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Title:

Preliminary Psychometric Analyses of Two Assessment Measures Quantifying Communicative and Social Activities: the COMACT and SOCACT

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Abstract

Background: There is a need for clinical tools that capture the real-life impact of aphasia (Simmons-Mackie, Threats & Kagan, 2005). This study reports on a psychometric investigation of two self-report tools: the Communicative Activities Checklist and the Social Activities Checklist (COMACT; SOCACT: Cruice, 2001), which assess the dimensions of communication activity and social participation in aphasia.

Aims: (1) To investigate internal consistency, convergent and known validity of the COMACT and SOCACT; and (2) To investigate the impact of personal contextual factors: gender, age, years in education, linguistic ability and emotional health on communicative and social activities.

Method: 30 participants with mild-moderate chronic aphasia (PWA: mean age 71 years, mean time post-onset 41 months, mean years in education 10.77) and 75 control neurologically healthy participants (NHP: mean age 74 years, mean years in education 13.18) completed the COMACT and SOCACT reporting how frequently they engaged in particular activities. The COMACT has 45 communication activities with sub-scales of Talking, Listening, Reading and Writing. The SOCACT contains 20 social activities with sub-scales of Leisure, Informal and Formal. Internal consistency (IC) was examined using Cronbach's alpha (α). Correlations with published assessments, Western Aphasia Battery (WAB: Kertesz, 1982) and Communication Activities of Daily Living (CADL-2: Holland, Frattali & Fromm, 1999) were computed for COMACT only. Multiple regression models were examined for differences in participant (PWA vs. NHP) performance on COMACT and SOCACT.

Results: Total COMACT IC was 0.83 (PWA), and 0.84 (NHP). Following deletion of four items, to further improve sub-scale ICs, total COMACT IC was 0.83 (PWA) and 0.86 (NHP). COMACT total score and WAB AQ were moderately correlated (r = 0.55). Total SOCACT IC was 0.58 (PWA) and 0.63 (NHP). Following single item deletion, total IC was 0.65 (PWA) and 0.64 (NHP). Statistical analysis revealed PWA, in comparison to NHP, participated in significantly fewer communication and social activities. Personal contextual factors impacted both groups differently; particular aspects were associated with communication activity (age and language severity) and social activity (age only). For NHP, ageing, emotional health and years in education were significant predictors of social and communication activity.

Conclusion: This study finds the COMACT to be a reliable, valid measure of communication activity. The SOCACT had 'questionable' IC and requires further psychometric investigation. Both tools demonstrate known group validity. Relationships between impairment-level and personal contextual factors for communication activity and social participation are highlighted.

Keywords

Aphasia; communication activity; social participation; psychometric

Introduction

People with aphasia (PWA) want services that make a difference to their everyday lives (Worrall et al., 2011). Within the field of aphasiology, Simmons-Mackie (2008) has championed greater understanding of the real-life impact of communication disability. To ensure that therapeutic intervention is meaningful and produces measurable change in life participation, she advocates for participation in personally relevant activities, and involvement in a wider communicating society. In clinical settings, this can be promoted through an authentic, relevant and natural context for therapy, and by focusing on the personal perspective. To support clinicians to achieve this, tools that capture the real-life impact of aphasia are needed (Simmons-Mackie, Threats & Kagan, 2005). The wider healthcare context further supports this need. With increasing pressure on services, healthcare purchasers are evaluating individuals' own assessments of their condition, for example, through the use of patient reported outcome measures (PROMs), and comparing these against the costs of treatment (Devlin & Appleby, 2010). Speech and language therapists face the challenge of moving away from a 'medical' approach, which solely focuses on the linguistic deficit, to one that captures the personal perspective and meets the need for measurable outcomes to therapeutic intervention.

In order to better understand the impact of a health condition such as stroke, The World Health Organisation's International Classification of Functioning, Disability, and Health (ICF: WHO, 2001) is a natural starting point. The ICF is probably the most influential conceptual framework for evaluating impairment alongside the concepts of functionality, social participation and quality of life. It considers Functioning (Body Function and Structure), Activities and Participation, and Contextual factors. In recent years, the domain of Activities and Participation has been the focus of much research. It is known that older people with aphasia engage in many communication activities similar to healthy older people, but are

limited in the numbers of these activities (Davidson, Worrall& Hickson, 2003). Cruice et al. (2003) found that individuals with higher functioning and better communication ability presented with fewer limitations in social participation. The link between communication ability and social participation is significant; following a stroke, better quality of life, emotional health and well-being for people is associated with the ability to engage in required and favoured activities (Cruice, Hill, Worrall & Hickson, 2010; Cruice, Worrall, Hickson & Murison, 2003). Older people with aphasia have been found to have fewer social contacts, smaller social networks, and less engagement in social activities than age-matched peers without aphasia (Cruice, Worrall & Hickson, 2006; Hilari & Northcott, 2006; Northcott & Hilari, 2011). The severity of the aphasia (alongside the level of physical dependence) is an important predictor of social participation (Dalemans, De Witte, Beurksens, van de Heuval & Wade, 2010a). In summary, people with aphasia are at risk of social isolation and social exclusion (Parr, 2007).

Stroke and aphasia cannot be considered in isolation from the whole person and their life situation. The ICF conceptualises disability as an interaction between a health condition and personal and environmental contextual factors, which can be considered barriers or facilitators. Personal factors include gender, age, educational level, personality traits and lifestyle. Environmental factors include considerations outside the person's control such as physical, social and attitudinal environment. These contextual factors interact to impact on participation in communication and social activities. Research has already shown that age, gender and educational level (Code, 2003; Dalemans, et al., 2010a) alongside emotional health measured as 'positivism' (Dalemans et al., 2010a) influences participation in social and communication activities and, as such, are important factors to investigate.

Clinical frameworks developed from the ICF include Living with Aphasia: Framework

for Outcome Measurement (A-FROM: Kagan et al., 2008). This framework extends the scope of the ICF by considering 'life with aphasia' as a central concept and focuses on the psychosocial impact of stroke. Evidence from interviews with fifty PWA indicates that while PWA identify rehabilitation goals that focus specifically on communication (e.g. "The main thing was to be able to talk" p314), they additionally report socially-motivated goals, such as talking with friends or feeling comfortable in a crowd. Goals pertaining to valued social, leisure and work activities may be higher priority than goals associated with improved communication alone (Worrall et al., 2011). In a small in-depth study of four PWA (Rohde, Townley-O'Neill, Trendall, Worrall & Cornwell, 2012), one participant identified returning to drive as highest priority. This suggests that, following a stroke, it is important for clinicians to consider how PWA access desired life situations and perform in everyday communication activities. Eadie et al. (2006) highlight further reasons for measuring communication exchanges that take part in life situations including: (1) developing and revising multidimensional models of rehabilitation; (2) documenting effectiveness of intervention programmes and reflecting client's concerns and values as a way of prioritising potential therapeutic intervention; (3) and being able to compare across populations of people with and without communication disorders in order to better understand the impact of aphasia (p2). This study will consider two measures that can assist in the measurement of everyday communication activity and social participation: the Communicative Activities Checklist and the Social Activities Checklist (COMACT; SOCACT: Cruice, 2001). These checklists have been used in previous research (Cruice, et al., 2003; Cruice, Worrall & Hickson, 2006). They are designed to capture the self-reported communication and social activity of PWA, and also neurologically healthy populations. They have not been psychometrically tested and have yet to be studied in detail. These tools include a pre-determined range of activities to help guide discussion with participants focusing on concepts of activity engagement, frequency, and partners. This information can lead to further clinical discussion about

independence/dependence, ability and perceived difficulty in the specified activities.

