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To cite this article: Dana Wong, Hannah Miller, David Lawson, Karen Borschmann, Alexandra Armstrong, Nick Sathanathan, Nicolette Kamberis, Jessica Skaliotis & Emma Power (12 Feb 2024): Development of the Valued Living Questionnaire – Comprehension Support version (VLQ-CS) and validation in adults with acquired brain injury, *Disability and Rehabilitation*, DOI: [10.1080/09638288.2024.2315510](https://doi.org/10.1080/09638288.2024.2315510)

To link to this article: <https://doi.org/10.1080/09638288.2024.2315510>



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Published online: 12 Feb 2024.



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Development of the Valued Living Questionnaire – Comprehension Support version (VLQ-CS) and validation in adults with acquired brain injury

Dana Wong^{a*} , Hannah Miller^{a*} , David Lawson^a , Karen Borschmann^b , Alexandra Armstrong^a, Nick Sathananthan^a , Nicolette Kamberis^a, Jessica Skaliotis^a and Emma Power^{c,d} 

^aSchool of Psychology and Public Health, La Trobe University, Melbourne, VIC, Australia; ^bFlorey Institute of Neuroscience and Mental Health, University of Melbourne, Heidelberg, VIC, Australia; ^cUniversity of Technology Sydney, Speech Pathology, Graduate School of Health, Sydney, Australia; ^dThe Centre for Research Excellence in Aphasia Rehabilitation and Recovery (Aphasia CRE), Melbourne, VIC, Australia

ABSTRACT

Purpose: Valued living (acting in accordance with personal values) is associated with better outcomes after acquired brain injury (ABI), but its measurement using the Valued Living Questionnaire (VLQ) may not be valid due to comprehension errors relating to structure and content. We aimed to modify the VLQ to improve its accessibility and evaluate construct validity and reliability in an ABI cohort.

Materials and methods: Adaptations made in the VLQ – Comprehension Support version (VLQ-CS) used established communication support methods and addressed common comprehension errors. 103 community-dwelling participants (34% female; mean age 52.17, range 19–79) with ABI (66% stroke, 16% TBI, 18% other) completed the VLQ-CS, and measures of convergent (valued living, mood, wellbeing, psychological inflexibility) and divergent validity (subjective memory). Test-retest reliability was evaluated with repeated administrations 6–8 weeks apart for a subset of participants ($n=44$), using Intraclass Correlation Coefficients (ICCs).

Results: Convergent validity was supported; VLQ-CS scores were positively correlated with measures of valued living ($r=.60-.65$) and wellbeing ($r=.64-.67$), and negatively correlated with depression ($r=-0.56-.58$), anxiety ($r=-0.35-.38$) and psychological inflexibility ($r=-0.37-.41$). Divergent validity was marginal ($r=-0.29$). Test-retest reliability was good for the VLQ-CS Composite score (ICC=.80).

Conclusions: The VLQ-CS shows promise as a valid, reliable measure of valued living post-ABI. Future research should extend to neurotypical and other clinical populations.

ARTICLE HISTORY

Received 1 July 2023
Revised 5 January 2024
Accepted 2 February 2024

KEYWORDS

Valued living; Valued Living Questionnaire; acquired brain injury; reliability; validity; accessibility; rehabilitation

► IMPLICATIONS FOR REHABILITATION



- Valued living or values-based action is associated with better functional and psychosocial outcomes after acquired brain injury (ABI) and is therefore an important target for intervention.
- Measurement of valued living needs to be clear, easily understood, and relevant for people with cognitive and communication impairments associated with ABI and other conditions.
- The Valued Living Questionnaire – Comprehension Support version (VLQ-CS) was developed to optimise accessibility and reduce comprehension errors.
- The VLQ-CS is valid, reliable and fit-for-purpose as a measure of valued living for people with ABI.

Introduction


Valued living represents the extent to which an individual engages in actions consistent with their personally held values [1]. For example, a personal value around social connection may be reflected in actions such as calling a friend or joining a book club. Values and valued living provide life with a sense of meaning and guide the prioritisation of goals in acquired brain injury (ABI) rehabilitation [2]. Value-consistent action can serve to maintain and enrich self-concept [3], facilitating adjustment to life after ABI [4]. Conversely, a reduction in value-consistent action or “valued living” is associated with higher prevalence of mood disorders [5, 6], which are common following ABI [7]. With a recent increase in research evaluating values-based interventions such as

Acceptance and Commitment Therapy (ACT) to address the high rates of emotional difficulties after ABI [8–12], the accurate evaluation of personal values and valued living in people with ABI is becoming increasingly important.

The Valued Living Questionnaire (VLQ), developed by Wilson, Sandoz, Kitchens, and Roberts (2010) [1], was the first and remains perhaps the most widely recognised measure of valued living [13]. In their investigation of the construct validity of the original VLQ, Wilson and colleagues (2010) conducted correlations between the VLQ Composite scale and measures of theoretically related constructs, including the Butcher Treatment Planning Inventory (BTPI; [14]), Acceptance and Action Questionnaire (AAQ-II) [15] and the Short-Form 36 (SF-36; [16]). The Composite scale (measuring overall valued living)

CONTACT Dana Wong  d.wong@latrobe.edu.au  School of Psychology and Public Health, La Trobe University, Melbourne, VIC, Australia

*These authors are joint first authors of this work

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/09638288.2024.2315510>.

