a significant difference from pre- to post-treatment ($p < .0001$, 95% CI [55.15, 66.91]) for trained scripts. Performance on untrained scripts was not significantly different from pre- to post-treatment ($p = .752$, 95% CI [−15.11, 7.19]). Additionally, simulations were conducted to determine stability of performance on the primary linguistic outcome measure from pretreatment to each follow-up time point. Maintenance of gains was confirmed for trained scripts through 12 months post-treatment ($p < .0001$, 95% CI [56.25, 67.65] at the 3-month time point; $p < .0001$, 95% CI [55.15, 66.91] at the 6-month time point; and $p < .0001$, 95% CI [52.94, 65.07] at the 12-month time point). Performance on untrained scripts was not significantly different from pre-treatment to any follow-up. This indicates that there was not a significant improvement or decline in performance longitudinally, compared to baseline.

To provide context for the participant's treatment response over time, we report her standardized speech, language, and cognitive test scores from all treatment phases (see Table 2). While the participant demonstrated consistently high performance on trained scripts through the 12-month follow-up, results from standardized testing indicate decline in some areas of speech and language functioning during this period. That is, the participant demonstrated increased motor speech impairment on the MSE for dysarthria, with a rating of 1 at pre-treatment to a 2 at the 1-year follow-up (using a severity scale of 0 = *no impairment* to 7 = *severe impairment*), with stability in apraxia of speech status (MSE rating of 2 longitudinally). Linguistically, the participant's global language performance on the WAB-R Aphasia Quotient (AQ) declined from a 96.6 at pre-treatment to a 92.5 at the 1-year follow-up and sentence production performance on the NAT was relatively stable, as evidenced by 90% accuracy at pre-treatment and 86.7% accuracy at the 1-year follow-up. Cognition remained grossly stable longitudinally, with the participant scoring 30/30 on the MMSE at pre-treatment and the 1-year follow-up.

Speech-Language Performance Relative to Comparison Cohort

To address the second part of Research Question 2, unstandardized difference tests (Crawford & Garthwaite, 2005) were used to compare the magnitude of change in the participant's performance on the primary linguistic outcome measure to that of the existing VISTA cohort (Henry et al., 2018; see Table 4). Results indicated no significant difference for change in performance on the primary linguistic outcome measure between the VISTA+C participant and the comparison cohort for trained or untrained scripts from pre- to post-treatment (trained scripts: $t(9) = -.47$, $p = .647$; untrained scripts: $t(9) = .79$, $p = .450$) and from pre-treatment to all follow-up time points (3-month time point: trained scripts: $t(9) = -.57$, $p = .582$; untrained scripts: $t(9) = .26$, $p = .804$; 6-month time point: trained scripts: $t(9) = -.79$, $p = .448$; untrained scripts: $t(9) = .06$, $p = .950$; 12-month time point: trained scripts: $t(9) = -.71$, $p = .499$; untrained scripts: $t(9) = .16$, $p = .873$).

Comparing change on speech, language, and cognitive scores between the VISTA+C participant and the existing VISTA cohort more broadly across all time points, unstandardized difference tests indicate that the magnitude of change in the participant's performance did not differ significantly from the comparison cohort on standardized assessments from pre- to post-treatment (WAB-R AQ: $t(9) = .75$, $p = .474$; MMSE: $t(9) = .18$, $p = .859$; apraxia of speech rating on the MSE: $t(9) = 1.04$, $p = .327$; dysarthria rating on the MSE: $t(9) = .46$, $p = .654$; NAT: $t(9) = .85$, $p = .416$)

Figure 2. Multiple baseline data showing the Video-Implemented Script Training for Aphasia plus counseling (VISTA+C) participant's performance for trained and untrained scripts over time. Vertical lines indicate treatment phase, which includes pre-treatment, treatment, maintenance, post-treatment, and follow-up phases. Tx = treatment; Mo. = month; F/u = follow-up.