Being able to self-report in areas of communication and social activities is important. Research has shown that clinician ratings and self-ratings of functional communication for people following a stroke differ significantly (Hesketh, Long & Bowen, 2011). Cruice et al. (2006) report that family members and friends do not rate reliably or predictably on any aspect of social functioning for people with aphasia (for social activities, social network, social contacts or social relationships). Available communication and social self-report measures that involved the use of proxies (to complete the measure in place of the person with aphasia) were therefore not included, for example, in the Communication Effectiveness Index (CETI: Lomas, Pickard & Mohinde, 1987).

A well-known self-report measure is The Communication Disability Profile (CDP: Swinburn & Byng, 2006). It comprises four sections: activity, social participation, external influences, and emotional consequences. A recent study (Leng Chue, Rose & Swinburn, 2012) provides psychometric evidence for acceptable test-retest reliability and adequate internal consistency of the CDP. The CDP is designed to assess the broader impact of aphasia on the individual. It does not quantify number of activities and frequency of activities participated in. Quantifying these would allow the extent of activity engagement or limitation to be qualified within the ICF framework. The CDP is designed specifically for PWA whilst the SOCACT and COMACT can be used with neurologically healthy people allowing comparison across populations.

Measures to consider the impact of stroke on functional status, focusing on social activities, have also been developed from a multidisciplinary field. One such widely used measure is the Frenchay Activities Index (FAI: Schuling, de Haan, Limburg & Groenier,

1993), which considers domestic, leisure and outdoor activities. This global measure has excellent psychometric data, however, there are only three items that consider communication-linked social activities (namely 'social occasions', 'reading books' 'pursuing hobbies') and hence it has limited clinical use in PWA. A measure specific to social participation is the Community Integration Questionnaire (CIQ: Djikers, 2000), which was originally developed within the brain injury field, and recently adapted for people with aphasia (Dalemans et al., 2010a). It contains a short (five-item) social integration scale, providing frequency (of participation) information for finances, shopping, leisure, and visiting friends. Clinical usefulness of the tool may be limited by its brevity in examining the full range of concepts associated with social participation. The adapted CIQ has good internal consistency, test-retest reliability and acceptable validity (Dalemans, De Witte, Beurksens, van de Heuval & Wade, 2010b), but the social integration scale does not have acceptable internal consistency as a stand-alone measure (Hirsh, Braden, Craggs & Jensen, 2011). Finally, there are some measures that combine social and communication activities. The ASHA Quality of Communication Life Scale (QCL: Paul, Holland, Frattali, Thompson, Caperton & Slater, 2004) assesses the impact of an individual's communication disability on: relationships, communication interactions, participation in social, leisure, work and education activities, and overall quality of life, but Hilari and Cruice (2013) note the lack of available psychometric information about this measure. The Assessment for Living with Aphasia (ALA: Kagan et al., 2011) is a pictographic, self-report measure of aphasia-related quality of life addressing communication and participation activities. Recent psychometric evaluation of test re-test reliability, internal consistency and construct validity has been published showing acceptable values (Simmons-Mackie et al., 2014). Nevertheless this measure was designed for use with PWA only, and so is limited for comparisons with NHP. In conclusion, there is still a need for robust psychometrically evaluated tools that consider communication activities and social participation in sufficient detail to help guide therapeutic intervention, whilst also being

suitable for both aphasic and neurologically healthy populations. This research study will consider whether the COMACT and the SOCACT could be used to address this gap.

The COMACT and SOCACT

The COMACT measures the frequency and the types of communicative activities engaged in by participants (Appendix A). Review of empirical research in fields of aphasia, hearing, and communication (Davidson, Worrall & Hickson, 2003; Le Dorze & Brassard, 1995; Le Dorze, Julien, Brassard, Durocher & Boivin, 1994; Oxenham et al., 1995; Parr, 1995; Stephens & Hetu, 1991; Stephens & Zhao 1996) identified a consensus of communicative activity items. The item content of three validated measurement tools of communication activity were also reviewed: American Speech-Language-Hearing Association Functional Assessment of Communication Skills for Adults (ASHA-FACS: Frattali, Thompson, Holland, Wohl, & Ferketic, 1995); CETI (Lomas et al., 1987); and the Functional Communication Therapy Planner (FCTP: Worrall, 1999). Items that were identical or similar were identified, grouped and then collapsed into a single item. Communication areas identified included: social communication, communication of basic needs, reading, writing and number concepts, daily planning, life skills/personal care; understanding; speaking; conversation; literacy; and hearing for conversational speech and other auditory stimuli. Common communication partners of older people were peers, family, neighbours, health professionals, and community service people (Davidson et al., 2003; Shadden, 1988). Davidson et al. (2003) found eight major categories of communication: conversation; informing; greeting; questioning; reading; writing; other; and listening only, and demonstrated that when comparing PWA and NHP from an elderly population, number and time spent in communication activities, and number of communication partners, differentiated between the two groups. A total of 45 primarily transactional communicative activities were compiled across Talking (Items 1-16), Listening (Items 7-23), Reading (Items 24-37) and Writing (Items 38-45).

The SOCACT measures the range and frequency of social activities (Appendix B). Item content was generated from review of research and existing scales within stroke, gerontology, and mental health (Bowling et al., 1993; Cummins, 1997; McDowell & Newell, 1996). Two short 10-item indicators have been used in research with participants from mental health and healthy elderly backgrounds; 8 of those items were included in the final version of the SOCACT ensuring that core content was included. The three main areas were identified: leisure activities (solitary and social), hobbies, and interests. The distinction between activities inside and outside (place), and activities by self versus those with others (partners) were important. The level of organisation of an activity, for example going to classes and lectures versus visiting friends, was also an important element, and led to 'formal' and 'informal' categories. Thus, the 20-item measure consists of three areas: Leisure (Items 1-11), Informal (Items 12-15) and Formal (Items 16-20) activities.