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displayed weak but significant negative correlations with several measures including depression, anxiety, and psychological flexibility. No other established measure of VL was available at the time to include as a direct measure of convergent validity. To investigate the temporal consistency of the original VLQ [1], Pearson product-moment correlations between the two administrations (1–2 weeks apart) were calculated. The test-retest reliability of the Importance scale (how much the ten life domains are valued overall) was highly reliable (.90) whereas the Consistency Scale (value-consistency of actions, as indicated by the extent to which respondents feel they have behaved consistently with their values in the past week) was marginal (.58). The authors suggested that this latter finding was not surprising as actions are likely to change over the course of 1–2 weeks, and in their view did not reflect an issue with the VLQ's reliability. The reliability of the Composite Scale (which multiplies importance scores by consistency scores) was found to be good (.75), suggesting that actions may have been less variable for life domains rated as more important (which are weighted more heavily in the Composite Scale).

The VLQ has been adapted for research in several clinical populations, including in the context of alcohol consumption [17] and stress in carers of people with dementia [18]. However, the questionnaire has not previously been adapted for ABI or other cohorts commonly affected by significant cognitive and/or communication difficulties. When adapting or developing questionnaires for ABI, researchers have noted the importance of ensuring that the wording and concepts of the questionnaire can be accurately interpreted. Several studies aiming to adapt measures for ABI have ensured content validity through either the development or adaptation of content items based on interviews with individuals with ABI [19, 20]. For example, in the development of the Brain Injury Questionnaire of Sexuality (BIQS; [21]), questionnaire items were in part derived from traumatic brain injury (TBI) patient interviews to support the validity of the measure. The high convergent and divergent validity of the BIQS with similar and dissimilar measures respectively supported the utility of this approach.

Adapting and validating measures for ABI populations is also essential because measures developed and validated in a non-ABI sample may not be suited to post-ABI needs and experiences. For example, Whiting et al. (2015) [20] evaluated validation data on the Acceptance and Action Questionnaire-II (AAQ-II; [15]) and a version adapted for brain injury, the Acceptance and Action Questionnaire-Acquired Brain Injury (AAQ-ABI; [22]). They found that whilst both measures could be used with individuals with ABI, the AAQ-ABI measured psychological flexibility about the thoughts and feelings relating to the brain injury itself while the AAQ-II measured psychological flexibility around general psychological distress. The authors concluded that the one factor model of the original AAQ-II was not a good fit in an ABI population.

In a previous study [23], we invited adults with ABI to participate in a cognitive interview which probed their understanding of the original version of the VLQ. We identified and described 11 different comprehension errors commonly made by participants with ABI, including difficulties related to the structure of the measure (rating parts 1 and 2 separately), the cognitive demands associated with rating the importance of personal values in an abstract sense, and recalling and evaluating the value-consistency of their actions in the last week. Key concepts of the questionnaire were not well understood, including the concept of personal (rather than societal) importance, “consistency” of actions with values, and evaluating current importance and actions without reference to pre-injury values and actions. These comprehension errors highlighted the need for an adapted version of the VLQ more suitable for people with cognitive and/or communication impairment.

In this study, we aimed to develop a valid and reliable adaptation of the VLQ, the Valued Living Questionnaire – Comprehension Support version (VLQ-CS). Adaptations were guided by the comprehension errors previously identified [23] as well as principles of cognitive and communication support, including those recommended in the clinical guidelines (Stroke Foundation) for design of communicatively accessible written materials [24, 25] and communication support strategies for questionnaire administration [26]. We also aimed to investigate the psychometric properties of the VLQ-CS, specifically the test-retest reliability and construct validity (including convergent and divergent validity). It was hypothesised that, as for the original VLQ, the adaptations made to the VLQ-CS would mean that the Importance scale would be highly reliable between time points, the Consistency scale would have poor reliability due to the variability in behaviour week-to-week, and the Composite scale would demonstrate adequate test-retest reliability. We also hypothesised that the VLQ-CS would have adequate construct (convergent and divergent) validity, as reflected by moderate-strong correlations with similar measures of valued living and related constructs (e.g., mood, wellbeing, psychological flexibility), and no significant correlation with a dissimilar measure.

Method

This paper is reported in accordance with STROBE guidelines. Ethical approval for this study was obtained from the La Trobe University Human Research Ethics Committee (HEC18423), Monash Health (RES-19-0000268A) and Alfred Health (494/19).

Participants

Participants were included if they (i) were aged 18 years or over; (ii) had an ABI (including traumatic brain injury, stroke, or other non-degenerative ABI) that was either confirmed by the referring clinician or by health records, and (iii) had sufficient cognitive and language skills to complete the study tasks including conversing in groups, as judged by the referring and/or intake clinician (participants were sourced from clinical trials). This latter criterion meant that we did not have any participants with severe aphasia in the sample; however, the sample did include participants with moderate-severe cognitive and/or communication impairment (for example, requiring cues to consistently communicate ideas or understand simple instructions with an unfamiliar communication partner). Participants were excluded if they had (i) a pre-existing intellectual disability, or (ii) a severe psychiatric disorder.