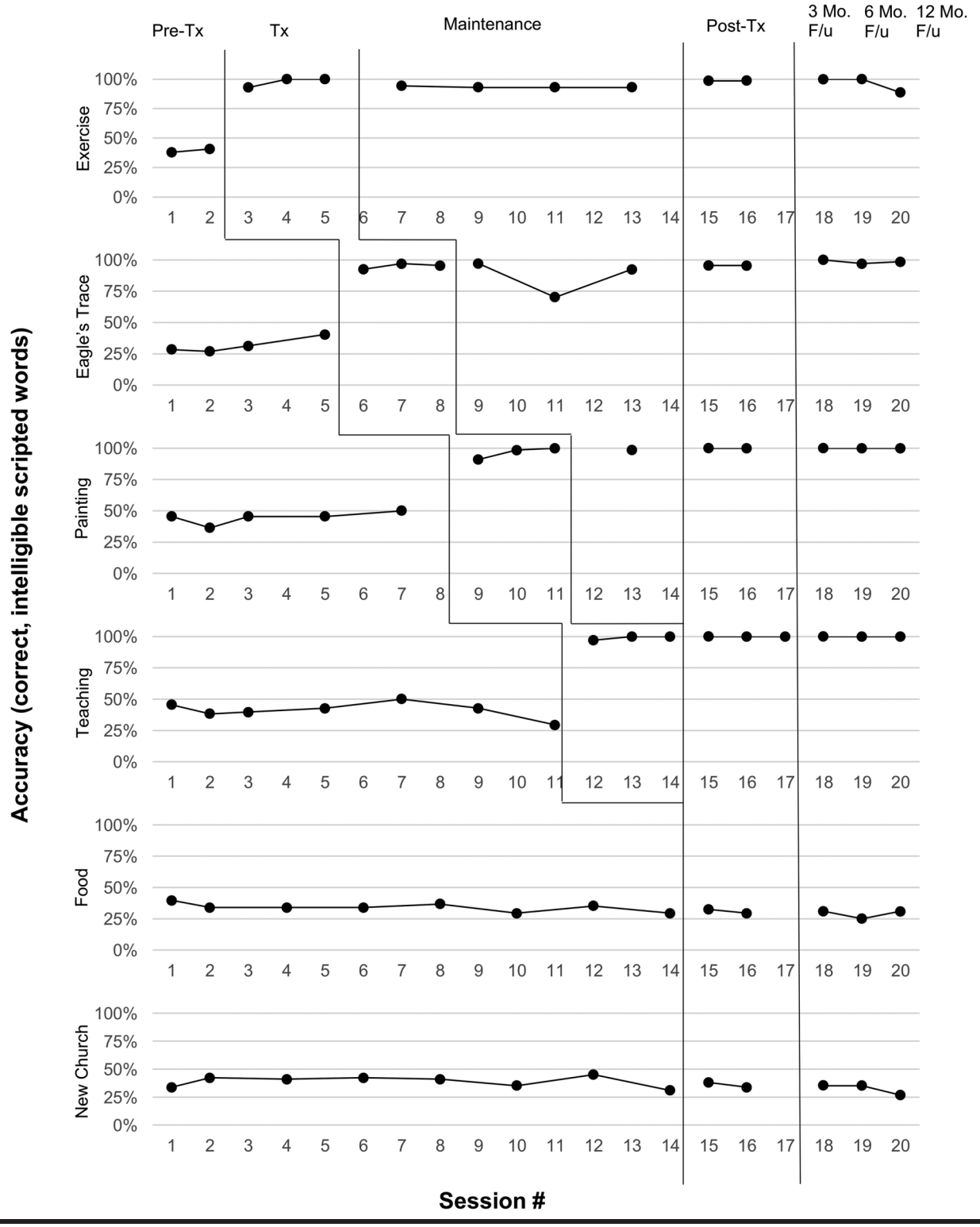


Table 4. Script production performance for trained and untrained topics in the VISTA+C participant and the original VISTA cohort.

Primary linguistic outcome measure: percent correct intelligible scripted words			
Condition	**Time point**	**VISTA+C participant mean**	**Original VISTA cohort *M* (*SD*)**
Trained	Pre	37.5	38.0 (13.7)
	Post	98.5	89.8 (14.7)
	3-month	100.0	87.5 (19.5)
	6-month	99.3	79.9 (21.2)
	12-month	97.2	68.6 (35.1)
Untrained	Pre	37.4	36.1 (14.7)
	Post	33.4	43.1 (19.9)
	3-month	37.1	35.6 (19.7)
	6-month	30.1	30.1 (20.1)
	12-month	28.3	31.1 (26.1)

Note. Unstandardized difference tests (Crawford & Garthwaite, 2005) revealed no significant differences in magnitude of change from pre-treatment to subsequent time points for the VISTA+C participant relative to the original cohort. VISTA = Video-Implemented Script Training for Aphasia; VISTA+C = VISTA plus counseling.