Aims of Study

The aim of the current study was, firstly, to consider the psychometric properties of the COMACT and SOCACT through determining the internal consistency (do test items that measure the same construct produce similar scores?) and known group validity (do the tools discriminate between people with and without aphasia?). The COMACT[1] was further investigated for convergent validity (are COMACT scores associated with formal linguistic and communication assessments measuring similar constructs?). Secondly, the study aimed to explore personal factors (age, gender, years in education, and emotional health) that may influence communication activity and social participation.

Methodology

Participants and Design

This study utilises data collected as part of a previous project (co-author MC). Ethical approval for the original project was granted by the University of Queensland (B/136/Spchpath&Aud/98/PhD), and re-use of the data approved by the same committee on 30/08/2012. PWA were recruited from the university clinic, local hospitals and community stroke groups. An aphasia-friendly information sheet (with pictograph design) was provided to potential participants. Inclusion criteria included: English as a first language, presence of aphasia for at least 1 year post-onset[2], reliable yes/no response with no less than 16/20 on the Western Aphasia Battery (WAB: Kertesz, 1982) yes/no questions, moderate comprehension (cut off score 5/10) as measured on WAB auditory comprehension subtest, no concomitant neurological disease (assessed through self-report) and hearing and vision sufficiently intact (assessed using basic audiometry, Snellen distance chart, and visual acuity tests, for both unaided and aided sensory functioning, see Cruice et al., 2003) for pen and paper assessment. Participants using a wheelchair were excluded to reduce potential confounding influence of mobility on emotional health, and difficulties of physical access to communication or social activities. A total of 30 PWA were recruited (16 female, 14 male).

NHP (75 total; 47 female, 28 male) were recruited from university and community sources. New control participants were recruited using snowballing sampling[3]. NHP were included if they reported no history of cerebro-vascular or neurological disease, and if: they spoke English as a first language, had hearing and vision sufficiently intact (assessed as outlined above) for pen and paper assessment, lived independently in the community and did not have concomitant mobility issues. Both PWA and NHP were from primarily white Australian background.

Procedure

All PWA were interviewed within their own home to reduce respondent burden, and reduce potential issues around mobility and transport. The majority of the NHP were interviewed at home or community locations. Testing sessions were a maximum of 2 hours to minimise fatigue. All 105 participants in the study were interviewed by a researcher who was also a qualified speech and language therapist (co-author MC).

Measures and Assessments

The test battery was chosen on the basis of psychometric value and greatest applicability for both participant groups. Minimising respondent burden for PWA was also evaluated. The assessment battery contained the COMACT and SOCACT, linguistic and functional communication assessments, and a measure of emotional health (see below for full details). All PWA completed the COMACT and SOCACT with the researcher present, and most NHP completed these independently and then discussed them during their interviews. Scores for both tools were calculated in the same way: for every activity engaged in, a score of 1 is given, and the frequency of participation reported. The maximum score was 45. However if 'not at all' or 'not applicable'[4] was reported, then 0 was scored. Scores reflect total number of activities participated in. The SOCACT additionally records social activity partners and overall activity satisfaction, although these data were not considered in this paper. Both the COMACT and SOCACT were usually completed in a 20-30 minute face-to-face interview. Participants completed a personal details form to gather information on age, gender, years in education and occupation.

Assessments for PWA only. The WAB Aphasia Quotient[5] was completed to profile the type and severity of aphasia. The Communication Activities of Daily Living-Second

Edition (CADL-2: Holland, Frattali & Fromm, 1999) was also completed. This assesses functional communicative ability through direct observation of performance, generating a score out of 100. Five items deemed not culturally appropriate for Australian participants (for example, telephoning an American number) were replaced with equivalent Australian items. Higher scores on both the WAB AQ and the CADL-2 indicate better functioning, and total scores on both assessments were used in the statistical analysis.

Assessment battery for both PWA and NHP. The abbreviated 15-item version of the Boston Naming Test (BNT-15: Mack, Freed, White Williams & Henderson, 1992) was used as a measure of word retrieval or linguistic ability. High reliability and validity with the original version is found (Franzen, Haut, Rankin & Keefover, 1995). The 15-item abbreviated version of the Geriatric Depression Scale (GDS: Sheikh & Yesavage, 1986) was used to evaluate emotional health. The GDS has good reliability, validity, sensitivity and specificity (McDowell & Newell, 1996). On the BNT-15, high scores indicate better naming ability; where on the GDS, higher scores are indicative of worsening emotional health (and increasing signs of depression).

Statistical Analysis

Data were analysed using exploratory data plots, Cronbach's α (internal consistency), Pearson's product moment r correlations (convergent validity), independent t-tests (known group validity), and multiple regression. All t-tests are reported at 2-tailed level of significance. Independent variables chosen for t-test analysis were age, gender, years in education, linguistic ability and emotional health. Variables found to be significant were placed as predictors in a linear regression model. To control for co-variance, a mixed entry model was used (block and hierarchical).

Results

Demographic information is reported in Table 1. Comparison of this information revealed there was no significant difference in age between PWA and NHP groups t (103) = -1.98, $p < .05$. The majority of the PWA sample was married or had a partner (n = 19, 63% of sample), compared to NHP (n = 38, 53% of sample).

On average, PWA were 41 months post stroke (M_{months} = 25.6, range: 10-108). WAB Aphasia Quotient (AQ) scores fell mainly between 60-89, indicating the group was mild-moderately impaired (see data in Table 5). A range of aphasia profiles were seen: anomic (n = 15), conduction (n = 8) Broca's (n = 3), Wernicke's (n = 3), and Transcortical Sensory (n = 1). All members of the group had good auditory comprehension.

There appeared to be a difference for years in education (calculated using years of higher education and further study or training) with NHP (M_{years} = 13.18, range in years: 6-23) having spent longer in education than PWA (M_{years} = 10.77, range in years: 6-20). This was found to be non-significant t (103) = - 2.90, p = .05. A significant difference in emotional health was found. PWA had significantly higher GDS scores (M_{GDS} = 3.60, range: 0-12) than NHP (M_{GDS} = 1.13, range: 0-5) suggesting an increased degree of depressive symptoms t (103) = 5.62, $p < .01$.

INSERT TABLE 1 HERE

Internal consistency

Internal consistency (IC) of the COMACT and SOCACT was examined separately for the two participant groups (see Table 2) using Cronbach's α. George and Mallery (2003) provide the following guide for interpretation "> .9 – Excellent, > .8 – Good, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor, and < .5 – Unacceptable" (p 231). Corrected

item-total correlations were calculated to assess whether items in the scale measured a single construct (and hence, correlated with one another).

COMACT: For PWA, IC was .83 (Total); .54 (Talking); .21 (Listening); .81 (Reading) and .69 (Writing). For NHP, IC was .84 (Total); .62 (Talking); .46 (Listening); .84 (Reading); and .59 (Writing). The COMACT as an overall tool demonstrated good IC for both participant groups, however the sub-scales were more variable. Talking IC was poor for PWA and questionable for NHP. Listening IC was poor for both PWA and NHP. Reading IC was good for both PWA and NHP. Finally, Writing IC was questionable for PWA, and poor for NHP.