Power analyses using GPower were based on effect sizes in previous research [1, 5, 6, 27] and indicated that to achieve a power of .8 ($\alpha = .05$), 399 participants were needed to find a small effect (psychological flexibility), 75 for a moderate effect (anxiety), and 17 for a large effect (depression and well-being).

Materials

Valued Living Questionnaire – Comprehension Support (VLQ-CS)

The VLQ-CS was adapted from the VLQ [1]. The adaptations made in the VLQ-CS were developed and implemented collaboratively by our multidisciplinary research team which included a speech and language therapist experienced in communication support methods as well as experienced, novice and trainee clinical neuropsychologists, one of whom has lived experience of stroke and aphasia. Adaptations included both general strategies to improve accessibility of materials for people with ABI, and specific revisions

to address the comprehension errors identified in our cognitive interviewing study [23]. General strategies included pictorial aids (e.g., thumbs up/down to indicate higher/lower ratings), simplification and inbuilt repetition of instructions, concrete examples of abstract concepts (i.e., examples of valued action in each life domain), and a visual rating scale where verbal expression may otherwise interfere [28, 29]. Principles of communication support were also utilised, including simple and high frequency words, short sentences, use of large and standard font, bolding or underlining key concepts, spacing each question on a separate page to avoid distraction by other questions, an increased amount of white space between the question and response set, and supporting questions with a specifically designed pictogram [24, 25,

30]. Furthermore, prompts were given by clinician administrators, drawing on a range of suggested communication support methods which are described in the administration instructions. The adaptations associated with specific comprehension errors identified by Miller and colleagues (2022) [23] are outlined in Table 1. The full VLQ-CS is in Appendix 1 (see supplementary material), together with administration and scoring instructions.

Scoring procedures were also adapted. For the original VLQ, three scores are derived: (i) the Importance score (VLQ-Importance) which is the sum of ratings for part 1 (the equivalent of part a in the VLQ-CS); (ii) the Consistency score (VLQ-Consistency) which is the sum of ratings for part 2/b; and (iii) the Valued Living Composite (VLQ-Composite) which is the sum of products

Table 1. Comprehension errors associated with completing the VLQ and associated VLQ-CS adaptations.

Comprehension error category – original VLQ	VLQ-CS adaptations
1. Misunderstanding the nature of each domain in part 1 (including difficulty identifying concrete examples of values-based actions in that domain)	<ul style="list-style-type: none"> Concrete examples of each domain, including pictorial aids, have been included to aid interpretation and assist participants to generate their own concrete examples of what the domain looks like in everyday life for them. The structure of the measure has been altered and consistency such that part b) (called part 2 in the original VLQ) is rated immediately after importance (part a) for each domain. This allows the user to immediately identify if they have misinterpreted a domain and change their rating for importance if needed. The names of three domains have been changed; “spirituality” was changed to “spirituality/meaning in life” as participants misunderstood spirituality to be limited to religion, “citizenship/community” was changed to “community” due to misinterpretation of the term “citizenship”, and “physical care” was changed to “health/wellbeing” to suggest a more holistic view of health, including mental health, nutrition and sleep as well as physical activity.
2. Poor understanding of the concept of personal importance <ul style="list-style-type: none"> c) Rating importance based on ideal values or societal expectations, rather than personal importance d) Rating domains on the basis of time spent or relative “success” in that area rather than personal importance 	<ul style="list-style-type: none"> For each domain, the question at the top of the page is “how important is [domain] to you at the moment?” The addition of “to you” emphasises that the rating should be made in terms of personal importance. The administration instructions state that for people with communication difficulties, the person assisting them should ensure they understand this concept through gestural or pictorial supports – for example “I want to know how important it is for you [point to the person, emphasise the word ‘you’], not for everyone else/in general [point to yourself, and gesture to others outside], just you [point to person again]”. The word “important” for part a) is underlined to emphasise the question is about personal importance rather than success in that domain. The rating scale also features the words “not important” (1) and “very important” (10) on every page to remind participants to provide a rating based on importance.
3. Confusion around the term “consistency”; whether it relates to consistency of action with the value or consistency over time	<ul style="list-style-type: none"> The term “consistency” has been replaced with a scale of “not ideal at all” (1) to “ideal” (10). This frames the conceptualisation of “consistency” in simpler terms that are easier to understand, by making the comparator “the ideal”.
4. Poor comprehension of questionnaire instructions	<ul style="list-style-type: none"> The instructions at the beginning of the VLQ-CS have been shortened and simplified. Also, there is in-built repetition of instructions with the question (“how important is [domain] to you at the moment?” (part a) or “in the last week, how much quality time or effort have you spent on [domain]?” (part b) at the top of every page.
5. Reluctance to rate importance (part 1) if it was felt the domain was not applicable	<ul style="list-style-type: none"> The word “important” for part a) is underlined to emphasise the question is about personal importance rather than success in that domain. The rating scale features the words “not important” (1) and “very important” (10) on every page to remind participants to provide a rating based on importance.
6. Memory difficulties in part 2 – difficulty remembering (i) actions over the last week or (ii) the importance rating from part 1 in order to complete part 2	<ul style="list-style-type: none"> The structure has been altered so that part a) (importance) and part b) (consistency) for each domain immediately follow one another. This lessens the need for the rater to remember the value assigned for importance when completing part b).
7. Perseverating on the idea of importance when completing part 2	<ul style="list-style-type: none"> The altered structure of the measure means that the rater is oriented to the fact they need to rate two differentiated aspects of a domain (i.e., importance and value-consistent actions). The wording for part b) is also shortened and simplified, and the idea of value-consistent actions is presented in a concrete way by phrasing it in terms of “quality time or effort” spent on relevant activities.
8. Forgetting the applicable time frame (<u>in the past week</u>) when: <ul style="list-style-type: none"> e) Thinking about the importance of domains in part 1 f) When rating domains in part 2 	<ul style="list-style-type: none"> For each domain the question for part b “how important is [domain] to you at the moment?” Addition of “at the moment” has been included to emphasise that the domain should be rated in terms of how the domain is to the individual currently. For part b the statement “please rate for <u>this week</u>” is written above the rating scale with “this week” underlined. A 7-day calendar is also presented next to this statement as a visual cue to think about whether time or effort for a domain has been ideal over the last 7-day period.
9. Difficulty with mental reversal for unimportant domains when rating part 2 items (i.e., a lack of action being consistent with low importance of that domain)	<ul style="list-style-type: none"> As part of the administration instructions, if the rater decides the domain is not important to them (i.e., if they assign a value 4 or less for importance), part b is not administered and they do not rate consistency for that domain.
10. Uncertainty about part 2 ratings due to applicability of relevant actions for more than one domain (e.g., volunteering and work)	<ul style="list-style-type: none"> Included in the administration instructions is the directive that where there is cross-over between domains, a single action or activity can contribute towards multiple domains. For example, if it is relevant to the individual and they have spoken of volunteering, it may be considered when completing part b) for both “community” and “work”.
11. Difficulty assigning a numerical rating using the rating scale	<ul style="list-style-type: none"> Pictorial aids have been added to the rating scale which appears on every page, with a thumbs down for 1 (not at all important/ideal) and a thumbs up for 10 (extremely important/ideal) appear on either end of the scale. The scale is also graded in terms of colour, with numbers 1 to 5 (darkest to lightest) in red and numbers 6 to 10 in green (lighter to darkest). The wording of the rating scale for part b) has been changed from “not at all consistent” (1) and “completely consistent” (10) to “not ideal at all” (1) or “ideal” (10).

