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Visual analog rating of mood by people with aphasia

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During their recovery from left hemisphere stroke, people with aphasia experience diverse feelings^{1–3} that are likely to affect their ability to learn skills and strategies, adjust to life with aphasia, and experience good quality of life. Despite their multifaceted manifestations, most of what we have learned about feelings after left-hemisphere stroke has been limited to sadness and depression. In addition, most studies have avoided direct input from people with aphasia, simply because their language impairment prevented them from responding confidently to customary verbal questionnaires and interviews. In this article, our interest extends beyond sadness to other mood states, including those with positive valence. As a foundation for further work in this area, we also address the validity of response methods that minimize the need for language processing.

Feelings can be categorized in many different ways. From one perspective, they can be conceptualized as personal states that influence relatively continuously how we perceive the world around us. These states, usually known as moods, are affected by both external and internal circumstances.⁴ Another way to conceptualize feelings is in reference to specific and meaningful experiences or circumstances. From this perspective, feelings, now generally referred to as emotions, are relatively temporary and tend to increase or decrease readiness to act on the environment.^{4,5} Personally meaningful activities and relationships are particularly likely to trigger emotions, so client-centered and contextualized treatment may be expected to do so as well.

Mood Affects Rehabilitation and Life Participation

Mood states may be conceptualized within the International Classification of Functioning, Disability, and Health (ICF) as personal factors that modify disability and functioning.⁶ Some authors have argued that feelings with both positive and negative valence should be considered routinely in rehabilitation and discharge planning;^{7–11} however, knowledge about the role of mood in stroke recovery is rather narrow.

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Most attention, by far, has been given to depression, which is a mood disorder rather than a mood state. Diagnostic criteria for depression does include sad mood, but also a variety of other psychological and somatic signs and symptoms, such as anxiety, weight change, indecisiveness, feeling of worthlessness, agitation, lethargy, and altered sleep patterns.¹² By all accounts, depression is common after stroke,^{13–15} though prevalence rates are uncertain for people with aphasia, for whom standard assessment practices usually are invalid. There is no question that screening and intervention for post-stroke depression is important, given that it has been linked to decreased quality of life,¹⁶ limited social participation,¹⁷ and compromised rehabilitation outcomes.^{3,15,18,19} Nonetheless, moods other than sadness—and mood disorders other than depression—are also important.

Anxiety is relatively common in stroke survivors,^{20–22} has particular social relevance for people with aphasia,²³ affects quality of life negatively,³ and is likely to reduce willingness to engage in rehabilitation- and life activities. Anger, confusion, fatigue, frustration, fear, loneliness, and boredom are other negative moods that may influence rehabilitation outcomes independently of depression and, therefore, merit separate attention.

Concerning moods with positive valence, there is increasing evidence that satisfaction and vigor help people cope and recover after the onset of an acute illness, such as stroke.^{7,9,24} Self-efficacy and hope have been associated with rehabilitation- and life goal achievement.^{25–27} Similarly, people who identify as living successfully with aphasia attribute their success to positive mood traits and attitudes.^{28–30}

Learning How People with Aphasia Feel

Because the vast majority of instruments for mood evaluation are linguistically demanding, they are of limited use for people with aphasia. Consequently, we know considerably less about how people with aphasia feel than about how other stroke survivors feel. Most research on mood post stroke has either excluded people with aphasia or relied on caregivers or health care staff to speak for them.^{31–33} Input generated through proxy is far from ideal. Caregivers find it difficult to separate their own mood from that of their loved one³⁴ and health care staff must infer the mood state or mood disorder from assorted behaviors that are also affected by cognitive and motor impairment, hospitalization, and illness.

Moreover, by removing the person with aphasia from conversations about his or her feelings, implicit messages are generated about incompetence and dependency—messages that are contrary to almost all long-term rehabilitation goals and to self-determination. Missed opportunities to discuss moods and emotions also may be missed opportunities to resolve unhelpful assumptions and life circumstances and avoid negative mood escalation.

Visual Analog Rating Methods

One way to minimize the linguistic complexity of mood evaluations is to use visual analog ratings. One such instrument, the Visual Analog Mood Scales (VAMS),³⁵ uses a combination of word labels and schematic faces to anchor both ends of a 100 mm vertical line on which respondents mark the extent to which they experience mood states. Two positive scales (happy, energetic) and six negative scales (sad, tense, afraid, confused, angry,

and tired) are included. A depiction and written label for each mood is printed at the bottom of the line; a neutral face and the word “neutral” appears at the top. The raw score (quantified in millimeters from the neutral anchor) has been shown to correlate significantly with verbally mediated mood assessments in neurologically healthy adults, in people with psychiatric conditions, and in stroke survivors with no or mild aphasia.^{36,37}

Unfortunately, the validity of the VAMS has not been established in the population for which the instrument was primarily intended—people with moderate to severe communication impairment—primarily because there are limited options for valid mood instruments to compare the results against. Interpretation of the schematic faces by people with aphasia was partially supported by reliable test-retest ratings for the VAMS³⁷ and for similar rating scales,³⁸ but this congruence is likely confounded by respondents’ recollection of the previous rating experience, which occurred in the same session.