or from pre-treatment to any follow-up time point (3-months: WAB-R AQ: $t(9) = -.77$, $p = .463$; MMSE: $t(9) = .43$, $p = .677$; apraxia of speech rating on the MSE: $t(9) = 1.07$, $p = .314$; dysarthria rating on the MSE: $t(9) = .23$, $p = .826$; NAT: $t(9) = -.21$, $p = .836$; 6-months: WAB-R AQ: $t(9) = -.87$, $p = .409$; MMSE: $t(9) = -.14$, $p = .890$; apraxia of speech rating on the MSE: $t(9) = .96$, $p = .363$; dysarthria rating on the MSE: $t(9) = .06$, $p = .950$; NAT: $t(9) = -.31$, $p = .767$; 12-months: WAB-R AQ: $t(9) = -.57$, $p = .584$; MMSE: $t(9) = -.65$, $p = .531$; apraxia of speech rating on the MSE: $t(9) = 1.04$, $p = .325$; dysarthria rating on the MSE: $t(9) = -1.62$, $p = .139$; NAT: $t(9) = -.77$, $p = .462$).

Psychosocial Outcomes

To address Research Question 3, evaluating psychosocial outcomes from pre- to post-treatment, we used mixed methods analyses, including quantitative and qualitative approaches.

Quantitative Results

Participant ratings from psychosocial and communicative functioning scales and subscales administered at pre-treatment, post-treatment, and follow-up time points (3, 6, and 12 months) are displayed in Table 5. Stability or numerical improvement in ratings of psychosocial and communicative functioning was observed from pre- to post-treatment on all 12 scales or subscales. Additionally, of the 11 scales and subscales administered during follow-up time points, results indicate stability or improved psychosocial or communicative functioning status longitudinally on seven scales.

Results from the PHQ-9 and GAD-7, which screen for the presence of a mood or anxiety disorder (i.e., clinical depression or generalized anxiety disorder) were not indicative of a clinical disorder at any time point. Regarding emotional state, scores from the PANAS indicated a high positive affect score of 48 out of 50 at both pre- and post-treatment. The participant's negative affect score was 13 at pre-treatment and 12 at post-treatment, out of 50 points, with lower scores indicating a less negative affect. These scores indicate low negative affect.

Results from additional scales and subscales provide contextualization specific to aphasia. Of note, these measures are all normed for individuals with stroke-induced aphasia. As such, we cannot compare the participant's scores directly to other individuals with PPA. Scores from the BOSS range from 0 to 100, with 100 indicating the least desirable health state. On the Communication subscale, the participant's score improved from a 25 at pre-treatment to a 14.29 at post-treatment. On the Social Relations subscale, the participant's score improved from a 15 at pre-treatment to a 0 at post-treatment. For the Positive Emotions subscale, the participant's score improved from 31.25 at pretreatment to 18.75 at post-treatment. On the Negative Emotions subscale, the participant's score was stable at 25 across both time points. On the SAQOL-39, which measures quality of life for individuals with stroke-induced aphasia, the highest possible mean score for a subdomain is 5. The participant's Communication subdomain score was generally stable from pre- (3.86) to post-treatment (4.43). Similarly, her Psychosocial subdomain score was also stable across pre- (4.6) and post-treatment (4.93) time points. Of note, the Physical subdomain was not administered (was not relevant for this individual) and, as such, an overall score could not be obtained. Results from the ACOM, which measures communicative functioning in daily contexts for individuals with stroke-induced aphasia, are indicated via T-scores, along with the standard error, and standard deviation. During pre-treatment, the participant's T-score was 55.30 (95% CI [52.35, 58.25]), with a standard error of 1.51. This score was .5 deviations above the mean (of individuals with stroke-induced aphasia). At post-treatment, the participant's T-score was 59.16 (95% CI: [56.26, 62.03]), with a standard error of 1.46. This score was .9 *SD*s above the mean (of individuals with stroke-induced aphasia).

Stability was demonstrated through the 12-month follow-up in positive self-perceptions of quality-of-life on

Table 5. Pre-treatment, post-treatment, and follow-up scores on psychosocial and communicative functioning scales for the VISTA+C participant.