Note: A more detailed description of the comprehension errors can be found in Miller et al. 2022.

(Importance \times Consistency) for each domain. In the VLQ-CS, ratings for part b are only included in calculations for the VLQ-Consistency or VLQ-Composite scales if the domain is rated ≥ 5 for importance. To account for the variation in the number of scores summed (as the consistency score will be missing for domains rated 4 or less for importance), the VLQ-Consistency score is prorated by summing available consistency ratings, dividing the sum by the number of ratings included, and multiplying by 10. Similarly, as the VLQ-Composite score is also missing for unimportant domains, this score is prorated in the same way. Detailed scoring instructions, including a worked example presented in table format, are included in [Appendix 1](#) (see [supplementary material](#)).

Convergent validity measures

Another established measure of valued living (Valuing Questionnaire), as the closest measure to the VLQ-CS, was included to examine convergent validity. Three additional measures of related constructs were also included: (i) mood (anxiety, depression); (ii) psychological inflexibility, which along with mood was also included in the validation of the original VLQ; and (iii) well-being, due to more recent data on its association with valued living [2, 27, 31]. Whilst in the validation of original VLQ, only modest correlations were observed for depression, anxiety, and psychological inflexibility, the authors noted that the healthy participants on average reported a high level of valued living. In clinical populations, stronger negative correlations have been observed between valued living and anxiety [6] and depression [5, 27]. We utilised the AAQ-ABI, as an adapted version of the AAQ, which was significantly (although weakly) correlated with the VLQ in the original validation study.

Valuing Questionnaire (VQ)

The VQ [32] is a 10-item self-report instrument designed to measure enactment of personal values over a one-week period, but (unlike the VLQ) without reference to specific life domains. Responses to each item range from 0 (not at all true) to 6 (completely true) and scores for two scales are produced: (i) VQ-Progress, which taps into the extent respondents are attuned to and acting in accordance with their values, with higher scores (ranging from 0–30) representing closer alignment between values and actions, and (ii) Obstruction (VQ-Obstruction), which reflects the extent to which disruptions get in the way of valued living. Only the VQ-Progress score was used in this study as it is in the most analogous to the VLQ-CS Consistency and Composite scores.

Hospital anxiety and depression scale (HADS)

The HADS [33, 34] is a reliable self-report measure of anxiety and depression symptom severity. The HADS contains 14 items relating to symptoms of anxiety (HADS-A) and depression (HADS-D), with scores ranging from 0 to 21 for each scale (0 to 7 representing “normal”, 8–10 “mild”, 11–14 “moderate,” and 15–21 “severe” levels of anxiety or depression). The HADS is a valid measure of anxiety and depression symptoms following ABI [35].