INSERT TABLE 2 HERE

In order to make the sub-scales stronger, item deletion was performed. Corrected Item-Total Correlations guided decision-making for items selected for deletion; in a reliable scale all items should correlate (at .3 or above) with the overall scale (Field, 2005). Examination of frequency data was also carried out to investigate minimal variance with ceiling and floor effects. Firstly, two items within Talking were selected for deletion (Item 1 'Talk to spouse' and Item 6 'Talk to pets'). Talking IC for PWA was raised to .69 and for NHP to .64. This resulted in a substantial difference, and although the sub-scale remained within the questionable range, it reached borderline acceptability for PWA. It is acknowledged that Item 1, in particular, is important clinically in capturing everyday talking activity for those to whom it applies. However, its inclusion with Item 6 substantially affects the statistical reliability of the Talking sub-scale. This is largely because it is not applicable to 37% of the current sample who did not have a spouse. The tension between measurement robustness and wider applicability in the context of clinical importance is discussed later.

The Listening sub-scale was problematic in different ways for PWA and NHP. With both groups, only a single item (Item 20 'Listening to sports programs') was indicated for deletion. This partially improved Listening IC to .38 for PWA and .57 for NHP, with total COMACT IC remaining unchanged. Further detailed examination of the item content of this sub-scale is required to evaluate how it could be strengthened.

Item deletion within the Writing sub-scale was made (Item 45 'Do word puzzles and games') which improved IC to .63 for NHP. Reading was not adjusted as it was sufficiently strong enough as a stand-alone sub-scale. The adjusted total COMACT IC, based on 41 items, was .83 for PWA (unchanged), and .86 for NHP.

SOCACT: For PWA, IC was .58 (Total); .55 (Leisure); -.25 (Informal); and .24 (Formal). For NHP, IC was .63 (Total); .49 (Leisure); .38 (Informal); and .46 (Formal). The SOCACT as an overall tool was not reliable in measuring the construct of social activities, with poor IC for PWA and questionable IC for NHP. Regarding sub-scales IC, Leisure had poor IC for PWA and unacceptable for NHP; Informal was unacceptable for both groups (and had a negative value); and Formal was poor for both groups. Sub-scales were investigated to identify if item deletion improved internal consistency.

The majority of Leisure test items had below .3 Corrected Item –Total Correlation for PWA or NHP, and item deletion did not make this sub-scale stronger. For the Informal sub-scale removing a single item (Item 15 'Go to church or religious events') made a substantial difference raising IC to a positive value of .36 for PWA and .57 for NHP. Item deletion did not make the Formal sub-scale stronger, so was left unchanged. Following these changes, total IC based on 19 items was improved to .65 for PWA and .64 for NHP, and remained questionable for both groups. All further analyses in this section involving the COMACT and SOCACT were completed using the adjusted scales.

Known Group Validity

COMACT: Results of the t-test analysis (Table 3) showed a significant difference between groups (PWA vs. NHP) for participation in communication activities overall, and in all sub-scales, wherein PWA participated in significantly fewer communication activities.

SOCACT: A significant difference between groups in participation in social activities overall, and Leisure and Informal sub-scales was also found. PWA participated in significantly fewer social activities in these sub-scales.

Further investigation of sub-scales, for example, Listening (COMACT) and Informal (SOCACT) revealed small standard deviations; scores were clustered around the mean, and high mean scores suggested ceiling level performance. Group differences were examined further. PWA had proportionally greater listening activity, however unacceptable Listening IC and ceiling level scores suggest cautious interpretation of this difference. It is also not possible to draw firm conclusions about group differences for SOCACT sub-scales (Leisure, Informal and Formal activities) because IC was unacceptable.

INSERT TABLE 3 HERE

Convergent validity

Significant relationships were found between COMACT scores and published assessments (Table 4). Pearson's r calculations were considered strong between 0.5 - 1.0, moderate between 0.3 - 0.5, or weak < 0.3.

INSERT TABLE 4 HERE

PWA had a mean BNT-15 score of 8.77 (SD = 4.68) and more than half of the sample had impaired naming. There was moderate positive correlation between BNT-15 with total

COMACT score, and Writing and Reading sub-scales (Table 4). Interestingly, the BNT-15 correlation with the Talking sub-scale was non-significant. NHP had a mean BNT-15 score of 14.29 (SD = 1.09). This was significantly different from PWA $t(101) = -9.53$, $p < .001$. For NHP, BNT-15 scores were strongly correlated with the Reading sub-scale, moderately correlated with total COMACT score, and weakly correlated with Talking and Writing sub-scales (Table 5). For both PWA and NHP, the Listening sub-scale did not correlate with published linguistic assessments.

INSERT TABLE 5 HERE

For PWA, total COMACT score was moderately correlated with WAB AQ and all WAB subtests (Table 4). Additionally, WAB AQ strongly correlated with Talking sub-scale, and moderately correlated with Reading and Writing sub-scales. Regarding WAB subtests, Talking was strongly or moderately correlated with all WAB subtests; Writing was moderately correlated with all WAB sub-tests; and Reading was moderately correlated with WAB naming and repetition. Listening was not significantly correlated with the WAB AQ or subtests.

PWA demonstrated a moderately low to high range of functional communication ability (CADL-2 scores range = 31 - 95, see Table 5). A strong correlation between total COMACT score and the CADL-2 was noted, and Reading and Writing sub-scales correlated strongly, and moderately, respectively. Similar to previous findings, the Listening sub-scale correlation was insignificant.

In summary, the COMACT had good IC and convergent validity correlating moderately to strongly with published linguistic and functional communication assessments. The COMACT Reading sub-scale had good IC, however, the Listening sub-scale was not acceptable and cannot be considered a reliable or valid measure of this construct. The

SOCACT scale had questionable IC, and the sub-scales were not valid measures of the constructs of Leisure, Formal or Informal social activities. The COMACT and SOCACT as overall tools demonstrated known group validity.

Personal factors - PWA

There was a significant impact of age on COMACT scores (Table 6) due to a strong negative association with the Reading sub-scale, and moderate negative association with Writing. As PWA age, they appear to participate in fewer reading and writing activities. There may be numerous reasons for this finding. It may be that normal physiological decline in visual acuity and general health is compounded by the presence of aphasia as PWA age. There were no significant correlations for years in education and emotional health, and no significant difference for gender on total or sub-scale COMACT scores.

INSERT TABLE 6 HERE

Regarding the SOCACT, the most influential factor was again age. A moderate negative association with total SOCACT score, and Leisure and Formal sub-scales was observed. With increasing age, there appears to be a decrease in PWA's participation in overall and specific social activities. This may again be related to personal issues such as changes in mobility. Additionally, there was a strong positive correlation between increasing years in education and Formal social activity and an inverse moderate negative correlation with Informal. The poor validity of these sub-scales has been acknowledged and prevents meaningful interpretation of these observed relationships.