Scale	Normative data (mean; *SD*)	Pre-treatment	Post-treatment	3-month follow-up	6-month follow-up	12-month follow-up	Total possible points
Personal Health Questionnaire (PHQ-9)	Healthy adults (3.3; *SD* ± 3.8)	4	2	3	4	3	27
Generalized Anxiety Disorder Scale (GAD-7)	Healthy adults (4.9; *SD* ± 4.8)	2	2	5	2	1	21
Positive and Negative Affect Scale (PANAS): Positive scale	Healthy adults (33.3; *SD* ± 7.2)	48	48	49	43	43	50
PANAS: Negative scale	Healthy adults (17.4; *SD* ± 6.2)	13	12	15	15	10	50
Burden of Stroke Scale (BOSS): Communication subscale	Stroke survivors (30.6; *SD* ± 23.7)	25.0	14.0	25.0	35.7	39.2	100
BOSS: Social Relationships subscale	Stroke survivors (17.5; *SD* ± 21.0)	15.0	0.0	5.0	20.0	20.0	100
BOSS: Positive Emotions subscale	Stroke survivors (34.8; *SD* ± 20.8)	31.3	18.8	18.8	31.3	31.3	100
BOSS: Negative Emotions subscale	Stroke survivors (38.4; *SD* ± 22.0)	25.0	25.0	25.0	25.0	18.3	100
Stroke and Aphasia Quality of Life Scale (SAQOL-39): Communication score	Stroke-induced aphasia: N/A for subdomains	3.9	4.4	4.0	3.9	4.1	5
SAQOL-39: Psychosocial score	Stroke-induced aphasia: N/A for subdomains	4.6	4.9	4.7	4.7	4.7	5
Aphasia Communication Outcome Measure (ACOM; T-score; standard error; standard deviation)	Stroke-induced aphasia (50; *SD* ± 10)	55.3; 1.5; .5 *SD* above mean	59.2; 1.5; .9 *SD* above mean	68.0; 1.7; 1.8 *SD* above mean	62.4; 1.5; 1.2 *SD* above mean	62.9; 1.5; 1.3 *SD* above mean	N/A
Stroke Aphasia Depression Questionnaire (SADQ-21)	Stroke-induced aphasia (median score: 23; interquartile range: 16–29)	18	21	N/A	N/A	N/A	63

Note. For the PHQ-9, GAD-7, Negative scale of the PANAS, BOSS subscales, and SADQ-21, lower scores indicate more desirable health state or affect. For the Positive scale of the PANAS and the SAQOL-39, higher scores indicate more desirable health state or affect. VISTA+C = Video-Implemented Script Training for Aphasia plus counseling; N/A = not applicable.

the Communication and Psychosocial subdomains of the SAQOL-39, and low report of negative emotions on both the PANAS and BOSS subscales. Additionally, scores on the ACOM indicated improved communicative functioning of over 7 points from pre-treatment to the 12-month follow-up. While the participant indicated a 5-point decline in positive mood on the PANAS from pre-treatment to the 12-month follow-up, her scores were consistently greater than 1 *SD* above the mean. Notably, the participant demonstrated an improved health state from pre- to post-treatment on the BOSS subscales in the areas of Communication, Social Relationships, and Positive Emotions; however, by the 12-month follow-up time point, her scores either returned to pre-treatment levels or indicated a decline in perceived health state.

Finally, the participant's daughter completed the SADQ-21 at pre- and posttreatment time points as an additional measure of mood. As with the other scales, this scale has been norm-referenced for individuals with stroke-induced aphasia. Scores on this scale range from 0 to 63, with 63 indicating the highest level of depression. The participant's scores on this measure were grossly stable, with a score of 18 at pre-treatment and 21 at post-treatment.

Qualitative Results

Phenomenological analysis of pre- and post-treatment interviews revealed several themes surrounding the lived experience of having PPA. Two themes were pervasive during both interviews, while six additional themes were prevalent either during the pre- or post-treatment interview. Specifically, the themes of *loss* and *resilience* were present throughout both time points. The participant described various ways in which her lifestyle and relationships have changed in the context of PPA (e.g., "I want them to know me before [the onset of PPA]. And that's not possible."), yet she also stated qualities about her character that underscored her perseverance when facing communication challenges associated with PPA (e.g., "It's not my nature to give up.").

Beyond those ongoing themes, three themes that were present during pre-treatment included *value of communication*, *negative self-perception,* and *avoidance*. The participant emphasized how meaningful communication is to her (e.g., "Communication is important. That differentiates us between animals and us—people."). She repeatedly expressed that, given her challenges with communication, she perceived herself unfavorably (e.g., "I don't feel like I'm a good, fun grandma. Because I can't participate in the children's dialogue.") and actively avoided certain communicative situations such as talking face-to-face or on the phone (e.g., "I'm texting all the time."). Of the five themes that were present during the pre-treatment phase, three themes reflected negative attitudes and perceptions surrounding communication.