Short Warwick-Edinburgh mental well-being scale (SWEMWBS)

SWEMWBS [36] comprises seven items from the full 14-item WEMWBS [37] covering subjective well-being. Statements are positively worded with five response categories from 1 (none of the time) to 5 (all of the time). Higher scores reflect greater subjective well-being; raw scores (ranging from 7 to 35) are transformed into

metric scores using a conversion table developed to facilitate parametric statistical analyses [36]. The SWEMBS has been found to be a valid measure of mental well-being in clinical populations [38].

Acceptance and Action Questionnaire-acquired brain injury (AAQ-ABI)

The AAQ-ABI [22] is a 9-item scale assessing both acceptance and avoidance of thoughts and feelings that may arise following brain injury. Statements such as “I hate how my brain injury makes me feel about myself” are rated on a 5-point Likert scale from 0 (not at all true) to 4 (very true) to produce a raw score from 0 to 36. Higher scores indicate greater psychological inflexibility. The AAQ-ABI has been validated in individuals with ABI [20].

Divergent validity

A measure of subjective everyday memory failures was chosen to explore divergent (also called discriminant) validity as a measure of a theoretically distinct construct that is also affected by ABI but not related to valued living.

Everyday Memory Questionnaire-Revised (EMQ-R)

The EMQ-R [39] was revised and shortened from the Everyday Memory Questionnaire [40]. The EMQ-R is a 13-item scale which measures everyday memory failures. Responses occur on a five-point Likert scale from 0 (“once or less in the last month”) to 4 (“at least once a day”), and scores ranging from 0 to 52. The total score was used for analysis, with higher scores representing a higher frequency of memory lapses. The EMQ-R has demonstrated good validity in neurological samples [39].

Procedure

Participants provided relevant demographic information (gender, birthdate, type and age at injury, and years of education) before completing questionnaires. Data were not consistently collected on ethnicity, however participants were asked if they identified as Aboriginal or Torres Strait Islander.

Data collection occurred from December 2019 to May 2022, during which time the Covid-19 pandemic caused Australia’s states to enter and exit periods of lockdown, especially in Victoria and New South Wales. Some assessments were conducted face-to-face at La Trobe University or in participants’ homes, whilst others were conducted via videoconference (Zoom) due to pandemic-related restrictions. The assessments were conducted by provisional psychologists undertaking doctoral or master’s-level training in clinical neuropsychology or registered clinical neuropsychologists. Assessors administered the VLQ-CS and helped participants interpret and complete the questionnaires. Some participants were sent some questionnaires to complete independently before meeting with the assessor to complete the remaining measures; however the VLQ-CS was always done with an assessor. Only data from a subset of the sample (44 participants) was available at two separate time-points to examine test-retest reliability. These assessments were 6–8 weeks apart and participants did not undertake any other study activities (including interventions) between the two administrations.

Data analysis

Statistical analyses were conducted using IBM SPSS version 22. Descriptive and frequency analyses were used for demographic

data. All variables were screened for outliers and data entry errors, and adherence to statistical assumptions for correlational and regression analyses: homoscedasticity, linearity, and normality using the Shapiro-Wilks statistic.

Test-retest reliability was calculated using an intraclass correlation coefficient (ICC) approach (two-way mixed effects, absolute agreement, multiple raters/measurements). A reliability coefficient of between 0.75 and 0.9 was considered to indicate good reliability [41]. Using a sample size calculator (<https://wnarifin.github.io/ssc/ssicc.html>), it was estimated that 34 participants were required to calculate an expected ICC of 0.75 ± 0.15 with 95% confidence.

To evaluate convergent and divergent validity, Pearson product-moment correlations were conducted to establish the presence of bivariate relationships between the Consistency and Composite scales and the other measures. The Consistency and Composite scores were chosen as measures of the value-consistency of actions and overall valued living (weighted to important domains) respectively. The Importance score was not hypothesised to demonstrate relationships with the other measures and was not included in previous VLQ validation studies. Cohen's conventions for interpreting the strength of correlational relationships were used, with $r = .10$ as weak, $r = .30$ as moderate and $r = .50$ as strong correlations [42].

As there is no single cut-off for correlational strength reflecting construct validity, the recommended multitrait multimethod was utilised whereby measures reflecting similar and dissimilar concepts were chosen as reference measures and construct validity was said to be supported with at least 75% of *a priori* hypotheses about the direction of relationships with convergent and divergent measures confirmed [43, 44]. In this case, there were six of these hypotheses: that there would be positive correlations with the VQ-Progress Scale and the SWMWBS; negative correlations with the HADS-D, HADS-A and AAQ-ABI; and no significant correlation with the EMQ-R. Therefore, to demonstrate construct validity using the multitrait multimethod, five of the six hypotheses (83.3%) would need to be supported.

Results

Data screening and preparation

No outliers were identified except for one participant within the test-retest dataset with extreme scores between time points, which was removed [45]. The variable distributions were within normal limits (according to the Kolmogorov-Smirnov test), except for the AAQ-ABI which was positively skewed. This scale was normally distributed after square root transformation was applied, confirmed by inspection of histograms. Consequently, all analyses were performed using the transformed variable (note that transformation did not impact the overall pattern of results).