There was no significant difference for gender on total SOCACT. However, significant differences were noted in Informal and Formal sub-scales. T-test analysis was completed and inspection of the means suggested that: (1) women participated in more Informal activities (M

= 2.69, SD = .48) than men (M = 2.21, SD = .58) t (28) = 2.45, p = .02; and (2) men participated in more Formal activities (M = 2.00, SD = .83) than women (M = 1.19 SD = .83), t (28) = - 2.2, p = .04. Though these findings were significant, further analysis was not conducted because of lack of sub-scale validity. No significant correlations were observed for years in education or emotional health (GDS) and total SOCACT score. Results reported previously show that PWA presented with significantly more depressive symptoms (compared to NHP cohort), however the impact of this on communication or social activity is not detected within the PWA group using correlational analysis and requires further investigation.

Personal factors - NHP

Increasing age and increasing depressive signs (emotional health) showed weak or moderate negative correlation with the COMACT (total and all sub-scales, bar Listening). Increasing years spent in education showed weak or moderate positive correlation with COMACT (total and all sub-scales, bar Listening). There were no significant differences seen for gender.

Age and emotional health showed weak or moderate correlation with SOCACT (total score and all sub-scales). Years in education showed a weak or moderate positive correlation with the SOCACT (total score and sub-scales). Again, there were no significant differences observed for gender.

In summary, individuals with aphasia with better naming skills and better overall language functioning reported more communicative and social activities. For PWA, increasing age correlated to decreasing participation in reading and writing activities; possible reasons for this are explored in the Discussion. Communication activity was not influenced by years in education, emotional health or gender. Overall social participation was influenced by age, but not by emotional health or gender. The impact of years in education was unclear with positive and negative correlations found. For NHP, increasing age was also related to decreasing

participation in talking, reading, writing, and all social activities. Increasing years of education were associated with more communication (with the exception of Listening) and social activities. Unlike PWA, this relationship was clear, and notably the NHP cohort had been in education for significantly longer than PWA. Finally, increasing signs of depression correlated with fewer communication (excluding Listening) and social activities. For both participant groups, gender was not a significant factor in overall COMACT or SOCACT scores.

Predicting communication and social activities

Multiple regression analysis was performed to investigate the relationship between the dependent variables (DVs) communication and social activity, expressed as COMACT and SOCACT scores, with correlating independent variables (IVs: presence of aphasia, age, gender, years in education and emotional health). A mixed model of entry was used with the DV added as 'stepwise', and IVs added as 'enter'. This way each IV is evaluated for what it adds to the prediction. Analysis revealed the assumptions of normality, multicollinearity, and homoscedasticity were not violated. The errors of prediction (residuals) were independent of one another (Durbin-Watson value was 2.06 for COMACT and 1.91 for SOCACT). Multiple regression analysis was therefore performed.

The overall COMACT regression model accounted for 48% of the variance (adjusted) in COMACT scores. R for regression was significantly different from zero, with $F\ (1, 99)$ $p < .001$, $R^2 = .503$, R^2 adjusted = .48. The analysis shows that presence of aphasia alone explained approximately 19% of the variance, and it was the most important predictor ($\beta = .52$, $t\ (99) = 6.14$, $p < .001$). Examination of β coefficients revealed age was the only other significant predictor ($\beta = -.30$, $t\ (99) = -3.94$, $p < .001$).

The overall SOCACT regression model accounted for 39% of the variance (adjusted) in SOCACT scores. R for regression was significantly different from zero, with F (1,99) $p < .001$, $R^2 = .42$, R^2 adjusted = .39. Examination of β coefficients revealed presence of aphasia was significant with the highest β value ($\beta = .35$, t (99) = 3.82, $p < .001$), followed by age ($\beta = -.33$, t (99) = - 3.97, $p < .001$). Years in education was also significant ($\beta = .28$, t (99) = 3.13, p = .002).

Discussion

Psychometric evaluation

Following adjustment to the COMACT through item deletion, a stronger tool was developed with good internal consistency (IC) for older people with and without aphasia. There was variable internal consistency (following adjustment) of individual sub-scales: Reading was good, Writing and Talking was questionable with borderline acceptability for PWA, and Listening was poor for NHP and unacceptable for PWA. The COMACT as an overall tool and the Reading sub-scale were demonstrated to be reliable measures of everyday communicative activities and reading activities respectively, with similar IC to other published communicative activity measures (for example the Communication Disability Profile, CDP: Leng Chue et al., 2012).

Investigation of known group validity revealed that although older PWA's participation in communication activities was varied, it was substantially less in terms of number and range of engagement than non-aphasic peers. On average, PWA participated in significantly fewer overall communication activities (approximately one quarter less) in the domains of talking, reading and writing. The negative impact of aphasia in sharing information, reading, and administrative writing tasks has been previously highlighted (Davidson et al., 2003; Mazaux et al., 2013).

Investigation of convergent validity with standardised tests of linguistic and functional communication (WAB AQ, CADL-2 and BNT-15) demonstrated positive correlation with the COMACT and sub-scales Talking, Reading and Writing. This suggests that the construct of 'communication' in the COMACT relates to the construct measured in published assessments. Of particular note was the Talking sub-scale; it correlated moderately with all WAB sub-tests, and correlated strongly with WAB Spontaneous Speech and Naming (both assessments of expressive language ability). However, the relationship between Talking and another test of naming (BNT-15) was more complex: there was no significant relationship in performance by PWA and only a weak positive correlation seen with NHP. It is possible that the difference in items on the two naming tests explain this conflicting finding in the PWA group. Further investigation is needed to determine whether naming of picture objects is associated with range of Talking activities.

Unexpectedly, Reading showed significant correlation with the BNT-15 and correlated strongly with CADL-2 performance. This suggests that better functional communication and language skills may positively influence reading activity. The relationship between self-reported participation in communication activity and ability measured through linguistic assessment remains unclear.