By contrast, during the post-treatment interview, the following themes emerged: *positive self-perception, sense of agency,* and *emotional attunement*. The participant indicated that she perceived herself in a positive light (e.g., "Well, I just talk to myself in my mind and I say, 'I can do it.'") and believed she had control over her actions (e.g., "Confidence to speak with unfamiliar people I meet."). Additionally, the participant often used emotion-centric language to express that, within the context of daily life, she was attuned to her internal state (e.g., "The counseling was tough. And it made me realize that I had feelings about it [PPA]."") and that those varied emotions were observed within a larger context of how she positively navigates life with PPA. At post-treatment, four out of the five themes reflected positive attitudes and perceptions surrounding communication, amidst the ongoing acceptance of loss.

Beyond interview data, qualitatively, the participant reported that she met her stated goal of thinking about herself and her communication more positively. Anecdotally, during pre-treatment, the participant described several communication environments she avoided. By the end of treatment, she reported making phone calls to family more frequently and accepting lunch invitations she may have previously declined. Additionally, at the conclusion of treatment, her daughter reported, "I feel the counseling along with the speech sessions is extremely beneficial and I don't think there would be as much improvement without the counseling."

Discussion

While there is substantial evidence supporting linguistic treatments for PPA, research evaluating the benefit of counseling interventions in this population is lacking. As such, the current pilot case study constitutes a preliminary step toward expanding the treatment literature in this understudied area. To our knowledge, this is the first study to evaluate the integration of explicit personal adjustment counseling techniques within a speech-language framework for PPA. This study is also one of only a few studies in the PPA literature to utilize mixed methods research to comprehensively capture treatment outcomes. Moreover, findings lend supportive evidence regarding the feasibility of telerehabilitation as an alternative to in-person PPA treatment.

Results indicated that, for an individual with mild nfvPPA, the treatment was feasible and led to improved speech-language and psychosocial outcomes. Specifically, the participant demonstrated intervention compliance and participated in all phases of the study through 1 year post-treatment. She met criterion on the primary language outcome measure of percent correct, intelligible scripted words for trained scripts, and her response to treatment was comparable to an existing cohort that received VISTA without counseling (Henry et al., 2018). Despite reporting a reasonably high quality-of-life and absence of frank depression or anxiety at baseline, our participant endorsed negative feelings related to communication difficulty and described avoiding specific social situations. We documented improvement in these domains following VISTA+C via quantitative self-report measures of communication functioning and qualitative themes derived from interviews. The emergence of the themes of *positive self-perception*, *sense of agency*, and *emotional attunement* at post-treatment suggest that, as a result of VISTA+C, the participant learned tools

to adaptively process and respond to her inner world, leading to increased awareness of her emotional state and enhanced self-determination and self-image. The benefits derived from jointly focusing on communication and counseling may together drive the positive changes on the ACOM and BOSS subscales, suggesting that the holistic nature of this intervention may be more impactful than the sum of its parts. These findings suggest that individuals who do not meet clinical criteria for a frank mood or anxiety disorder may still benefit from participating in an intervention that encompasses counseling alongside speech-language treatment.

Notably, this participant presented with a mild impairment of speech and language, without significant concomitant deficits in cognition and behavior that may eventually emerge in PPA. Enrolling an individual with this profile was intentional, given the metacognitive requirements of participating in all aspects of CBT. At its core, CBT trains individuals to think about thinking, verbalize their inner world, progressively take steps toward becoming their own therapist, and monitor and modify their thought processes and behaviors in a way that highlights their autonomy and self-efficacy. With this single-case pilot study, modifications were made to traditional CBT to account for aphasia, while preserving the basic premise of CBT, which requires a willingness and ability to engage in higher level thinking. However, per Kneebone's (2016a) framework for CBT after stroke, it may be possible to tailor this treatment approach for individuals with more severe cognitive and communication deficits. Further modifications may involve a more behaviorally-focused and less abstract, cognitively-focused approach, including concrete examples, mnemonic supports, increased multimodal/environmental cues, weekly "check-in" phone calls from the clinician, and care partner involvement. At this pilot stage, we believe that, with the use of aphasia-friendly visual and written supports and simplified language, aphasia modified-CBT may be successfully implemented for individuals who present with any PPA variant. In the future, our current protocol may be expanded and modified to meet the needs of individuals with more significant cognitive–linguistic impairment, as proposed by Kneebone (2016a). However, we believe that, even with more extensive modifications, this specific style of counseling may not be an ideal fit for individuals with lack of insight regarding their deficits.