Sample characteristics

There were 103 participants that met eligibility criteria. Participants were aged 19 – 79 years ($M=52.17$, $SD=13.24$), of whom 66% were male ($n=68$) and 34% were female ($n=35$). Participants had a range of injury types, including stroke ($n=68$), TBI ($n=16$), CNS tumor ($n=5$), encephalitis ($n=2$), multiple sclerosis ($n=4$), infection ($n=2$), cerebral amyloid angiopathy ($n=1$), and multifactorial ABI ($n=5$). The time since injury varied from < 1 – 47 years ($M=4.37$, $SD=6.17$, $Mdn=2.00$). Level of education ranged from 8 – 21 years ($M=14.73$, $SD=2.55$). No participants identified as Aboriginal or Torres Strait Islander.

Descriptive statistics on all measures are presented in Table 2. The mean VLQ-CS Composite score of 53.55 was lower than the mean VLQ Composite score of 64.21 in the original university student sample [1], reflecting lower valued living in this ABI cohort. When examining VLQ-CS Composite scores by injury type, classified as stroke ($n=68$), TBI ($n=16$) or other ($n=18$), there was a significant difference between subgroups ($F(2,99) = 5.87$, $p < .01$) whereby those with “other” ABI types ($M=41.79$, $SD=13.69$) had significantly lower valued living than participants with stroke ($M=55.75$, $SD=15.61$) and TBI ($M=55.92$, $SD=18.16$). VLQ-CS scores were not associated with time post-injury or years of education. Severity of anxiety and depression symptoms ranged from “normal” to “severe” and on average fell in the “normal” range. Most participants experienced everyday memory or other cognitive problems, as they were recruited from intervention trials where these were an eligibility criterion. This was consistent with EMQ-R scores, which were similar to other ABI samples, and indicated that everyday memory complaints were common in this sample [46]. Approximately 15 participants (15%) required communication supports during the interventions delivered in the trials from which data for this study were drawn, due to reported or observed mild-moderate aphasia. These supports were provided by therapists and included provision of simplified written information supported by pictures where required, and verbal strategies such as slowing down, rephrasing and simplifying sentences, clarifying the participant's understanding and verifying their verbal responses [24–26]–[27].

Test-retest reliability

For the subset of 44 participants who completed the VLQ-CS at two time points, reliability was found to be moderate for the Importance scale ($ICC = .66$, $p < .001$) and good for both the Consistency ($ICC = .80$, $p < .001$) and Composite ($ICC = .80$, $p < .001$) scales. Intraclass correlation coefficients and confidence intervals are displayed in Table 3.

As the results of an interim analysis conducted early in 2020 showed higher test-retest reliability at that point than in the final results, we speculated that Covid-19 lockdowns may have impacted the variability of value-consistent actions (e.g., whether or not people could work on “relationships” values by socialising). While there was insufficient power to calculate separate ICCs for participants who experienced a change in lockdown status between the first and second assessments (“lockdown-changed”, $n=20$) and those for whom there was no change in lockdown between

Table 2. Descriptive statistics for valued living, mood, wellbeing, psychological inflexibility and everyday memory measures.

Variable	<i>n</i>	<i>M</i> (<i>SD</i>)	Range
VLQ-CS	103		
Importance		77.56 (12.12)	42–103.08
Consistency		60.77 (16.26)	20–96
Composite		53.55 (16.55)	10–94.20
HADS	103		
Depression		6.63 (4.37)	0–20
Anxiety		7.20 (4.15)	0–19
SWEMWBS	103	23.35 (5.32)	11–35
VQ	51		
Progress		15.41 (7.20)	1–27
Obstruction		15.08 (5.87)	2–25
AAQ-ABI	51	15.09 (8.44)	3–32
EMQ-R	92	23.38 (12.98)	4–51

Note. VLQ-CS=Valued Living Questionnaire – Comprehension Support (VLQ-CS), HADS=Hospital Anxiety and Depression Scale, SWEMWBS=Short Warwick-Edinburgh Mental Well-being Scale, VQ=Valuing Questionnaire, AAQ-ABI=Acceptance and Action Questionnaire-Acquired Brain Injury (AAQ-ABI), EMQ-R=Everyday Memory Questionnaire-Revised.

Table 3. Test-retest reliability of the Valued Living Questionnaire – Comprehension Support version.

	Intraclass correlation	95% Confidence interval		F test			
		Lower	Upper	Value	df1	df2	Sig
Importance	.66	.44	.79	4.76	43	43	<.001
Consistency	.80	.63	.89	4.84	43	43	<.001
Composite	.80	.63	.89	4.92	43	43	<.001

timepoints (“lockdown-consistent”, $n=24$), correlations between VLQ-CS scores at the two timepoints were conducted separately for these two groups to explore the possibility that they had different effect sizes. Participants were categorised as being in a lockdown if their typical, day-to-day activities were restricted by government Covid-19 policies [47]. Sixteen of the 24 participants in the “lockdown-consistent” group were not in a lockdown at either administration, though five of these participants were in lockdown at some point in between administrations of the VLQ-CS. There were 11 “lockdown-consistent” participants who didn’t experience a lockdown at all during the study, including four who participated pre-pandemic.

For all VLQ-CS scales, the magnitude of correlations between the two time points was higher for the “lockdown-consistent” group (Importance: .77, Consistency: .73; Composite: .78) than for the “lockdown-changed” group (Importance: .56, Consistency: .59; Composite: .44).