We conducted the present study to understand better a range of feelings people with aphasia can have and to identify valid procedures for expressing them nonverbally. The dual purposes were to characterize the relative proportion of negative and positive mood states in people with chronic aphasia after stroke and to estimate congruent validity for visual analog rating methods that were designed to measure the same construct.

Methods

Participants

Twenty-four people with aphasia were originally enrolled. One was unable to understand the rating task, leaving a total of 23 participants (7 females). They were all tested at least three months after their stroke (median = 1 year 3 months). All but one had completed high school and over half (15) had a college and/or graduate degree. Demographics and language test results are presented in Table 1. We have included separate information for younger (<55 years; N=10) and older (N ≥ 55 years, N = 13) participants to facilitate descriptive comparison with the VAMS norms; however, due to the small sample, all statistical comparisons were conducted on the group as a whole. There was a wide age range, from 29 to 78 years, and a similarly broad range in aphasia severity and type. Thirteen participants scored above and ten participants scored below the 50th percentile for overall aphasia severity on the *Aphasia Diagnostic Profiles*.³⁹ Approximately half (11 of 23) had clinically significant auditory comprehension difficulties, as indicated by an aphasia classification of Wernicke’s, global, or mixed nonfluent aphasia. The study was approved by the Institutional Review Board at the university where the research was conducted. All participants provided written informed consent.

Procedures

The VAMS was administered according to the procedures detailed in the manual.³⁵ The eight moods were presented in the order of the response booklet (afraid, confused, sad, angry, energetic, tired, happy, and tense). Participants rated each mood based on how they felt at that time—“Show me how you are feeling now”.

As a second metric, we used four items from the Life Interests and Values Cards (LIV Cards).⁴⁰ The primary purpose of the LIV Cards is to facilitate conversation about life activities, but 11 faces that depict feelings are also included to support expression of emotions related to these activities. We presented four of these feeling cards (happy, sad, angry, and worried) to the study participants. A composite of the face drawings is shown in Figure 1. The cards were discussed, one at a time, in the order each participant selected them. Each mood card was placed at the top of a printed 100 mm vertical rating scale on which participants indicated their response by drawing a mark. There was no face for the neutral anchor on the bottom of this scale and no printed labels. Instructions were otherwise similar to those for the VAMS and the scoring was identical.

The two instruments were administered during the same session. The VAMS was given first and the LIV Cards were presented after the participants had completed one or more intervening language and cognitive tests. For both instruments, the strength of each mood was quantified as the distance in millimeters from the neutral end of the rating line.

Results

The most strongly and frequently endorsed feeling was happiness. On both instruments, 17 participants (74%) rated “happy” greater than halfway (> 50 mm) from the neutral anchor. Averaged across participants, the rating for a happy mood was greater than the rating for a sad mood by a factor 2.2 for the VAMS and by a factor of 1.7 for the LIV Cards. ANOVA showed that the mood ratings differed significantly on the VAMS [$F(7) = 4.998$, $P < 0.001$]. Posthoc analysis using Tukey’s Honest Significant Difference ($P < 0.05$) showed that this was due to higher ratings of “happy” compared to all other moods except confused and energetic. Ratings differed also among the four LIV Card feelings [$F(3) = 7.895$, $P < 0.001$], and posthoc comparisons again showed that “happy” was endorsed with significantly higher ratings than “sad,” “angry,” or “worried.” The mean rating of happy on the VAMS was comparable to that of the norm groups of younger and older adults³⁵ (slightly more than 70 mm from neutral) and the LIV Card rating for happy was similar.

This is not to say that all participants were mostly happy. As illustrated in Table 2, the mean rating for many negative mood states diverged from neutral by a third or more of the scale. In comparison to the published norms,³⁵ younger participants rated themselves, on average, as more confused, sad, angry, and afraid on the VAMS; and older participants rated themselves as more confused, sad, angry, afraid, and as less energetic. As illustrated by the large standard deviations, all mood ratings were diverse. Across participants they spanned more than 95% of the rating scale for all VAMS and LIV Card items. Sadness was rated as greater than halfway from the neutral anchor on the VAMS by 6 participants and as greater than halfway from the neutral anchor on the LIV Cards by 10 participants. Scores for four participants were more than two standard deviations from the VAMS normative sample mean on most or all negative mood states.