An additional treatment consideration is a patient's stage of grieving and degree of acceptance of their disorder (Kübler-Ross, 1969). For example, if an individual is experiencing denial of their disorder, engaging in aphasia-modified CBT may be perceived as obtrusive and counseling of this nature may be met with resistance. Therefore, obtaining a sense of a patient's emotional state and their personal conceptualization of their disorder is an important preliminary step before selecting a patient-centered intervention.

Returning to the topic of counseling interventions in speech-language pathology practice, CBT is one of a number of evidence-based psychotherapeutic interventions. While this counseling intervention may be appropriate for some patients, other related types of psychotherapy (e.g., acceptance and commitment therapy, mindfulness-based cognitive therapy) could potentially be modified for individuals with aphasia/PPA in future clinical research studies. Moreover, it is important to acknowledge that elements of counseling are often utilized by practicing clinicians. That is, although many speech-language pathologists report reduced confidence with providing counseling to individuals with aphasia, they also report that they use counseling microskills such as active listening and demonstrating empathy during patient interactions (Northcott et al., 2017). These "soft-skills" overlap with our aphasia-modified CBT approach and are critical elements in fostering strong therapeutic alliances with patients. In addition to these counseling microskills, CBT draws from the cognitive theory framework to encourage patients to examine thoughts, feelings, and behaviors and make adaptive adjustments accordingly. Future research examining the counseling skills in speech-language pathologists' clinical toolkit are needed to identify how targeted counseling research may be used to augment current practices of clinicians in the field.

While counseling is included in the speech-language pathology scope of practice, clinicians must be aware of the boundaries of the counseling services they can ethically provide. If depression or anxiety screenings signal the potential presence of a mood or anxiety disorder or if a patient's emotional challenges extend beyond the realm of communication, cognition, or swallowing, the clinician should refer the individual to a licensed mental health professional for further clinical management. One helpful guideline that may be applied from the stroke recovery literature is the "stepped care" model (Kneebone, 2016b). This model asserts that psychological care is warranted for all survivors of a stroke and, by extension, progressive disease, and proposes that the type of psychological care and the appropriate provider (e.g., allied health professional vs. licensed mental health professional) vary depending on the severity of an individual's emotional symptoms.

The current study has several limitations. First, the treating clinician conducted the pre- and post-treatment interviews and administered the psychosocial scales, introducing the potential for bias in the participant's responses. This limitation will be addressed in future replications of this study, and a separate researcher will conduct the interviews and administer the psychosocial scales. Additionally, we only obtained psychosocial and communicative functioning ratings for the individual participant and not for the existing comparison cohort. Thus, we were unable to directly compare psychosocial functioning across participants. In the future, we plan to administer these scales to participants receiving VISTA without counseling to enable this comparison. Notably, while some of the scales were appropriate for broad administration across individuals in the general population (i.e., PHQ-9, GAD-7, PANAS), several of the rating scales were normed for individuals with stroke-induced aphasia. As such, these results should be interpreted with caution. One PPA-specific scale, the Progressive Aphasia Severity Scale (Sapolsky et al., 2014), exists; however, this is not a dedicated psychosocial scale and would likely

not be a sensitive estimate of potential treatment response to the intervention used in this study. These challenges with utilizing disorder-specific psychosocial measures underscore the need for development of PPA-specific scales that are sensitive to the unique characteristics and experiences of this population.

Additionally, while our findings show promise in a single individual, generalizability to the broader population of individuals with PPA is limited. Given the positive findings with this pilot single case, we intend to recruit additional participants from each PPA variant and will pair tailored speech-language intervention (e.g., naming treatment for individuals with semantic and logopenic variants of PPA) with aphasia-modified CBT to determine acceptability, feasibility, and utility in a broader group of participants.

In summary, results from this single-case pilot study provide preliminary support for the feasibility and utility of a novel treatment paradigm that embeds aphasia-adapted counseling procedures within speech-language intervention. Outcomes indicate that this treatment resulted in improved self-report of communication success in the context of PPA on quantitative measures, which aligned with themes from qualitative interview data. We hope that these findings, alongside the extant literature, will serve to collectively demonstrate the value of providing holistic, person-centered care that addresses both the speech-language impairment and the emotional components of navigating life with a neurogenic communication disorder.

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