Construct validity

Convergent validity

As presented in Table 4, the Consistency and Composite scales both displayed strong positive correlations with VQ-Progress and SWEMWBS scores, strong negative correlations with depression, and moderate negative correlations with anxiety and the AAQ-ABI. These five correlations were all in the hypothesised direction.

Divergent validity

As shown in Table 4, both the Consistency and Composite scales displayed also displayed weak significant (at $p < .05$ level) negative correlations with the EMQ-R, contrary to the hypothesis that there would be no significant correlation.

The validity analyses together met the multitrait multimethod criterion of at least 75% of *a priori* hypotheses supported, with five of the six hypotheses (83.3%) supported.

Discussion

Our aim was to adapt and validate a measure of valued living suited to the needs of individuals with cognitive and communication difficulties. Adaptations to the VLQ incorporated communication support strategies and addressed the comprehension errors identified in a previous study within an ABI cohort [23]. Adaptations included the addition of pictorial aids and concrete examples to support interpretation of questions, simplification of the instructions and rating scale, and alteration of the structure. Instructions were also created to guide administration for those with cognitive or communication difficulties. The VLQ-CS demonstrated good test-retest reliability and good construct validity. Overall, the VLQ-CS appears a valid and reliable tool suitable for use in clinical practice and research with people with ABI.

Exploratory analyses examining the impact of lockdown-consistency suggested that test-retest reliability may have been reduced by participants whose lockdown status changed between

Table 4. Correlations between VLQ-Consistency and VLQ-Composite scales and convergent and divergent validity measures.

	<i>n</i>	VLQ-Consistency	VLQ-Composite
HADS-Depression	103	-.56**	-.58**
HADS-Anxiety	103	-.35**	-.38**
SWEMWBS	103	.64**	.67**
VQ-Progress	51	.60**	.65**
AAQ-ABI	51	-.41**	-.37**
EMQ-R	92	-.29*	-.29*

Note. HADS = Hospital Anxiety and Depression Scale, SWEMWBS = Short Warwick-Edinburgh Mental Well-being Scale, VQ = Valuing Questionnaire, AAQ-ABI = Acceptance and Action Questionnaire-Acquired Brain Injury (AAQ-ABI), EMQ-R = Everyday Memory Questionnaire-Revised.

* $p < .05$, ** $p < .01$, two-tailed.

timepoints (as correlations between timepoints were substantially lower for this group). This was not an initial aim of the study, which was conceived and designed pre-pandemic, but an interesting subsidiary finding. It is feasible that lockdowns impacted valued actions given the restrictions placed on people’s movements and activities [47]. For example, Melbourne’s tightest restrictions involved enforced “stay at home” rules that meant individuals were only allowed to leave the house for “essential activities” within a 5-kilometre radius from their homes. There were also restrictions placed on socialising and participating in community programs (e.g., many recreational and religious services had to be converted to online delivery). This possibly had a positive effect for some life domains, such as parenting, where more time and effort was spent in the home; and a negative impact on others, such as social connection. The “lockdown-consistent” cohort included participants who experienced lockdowns between timepoints, which may also have impacted results. It would be interesting to further explore the relationship between lockdowns, valued living, and mood in future research.

While moderately reliable with an ICC of .66, the Importance scale in the current study fell short of the original VLQ which had excellent reliability (.90). The extent to which life domains are personally valued should theoretically display greater reliability across time compared to week-to-week behaviour measured by the Consistency scale, as was demonstrated by Wilson and colleagues [1]. However, it should also be noted that in the validation of the original VLQ [1], the time in between administrations was 1–2 weeks, whereas in our study it was 6–8 weeks. It is possible that some participants, particularly in the early period post-injury, experienced a change in personal priorities in the two months between administrations. Future research would be needed to explore the potential significance of changes in the VLQ-CS Importance Scale scores at different stages post-injury. Reorganising one’s personal priorities can be a helpful process that enables individuals to regain a sense of control in their everyday lives following an ABI and to re-evaluate the activities that give “meaning and purpose in life” [48].

Interventions targeting valued living generally use scores on the Consistency and Composite scales for outcome measurement (as they reflect changes in value-consistent behaviour), and therefore adequate reliability of these scales is perhaps of greater

significance for research and practice than the Importance scale. The VLQ-CS Consistency scale was more reliable in our sample (ICC = .80) than in the study of the original VLQ, which had marginal reliability ($r = .58$; [1]). This was unexpected, especially as valued living could plausibly be more variable in an ABI cohort and during a pandemic. One interpretation of this finding is that the adaptations incorporated in the VLQ-CS reduced the impact of comprehension errors on the variability of item responses. It is possible that value-consistent actions are not in fact as variable from week to week as originally thought, but rather that the poor reliability of the Consistency scale in the VLQ may have been due to unstable interpretations of what the value-consistency questions were actually asking, even in a healthy adult cohort without cognitive or communication impairments. Future research could explore whether the test-retest reliability of the VLQ-CS Consistency scale is also higher in a healthy adult cohort in comparison with the original cohort [1].