Congruent validity was estimated with Pearson correlations between corresponding items on the VAMS and the LIV Cards. Although they were not fully equivalent, we elected to compare the “tense” scale of the VAMS to the “worried” scale of the LIV Cards. The results

—presented in Table 3—showed a strong correlation for “happy” ($r = 0.82$),” and moderate correlations for “sad” ($r = 0.49$), “angry” ($r = 0.57$), and “tense/worried” ($r = 0.57$).

Discussion

Mood State Profiles

Positive mood is rarely discussed in the rehabilitation literature and is seldom assessed clinically. Yet, the 23 stroke survivors who participated in this study identified most strongly as being happy. In fact, their mean happiness rating corresponded to levels previously reported for neurologically healthy adults.³⁵ We submit that the tendency, in health care practices, to focus on problems and negative feelings needs expanding. Acknowledgement of positive feelings can be a powerful impetus for discovering what is meaningful, pleasant, and possible, and these experiences and activities can be incorporated into a productive recovery and life journey.⁴¹ Personal strengths can be employed to negotiate limitations,⁴² and improved confidence and self-efficacy can promote quality of life post-stroke.^{43,44}

At the same time, negative moods were prominent in several study participants, and they extended beyond sadness. The reasons our participants reported feeling sad, tense, worried, angry, tired, and/or afraid were not addressed in the present study, but would have provided opportunity, in clinical practice, for reflection and counsel. Even basic awareness about emotions and moods can modify their intensity.⁴⁵

The relatively high ratings of “confused” on the VAMS were surprising. It is possible that the participants felt genuinely confused about their life circumstances. A more probable explanation is that they were puzzled about the reasons they were asked to talk about their feelings, or uncertain—since “confused” was only the second mood rated—about whether they were completing the rating task correctly. In previous applications of the VAMS sadness scale, aphasic stroke survivors have sometimes been reported to give ambiguous answers or to have difficulties comprehending the verbal instructions for the scales.^{46–48} One potential participant was excluded from the present study, because he, similarly, was unable to complete the task. Although the other 23 responded confidently and did not express overt confusion, they may have been unsure about how to interpret the scale or the face drawings.

Congruent Validity of the Rating Methods

The significant and moderate-to-high correlations between scores on two conceptually similar instruments indicate that visual analog rating scales are valid for assessing mood in people with aphasia. Although the VAMS and the LIV Cards differ somewhat in what mood states they address, we were able to compare results for four basic feelings. By using different, but conceptually equivalent, methods with the same participants and during a single session, it was possible to examine instrument congruence. Most importantly, the minimal language demands allowed us to base the evaluation on participants with a diverse range of aphasia severity.

While the correlations supported congruent validity, we had expected that their magnitude would be greater for equivalent negative mood states. Several minor methodological differences may have reduced correlation strength. For example, the order of mood ratings

within each instrument was determined based on different principles; different numbers of moods were rated; only the VAMS used a neutral anchor and written words; and the visual scale layouts were in opposite directions. However, the most obvious difference between the materials is how the feelings were depicted. Whereas the VAMS relies on stylistically drawn faces within a symmetric circle, the LIV Cards uses more expressive and diverse human faces drawn in cartoon style (Figure 1). These differences may have affected the degree to which the respondents related personally to the depictions.

Like the rest of the LIV Cards material, the line drawings for feelings were developed through an iterative process, whereby sketches were presented to students, colleagues, and people with aphasia, who were requested to say what they represented.⁴⁹ Based on this feedback, sketches were discarded, redrawn, and replaced, to yield a set that needed minimal verbal clarification; however, recognition was not quantified systematically. It would be helpful to examine anchor saliency more formally for both the LIV Cards and the VAMS. Although interpretation of facial expression is not generally considered problematic after left hemisphere stroke, some studies have indicated subtle impairments,⁵⁰ so validation specific to left hemisphere stroke survivors should be pursued.

Recognition of facial expressions varies across moods and it has been observed that recognition is more accurate for positive emotions than for negative emotions.⁵¹ This observation may explain, in part, why the correlation between the two instruments in the present study was particularly strong for “happy.” Participants’ inclination to identify with the faces may also have differed for extraneous reasons. The VAMS and the LIV ratings diverged most for “sad.” Means were, on average, 10 mm farther from neutral on the LIV ratings and the correlation between the instruments ($r = 0.49$) was lower than for other moods (Table 2, all participants). Further inspection of the table shows that a higher average sadness rating with the LIV Cards was evident for the 13 older participants, whereas the mean LIV Card sadness rating for the 10 younger participants was similar to that of the VAMS. As illustrated in Figure 1, the sad face has the appearance of an older man. Thus, older participants may have identified more readily with this depiction, whereas no such effects would be expected for the schematic VAMS drawings. These and other age effects should be examined in a larger sample of people with and without aphasia.