The results of internal consistency and convergent validity analyses highlighted that the Listening sub-scale was unreliable. Whilst this sub-scale did discriminate between PWA and NHP, ceiling effects were seen for both participant groups. An unclear construct can lead to unexpected variance in scores: there may have been confusion whether scale items referred to listening, hearing or understanding. Conceptually this distinction is important. 'Listening' and 'hearing' both suggest passive participation whilst 'understanding' requires active analysis of information. Formal linguistic assessments usually focus on the latter. Interestingly, although a range of ability was seen on the WAB Comprehension subtest, all PWA reported high levels

of engagement in listening activities. This suggests that PWA did not interpret listening items to mean successful understanding and may have equated listening with 'hearing' in this context. Hearing impairment, in itself, has been found to predict activity limitation and social health for community-based older people (Cruice et al., 2006; Hickson et al., 2008). It may therefore be important to ask specific questions about self-reported hearing ability if this is the intended focus of investigation. In conclusion, the Listening sub-scale is not a valid stand-alone measure at present, however research shows that listening activity is relevant in aphasia. Worrall et al. (2002) found PWA, compared to controls, participated in fewer communicative activities overall and had a higher degree of listening behaviour. Before a decision can be made regarding the Listening sub-scale, further conceptual development is required: (1) through clarification of the construct being measured; (2) through development of item content to include comprehension and hearing items; (3) by revising items showing ceiling effect; and finally, (4) through further pilot testing with feedback sought from older adults with and without aphasia on how accurately item content captures everyday listening activities. This process could also be applied to Talking sub-scale (in particular Item 1, Talking to Spouse) where further development is required, to explicitly capture relationships with partners as well as spouses. This item could not be included within the current COMACT scale because it reduced sub-scale internal consistency by being non-applicable to a large sub-group of the sample. We acknowledge that this item is important, and recommend clinically that this item is used in a reworded form (e.g. focusing on important partner relationships rather than spousal) and information is gathered about frequency of talking activity. This information cannot, however, be currently scored within the Talking sub-scale.

The SOCACT has questionable IC as a measure of social participation overall, and is not consistent at measuring Leisure, Informal and Formal activities. Reference to research literature suggests the relationship between a health condition and social activity participation

is not clear-cut. A study comparing stroke to control participants, for example, revealed no difference between groups in the time they spent participating in social leisure activities (McKenna, Liddle, Brown, Lee & Gustafsson, 2009). The challenge facing researchers and clinicians in developing measures that adequately capture the participation component of the ICF model is acknowledged; a review of available of communicative participation concluded that, currently, no one instrument exists that adequately captures this concept (Eadie et al., 2006). Social participation research has included consideration of personality factors of attitude and motivation, 'environmental' factors such as communication partners (Dalemans et al., 2010a) and social networks (Cruice et al., 2006). The SOCACT was only partly investigated in this study. It also contains an activity partner section and a satisfaction measure - to capture information about the communication environment and how satisfied people are with overall social activity - that were not investigated here. The scale has also been updated recently (SOCACT-2: Cruice 2012) with minor wording changes, but the need remains for ongoing conceptual and psychometric evaluation.

In conclusion, the ongoing need for robust participation measures encourages the further analysis and development of the SOCACT. One method that could be employed is factor analysis, which reveals the underlying structure of a tool through clustering items that measure the same construct (Pring, 2004). This type of analysis was informative in understanding sub-scale structure of the Community Integration Questionnaire (CIQ: Djikers, 2000) initially used in brain injury and now applied to aphasia (Hirsh et al., 2011). Finally, it is recommended that input from older adults with and without aphasia is sought, to ascertain if item content reflects the breadth of potential activities they wish to engage in.

Variable impact of personal factors on communication and social activity

Personal factors, specifically age, gender, emotional statement, and education, as well as linguistic ability, were considered for their contribution to communication and social activity in aphasia. The varying findings are discussed below, in relation to the limited existing literature that exists for comparison. For adults with aphasia, increasing age was related to decreasing communication and social activity. A link between increasing age and diminishing social participation has been reported in other literature (Code, 2003; Dalemans et al., 2010a). However, conflicting findings for age are present in the literature. Mazaux et al. (2013) found no link between communicative activity and age. This could indicate variable findings for age, or possibly different sample age ranges and methodologies. It is also important to note that age may be a proxy for other important variables, such as severity of stroke or visual impairments. In future studies it will be important to disentangle age from other factors, since it is likely that it is not age per se that leads to poorer outcomes, but the associates of older age. For aphasic adults, gender, emotional health and years in education did not significantly relate to communication activity. These findings support those of Mazaux et al. (2013).

Gender was not predictive of PWA's participation in communication or social activity in the current study. Similar to above, conflicting evidence is found in existing literature on social participation. Code (2003) found a non-significant association, and conversely, Dalemans et al. (2010a) found gender to be predictive of social participation. Regardless of the reasons these differences may exist (differing sample sizes, different assessments), gender is worthy of further investigation, as the current study suggests differences may exist for type of social activity.

Emotional health was also found to be non-significant when predicting social participation in this study. This relationship may be complex: better emotional health has been found to significantly correlate with better quality of life, which in turn is linked to better communication ability and fewer social functioning limitations (Cruice et al., 2003).

Number of years in education related positively to some social activities (Formal), and negatively to others (Informal). The evidence base in aphasia is small, and the current study's findings are inconclusive, suggesting further investigation in general of the function that education plays in communication and social activity.

Finally, linguistic ability was considered. Consistent correlation between lower scores (increased severity of impairment) on published assessments with lower scores on COMACT and SOCACT suggested the severity of the aphasia uniquely contributed to activity and participation. This is supported by existing literature wherein severity of aphasia has been linked to increasing difficulties in everyday communication and social activity (Dalemans et al. 2010a; Darrigrand et al., 2011; Mazaux et al., 2013).

Personal factors appeared to influence communication and social activity more in NHP, than PWA. Communication and social participation for NHP were negatively impacted by increasing age and increasing depression (emotional health), but conversely were positively influenced by increased years in education. The impact of personal factors (emotional health and education) appeared more profound for older adults without aphasia. It is possible that the presence of aphasia (or a health condition) may mask the impact of other variables. Emotional health was a non-significant factor in PWA's communication and social activity, yet PWA had significantly higher degrees of depression (as indicated by higher GDS scores) than NHP. Estimates of the prevalence of post-stroke depression range from 25-79% (Kneebone & Dunmore, 2000; Thomas & Lincoln, 2006), although estimates for those with post-stroke aphasia are less clear. Further research is needed to examine the relationship between emotional health and activity engagement, potentially investigating more qualitative aspects of this relationship.

Clinical implications

The COMACT and SOCACT provide quantitative data about real-life communication and social activities from the individuals' own perspective. They are completed through a short face-to-face interview making them potentially useful tools for time-pressured clinicians. The COMACT overall scale, and the Reading sub-scale as a stand-alone measure, is recommended for clinical application. This tool can be used in the assessment stage to aid discussion with clients, and identify personally relevant activities. This information could inform explicit goals for therapy, or identify specific impairment-based linguistic goals that need to be addressed in order to make a particular activity achievable. A strength of the COMACT as a quantitative measure is that it could be used to measure change (i.e. in numbers of communication activities overall), with the caveat that clinicians need to establish if achieving a greater range of communicative activity (higher COMACT score) is an area of focus for the client.

The SOCACT is sensitive to the presence of aphasia, and to age of the participant. Furthermore, people with aphasia who had better functional communication skills, as measured by performance on CADL-2, had increased participation in everyday social activities.