Convergent validity of the Consistency and Composite scales was supported across all measures. This included strong positive associations with the Valuing Questionnaire Progress scale, another established measure of valued living which was not available at the time of the original validation study. The Valuing Questionnaire was recently found to consistently show strong relationships with depression symptoms across studies [49]. The VLQ-CS scales also displayed moderate negative correlations with anxiety and depression symptoms. The magnitude of the correlation between valued living and these constructs was stronger in our ABI cohort than in the healthy sample in the original VLQ validation study, consistent with previous research [2, 5, 6, 27]. Additionally, consistent with expectations, there was a significant, moderate, negative correlation between the VLQ-CS scales and psychological inflexibility, with the magnitude of this correlation being greater than seen in the original VLQ validation study [1]. However, the original sample completed the AAQ, while our sample completed the AAQ-ABI, with these measures potentially assessing different constructs [20].

Contrary to expectations, divergent validity was not supported, with a significant negative relationship found between the VLQ-CS scales and subjective memory complaints on the EMQ-R. However, the relationship between the VLQ-CS and the EMQ-R was small and weaker than with the convergent measures. While we hypothesised that memory difficulties would not be significantly related to valued living, this may not have been the most divergent type of measure to use. Higher frequency of memory complaints on the EMQ-R such as “forgetting to do things you said you would do, and things you planned to do” may impact the recall and execution of planned value-consistent actions (e.g., plans to catch up with friends). The EMQ-R was selected from the measures administered in the studies from which participants in this study were sourced, so while it was an available measure to assess discriminant validity, it was perhaps not an ideal measure for this purpose. Future studies may wish to include a more distinct measure of discriminant validity for this reason.

Our findings should be interpreted in the context of several limitations. Our sample size was not large enough to detect small effects. As only a subset of data was available for some measures, the correlational analysis with the AAQ-ABI was underpowered; however, the effect was still detected so it is unlikely to have had a significant impact on the results. While it was a strength that we had a heterogeneous sample in terms of ABI types, we lacked data on injury severity and objective measures of cognitive and communication abilities which limits generalisability. We did have approximately 15% of the convenience sample demonstrating the need for small communication supports during the intervention trials from which they were sourced, but this percentage is lower

than the typical incidence of people with aphasia in ischaemic stroke populations [50] and our participants likely represent people with milder aphasia. Inclusion criteria for the source studies included the requirement that participants had sufficient cognitive and language abilities to complete the convergent and divergent measures as these measures were not all presented with the same communication supports and adaptations as the VLQ-CS. Eligibility based on sufficient language ability to participate was made through clinician judgement. Future studies could use standardised assessments or other previously used methods [51] to reduce participant burden. For example, severity rating scales (e.g., AusTOMS) could be completed in conjunction with a speech-language pathologist to characterise any language activity limitations. Further, as the sample did not include non-English speakers or First Nations participants and were on average highly educated, the generalisability of findings to people from culturally or linguistically diverse backgrounds, lower socioeconomic status and lower health literacy is uncertain. Future research should replicate and extend our foundational study with a more severely impaired sample, including people diagnosed with severe aphasia, and those from more diverse cultural and socioeconomic backgrounds. Further exploration of the differences noted in valued living in those with “other” ABI types and those with stroke and TBI would also be worthwhile.

Our preliminary findings support the reliability and validity of the VLQ-CS in people with ABI. The VLQ-CS could be considered a valid and meaningful measure of valued living for clinicians and researchers aiming to evaluate and/or improve valued living and meaningful participation after brain injury [e.g., 52]. The adaptations and communication supports used in the VLQ-CS appeared to be effective in improving comprehension of the measure in this sample. Indeed, these could also potentially be helpful in the general population, and we have since conducted a similar validation study of the VLQ-CS in a neurotypical adult cohort (to be reported separately). Similar adaptations could be applied to other questionnaires commonly used in clinical populations experiencing cognitive and communication difficulties. Improving the accessibility of measurement tools to enable comprehension and engagement is crucial for optimising equitable service delivery.

Acknowledgement

The development of the VLQ-CS was facilitated by a Stroke Foundation Tim Glendinning grant. Participants in this study were drawn from three source studies, each with separate funding. The VaLiANT study (Sathanathan et al. 2022) was supported by the La Trobe University Sport, Exercise, and Rehabilitation Research Focus Area Grant Ready Scheme. The Memory-SuSTAIN study (clinical trial registry number: ACTRN12619000823178) was supported by a Stroke Foundation Seed Grant [ECSEED1901]. The observational study was not funded; the authors wish to thank the Caulfield ABI Community Rehabilitation team for their support in recruitment and data collection for that study.

Disclosure statement

The authors report there are no competing interests to declare.

Funding

The author(s) reported there is no funding associated with the work featured in this article.

ORCID

Dana Wong  <http://orcid.org/0000-0001-9619-1929>
 Hannah Miller  <http://orcid.org/0000-0002-4034-8875>
 David Lawson  <http://orcid.org/0000-0002-1016-1081>
 Karen Borschmann  <http://orcid.org/0000-0001-5364-2718>
 Nick Sathananthan  <http://orcid.org/0000-0001-8905-1426>
 Emma Power  <http://orcid.org/0000-0002-2638-0406>

Data availability statement

The data analysed in this paper are available upon reasonable request to the authors.

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