It is important to recognize that the instrument congruence presented in the present study does not inform potential validity for these tools to screen for mood disorders, which include many other signs and symptoms and much more explicit criteria. For instance, contrary to initial claims, the VAMS sadness scale has been found ineffective for depression screening.³⁴

Feelings about Life Activities

The purpose of the LIV Cards is to facilitate discussion about life activities and their perceived value, and the feelings cards were developed to help people express their feelings about those activities⁴⁹. Knowing about, not only general mood, but also activity-specific emotions has concrete advantages for rehabilitation- and post-rehabilitation life planning. Life activities that trigger positive emotions may be selected to strengthen confidence and motivation, whereas activities that trigger negative emotions may be modified, practiced,

discussed, and/or reframed to help people with aphasia participate in them as fully as possible.

Conclusions

People with chronic post-stroke aphasia experience diverse moods and, when given nonlinguistic methods for communicating about them, most have no problem doing so. The demonstrated congruence between two instruments designed to measure similar constructs suggests that visual analog ratings with pictorial anchors are valid tools for eliciting self-report in people with aphasia of varying severity. Instrument variables that influence interpretation should be identified in future research and then modified to improve design and general administration procedures.

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Figure 1.

Composite illustration of the four moods evaluated with the LIV Cards. Reprinted, with permission, from Haley KL et al. *Life Interests and Values Cards*. Chapel Hill, NC: Department of Allied Health Sciences; 2010. Copyright © 2010 by the Department of Allied Health Sciences, University of North Carolina at Chapel Hill.

Table 1

Participant Demographics and Clinical Test Results.

Variable	Younger Participants	Older Participants	All Participants
Age (years)			
Range	29–54	55–78	29–78
Median	44	62	56
Gender (number of participants)			
Male	7	9	16
Female	3	4	7
Months post onset (number of participants)			
3 – 11	5	4	9
12 – 24	3	7	10
>24	2	2	4
ADP severity (percentile)			
Range	9–97	14–98	9–98
Median	46	73	63
ADP Aphasia Profile (number of participants)			
Global	0	1	1
Mixed nonfluent	5	4	9
Broca	2	0	2
Borderline fluent	0	1	1
Wernicke	0	1	1
Conduction	1	2	3
Anomic	1	3	4
Not Classifiable	1	1	2

Notes: ADP = Aphasia Diagnostic Profiles; Younger participant and older participant subgroups are presented for descriptive purposes

Table 2

Ratings, expressed in mm from the neutral anchor, for the VAMS and LIV Cards.

Mood Scale	Younger Participants		Older Participants		All Participants	
	M	SD	M	SD	M	SD
VAMS						
Happy	72.2	32.4	70.2	36.8	71.1	34.2
Energetic	62.0	29.1	49.1	39.1	54.7	35.0
Sad	29.1	29.9	34.1	30.4	31.9	29.6
Angry	28.1	35.3	30.8	35.1	29.6	34.4
Tense	22.4	19.8	37.6	36.6	31.0	30.8
Confused	26.3	23.8	53.5	36.6	41.7	33.9
Tired	39.8	24.7	40.2	37.8	40.0	32.1
Afraid	15.1	13.6	34.8	37.7	26.3	30.8
LIV Cards						
Happy	68.3	34.1	70.8	23.5	69.7	27.9
Sad	30.4	32.7	50.5	29.9	41.8	32.1
Angry	35.3	37.1	22.2	30.8	27.9	33.6
Worried	28.8	25.2	41.5	37.6	36.0	30.2

Notes: Scores for younger (< 55 years) and older participants (> 55 years) are reported for descriptive purposes only to allow comparison with VAMS norms. Statistical comparisons were based on data from all participants.

Table 3

Pearson correlations between corresponding mood ratings for the VAMS and the LIV Cards.

LIV Cards	VAMS			
	Happy	Sad	Angry	Tense ^a
Happy	0.82 **	-0.73 **	-0.47 *	-0.22
Sad	-0.16	0.49 *	0.37	0.43 *
Angry	-0.31	0.55 **	0.57 **	0.29
Worried ^a	-0.21	0.57 **	0.23	0.57 **

Notes:

** correlation is significant at the 0.01 level (2-tailed),

* correlation is significant at the 0.05 level (2-tailed).

^aTense and worried were compared despite their conceptual difference)