The need for such measures is clear with Simmons-Mackie (2005) drawing attention to the lack of functional communication outcome measures being used by speech therapist in clinical settings. Furthermore, at present no single measure exists that adequately captures the domain of communication participation (Eadie et al., 2006). The SOCACT satisfaction item could form the basis for conversations with PWA around potential participation goals or aspirations. Gustafson and McLaughlin (2009) found that post-stroke patients' goals were at odds with clinicians' goals, most notably in the acute stage of recovery. People with communication disability reported they wished to work on participation goals linked to real-life, rather than the traditional impairment goals (a similar theme is raised by Worrall et al., 2011 as reported in Introduction). Research has also found a mismatch between client and clinician goals, particularly around valued activities such as hobbies (Rohde et al., 2012).

Although data collated from the SOCACT cannot be generalised, there does still appear to be potential clinical use with individuals to identify frequency of engagement in social activities, and particularly, individuals' satisfaction with this. The use of such a tool would also highlight the importance of social participation in rehabilitation more generally.

Limitations of study and Future research

This study provides preliminary psychometric data for the COMACT and SOCACT. In addition to identified areas that require revision, further psychometric testing is recommended. The psychometric evaluation used by Eadie et al. (2006) in their review of participation measures may provide a useful framework, for example they additionally examined reliability (test-retest) and validity (content and face). Future studies could also add useful information about the ways in which demographic profile impacts on stroke. The COMACT and SOCACT were designed to be appropriate for older adults with and without aphasia (mild to moderate in severity), and therefore may not be appropriate for people who have significant aphasia, which may limit their everyday clinical use. Adaptation of these tools to increase their suitability for people with severe aphasia is an area for future research. Furthermore, the activities of people with aphasia and concomitant mobility difficulties are not represented in these findings. Broader sampling to include a range of mobility difficulties is needed, and consideration of this in statistical analysis (i.e. with analysis of covariance) is much needed. Additionally, this study did not find gender to be a significant factor however the higher proportion of female to male NHP participants (in comparison to PWA where gender is more evenly split) is acknowledged.

The original research population was sampled from a mono-cultural Australian participant group. Worrall et al. (2002) observed differences in communication behaviour dependent on personal factors such as age, cultural background, and environment. It is

highlighted that environmental factors were not considered as part of this study (for example, interpersonal relations), and the role these play would be an area for future research. Further pilot testing of both tools would be informative (including a UK-based population) that included younger people, and different cultural or ethnic backgrounds. Participants from a range of healthcare settings (acute hospital settings as well as community-based) could be considered to capture possible differences in activity and participation. This work would provide a current data pool to supplement results available from the original research, allowing better generalisation of results and more accurate psychometric analysis. Feedback from participants could be used to further refine item content; it is noted that recent technological advances impacting on communication (for example, the widespread use of the internet, email and social media tools) are not clearly captured in original item content, which was developed over ten years ago. In order to design a patient-centred measure, protocols developed to capture feedback from service users (through focus groups and expert panels) could be adapted for the aphasia population. Rose, Evans, Sweeney & Wykes' (2011) study describe one such protocol using mixed participatory and qualitative methodology to design an outcome measure suitable for mental health service users, which was then psychometrically tested.

Conclusion

This study provides preliminary psychometric data for the COMACT and SOCACT. Although further testing of both tools is necessary with wider populations, such as those with more severe aphasia, the findings indicate that the COMACT is suitable to use clinically with people with mild to moderate aphasia. This study highlights relationships between the impairment level and personal contextual factors for communication activities and social participation for people with aphasia, which are different to their non-affected peers. The challenge remains to develop tools that accurately capture the personal perspective of people with aphasia, that are inclusive of all persons with aphasia (i.e. include those with severe

aphasia and those with mobility restrictions), and that identify areas of important life participation to inform and guide therapeutic intervention.

Footnotes

[1] Convergent validity could not be tested for the SOCACT as no formal standardised assessment of social participation was administered in this research.

[2] One participant was just below the twelve-month cut-off post stroke.

[3] Members of the parent project were asked to introduce new people to the research; some of these in turn nominated further individuals.

[4] 'Not at all' refers to communication or social activities which the participant chooses not engage in. 'Not applicable' is for those communication or social activities that the participant cannot engage in, for example, COMACT Item 1 'Talk to Spouse' is not applicable if the participant is unmarried/without partner.

[5]The revised version of the WAB (published in 2006) was not published when study data was originally collected.

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Appendix A. Communicative Activities Checklist

How OFTEN do you do these activities? Please tick (✓) ONE box only.

Activity	Daily	Week-ly	Fort-nightly	Month-ly	Rarely	Not at all	N/A
Talk to spouse							
Talk for family							
Talk to friends							
Talk to neighbours							
Talk to shopkeepers/ trades people							
Talk to pets							
Talk on phone							
Talk in a small group of people							
Talk in a large group of people							
Give a speech at an informal group							
Give a speech at a formal group							
Talk about photos							
Tell stories & jokes							
Place bets							
Order drinks							
Say prayers							

Activity	**Daily**	**Week-ly**	**Fort-nightly**	**Month-ly**	**Rarely**	**Not at all**	**N/A**
Listen to radio							
Listen to TV							
Listen to news							
Listen to sports pro-grams							
Listen to a conversa-tion							
Listen to a group of people talking							
Listen to a speech							
Read letters and cards							
Read mail catalogues							
Read pamphlets							
Read magazines							
Read newspapers							
Read novels/ books							
Read the phone book							
Read forms & bills							
Read bank statements							
Read newsletters							
Do crosswords							

Activity	Daily	Week-ly	Fort-nightly	Month-ly	Rarely	Not at all	N/A
Read instructions and labels							
Read bus and train timetables							
Read map and direc-tions							
Write letters and cards							
Write stories and newspaper articles							
Write shopping lists							
Write diary							
Write cheques							
Fill in forms							
Write messages							
Do word puzzles and games							

THANK YOU for filling in this form

Appendix B. Social Activities Checklist

How OFTEN do you do these activities? Please tick (✓) ONE box only per line.

Activity	Weekly	Fort-nightly	Monthly	Rarely	Not at all	N/A
1. Visit exhibitions, museums, libraries						
2. Go to the movies, theatres, concerts, plays						
3. Go to restaurants						
4. Go shopping						
5. Watch television						
6. Read						
7. Exercise or play sports						
8. Take part in outdoor activities						
9. Travel or go on tours						
10. Play cards or other indoor games						
11. Work on hobbies						
12. Play with or help children/ grandchil-dren						

Activity	Weekly	Fort-nightly	Monthly	Rarely	Not at all	N/A
13. Visit or help friends/ relatives						
14. Go to family festivities or parties						
15. Go to church events or religious communities events						
16. Go to meetings of community voluntary organizations or charitable societies						
17. Go to professional events or union meetings						
18. Go to classes or lectures						
19. Go to clubs						
20. Go to political activities or occasions						

With **WHOM** do you **usually** do these activities? Please tick **(✓) ONE** box only.

Leave a blank for those that are not applicable (N/A).

Activity	By self	Spouse	Children	Relatives	Friends
1. Visit exhibitions, museums, libraries					
2. Go to the movies, theatres, concerts, plays					
3. Go to restaurants					
4. Go shopping					
5. Watch television					
6. Read					
7. Exercise or play sports					
8. Take part in outdoor activities					
9. Travel or go on tours					
10. Play cards or other indoor games					
11. Work on hobbies					
12. Play with or help children/ grandchildren					
13. Visit or help friends/ relatives					
14. Go to family festivities or parties					

Activity	By self	Spouse	Children	Relatives	Friends
15. Go to church events or religious communities events					
16. Go to meetings of community voluntary organizations or charitable societies					
17. Go to professional events or union meetings					
18. Go to classes or lectures					
19. Go to clubs					
20. Go to political activities or occasions					

Please tick **(✓)** ONE only:

I am satisfied with the activities I do ☐

I would like to be doing more activities ☐

I would like to be doing fewer activities ☐

Is there anything that limits you in doing these social and recreational activities?

THANK YOU for filling in this form

TABLE 1

Demographic data for participants

	PWA (n = 30)	NHP (n = 75)
Gender	16 female; 14 male	47 female; 28 male
Age	M: 70.96 Range: 57 - 88 SD: 8.4	M: 73.85 Range: 62 - 98 SD: 6.8
Years in Education	M: 3.60 Range: 0 - 12 SD: 3.31	M: 13.18 Range: 6 - 23 SD 3.8
Emotional Health (GDS score)	M: 3.60 Range: 0 - 12 SD: 3.31	M: 1.17 Range: 0 - 5 SD: 1.13

TABLE 2

Summary of Internal Consistency Analysis for COMACT and SOCACT

Measure	PWA Cronbach's α	Corrected Item-Total Correlation	Adjusted Cronbach's α	NHP Cronbach's α	Corrected Item-Total Correlation	Adjusted Cronbach's α
COMACT						
Talking	.54	-.02 to .54	.69	.62	.02 to .47	.64
Listening	.21	-.10 to .35	.38	.46	.08 to .49	.57
Reading	.81	.18 to .61	-	.84	.18 to .66	-
Writing	.69	.21 to .64	.69	.59	.05 to .57	.63
Total	.83	-.21 to .56	.83	.84	-.04 to .89	.86
SOCACT						
Leisure	.55	.09 to .38	-	.49	-.65 to .42	-
Informal	-.25	-.36 to .23	.36	.38	.01 to .47	.57
Formal	.24	-.07 to .47	-	.46	.19 to .45	-
Total	.58	-.30 to .48	.65	.63	-.00 to .43	.64

Note: Non-adjusted Cronbach's *α* values have been omitted (and replaced by -)

TABLE 3

Raw Scores & Independent t-tests (PWA vs. NHP) for adjusted COMACT and adjusted SOCACT

Measure	PWA (n = 30)			NHP (n = 75)					
	M	Range	SD	M	Range	SD	t	df	p (2-tailed)
COMACT									
Talking	8.97	4 - 12	2.07	11.32	6 - 14	2.02	-5.36	103	p < .001
Listening	5.60	4 - 6	.68	5.85	4 - 6	.39	-2.40	103	p < .05
Reading	9.13	0 - 14	3.22	12.51	0 - 14	2.73	-5.43	103	p < .001
Writing	2.53	0 - 7	1.20	5.27	0 - 7	1.60	-7.36	103	p < .001
Total	26.23	16 - 42	6.71	34.95	14 - 41	5.21	-7.26	103	p < .001
SOCACT									
Leisure	8.13	4-11	1.80	9.69	3 - 11	1.68	-4.21	103	p < .001
Informal	2.47	1-3	.57	2.64	0 - 3	.63	-3.47	103	p < .001
Formal	1.57	0-4	1.07	2.57	0 - 5	1.44	-1.31	103	p = .19
Total	12.17	7 - 17	2.47	14.87	6 - 19	2.99	-5.36	103	p < .001

TABLE 4

Significant *Pearson's* r correlations between Linguistic & Functional Communication Assessments with COMACT and SOCACT

	BNT-15		WAB					CADL-2
Measure	PWA (n = 30)	NHP (n = 72[1])	PWA only (n = 30)					PWA only (n = 30)
			AQ	Comp	Spon Speech	Naming	Repetition	
COMACT								
Talking	-	.27*	.60**	.40**	.61**	.53**	.42**	-
Listening	-	-	-	-	-	-	-	-
Reading	.38**	.56**	.39**	-	-	.44**	.38**	.56**
Writing	.42**	.25*	.45**	.41**	.40**	.43**	-	.42**
Total	.44**	.47**	.55**	.44**	.45**	.55**	.47**	.51**
SOCACT								
Leisure	-	.54**	-	-	-	-	-	-
Informal	-	.35**	-	-	-	-	-	-
Total	.44**	.46**	-	-	-	-	-	-

[1] Data not available on BNT for 3 NHP

Note: All non-significant correlations are omitted (and replaced by -)

Note:* Correlation significant, $p < .05$. (2-tailed)

Note: ** Correlation significant, $p < .01$. (2-tailed)

TABLE 5

Raw scores for assessment battery for PWA only (n = 30)

Assessment	M	Range	SD
CADL-2	73.4	31 - 95	16.72
BNT-15	8.77	0 - 15	4.68
WAB AQ	74.34	21.9 - 95.8	18.56
WAB spontaneous speech	15.03	4 - 20	4.17
WAB auditory comprehension	8.49	6.05 - 10	1.3
WAB repetition	6.92	0 - 10	2.87
WAB naming	6.74	0 - 9.5	2.41

TABLE 6

Significant Pearson r Correlations for Independent Variables, PWA vs. NHP

	Age		Years in education		Emotional Health	
	PWA	NHP	PWA	NHP	PWA	NHP
COMACT						
Talking	-	-.32**	-	.26*	-	-.27*
Reading	-.53**	-.43**	-	.35**	-	-.39**
Writing	-.39**	-.31**	-	.33**	-	-.36**
Total	-	-.44**	-	.39**	-	-.43**
SOCACT						
Leisure	-.42**	-.49**	-	.42**	-	-.29**
Formal	-.40**	-.24*	.53**	.40**	-	-.30**
Informal	-	-.42**	-.43**	.35**	-	-.39**
Total	-.47**	-.47**	-	.49**	-	-.38**

Note: All non-significant correlations are omitted (and replaced by -)

Note:* Correlation significant, $p < .05$. (2-tailed)

Note: ** Correlation significant, $p < .01$. (2-tailed)