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# Activities of Daily Living Inventory (ADLI): Proposal of a new instrument and preliminary data

Joana O. Pinto[a,b,c,d,e], Diogo Pontes[a], Artemisa R. Dores[a,b,d], Bruno Peixoto[c,f,g] and Fernando Barbosa[a]

[a]Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto, Porto, Portugal; [b]ESS, Polytechnic of Porto, Porto, Portugal; [c]Department of Social, Behavioral Sciences of University Institute of Health Sciences- CESPU, Gandra, Portugal; [d]Center for Rehabilitation Research, ESS, Polytechnic of Porto, Porto, Portugal; [e]Lusófona University, Porto, Portugal; [f]Associate Laboratory i4HB - Institute for Health and Bioeconomy, University Institute of Health Sciences – CESPU, Porto, Portugal; [g]UCIBIO - Applied Molecular Biosciences Unit, Translational Toxicology Research Laboratory, University Institute of Health Sciences (1H-TOXRUN, IUCS-CESPU), Porto, Portugal

**ABSTRACT**

The evaluation of Activities of Daily Living (ADL) has become a critical issue in neuropsychology, but existing instruments for evaluating ADL have some limitations. This work aims to propose a new instrument to evaluate ADL, the ADL Inventory (ADLI), for which we present preliminary data.

The ADLI was developed based on a comprehensive model of the stages of test development and following a combined framework of the World Health Organization's International Classification of Functioning, Disability, and Health and the American Occupational Therapy Association models.

Besides sociodemographic information, ADLI includes 144 items, organized into four sections: (a) basic ADL; (b) IADL; (c) advanced ADL; and (d) factors influencing functionality. The main characteristics of ADLI are: having self- and informant-report forms; including items focused on different sensory and neurocognitive functions; individualizing the progression along items considering the person's functionality; considering the impact of several factors on functionality; and using a large response scale. Preliminary data of predictive and convergent validity for ADLI are presented. The preliminary study comprised 15 older adults. The Addenbrooke's Cognitive Examination – III, the Barthel Index, and the Instrumental Activities of Daily Living (IADL) Scale were applied to determine the predictive and convergent validity of ADLI.

**KEYWORDS**

Advanced activities of daily living; basic activities of daily living; instrumental activities of daily living; neuropsychological assessment; neuropsychological rehabilitation

## Introduction

The assessment of the activities of daily living (ADL) has become a critical issue in neuropsychology, not only to describe functional performance (Klimczuk, 2016), but also to support the diagnosis of neurocognitive disorders such as major neurocognitive disorder (De Vriendt et al., 2021), to predict the need of institutionalization (Gaugler et al., 2007), as well as to determine and evaluate the efficacy of neuropsychological intervention programmes, including their ecological validity. Therefore, even if ADL evaluation can be handled by multiple health professionals, such as occupational therapists, physiotherapists or physiatrists, this evaluation is relevant or even indispensable for measuring functional cognition, as several activities depend on cognitive requirements (Domensino et al., 2022).

A recent survey exploring the practices and perspectives of neuropsychologists in evaluating functional abilities to distinguish individuals with normal cognition, mild and major neurocognitive disorders revealed the absence of a gold standard measurement approach (Shaikh et al., 2023). Either adopting a gold standard among existing instruments or creating a new one more suitable to inform the evaluation of functional cognition, has the potential to improve the differential diagnosis between normal cognition and neurocognitive disorders. Additionally, the findings suggested that the evaluation of functional abilities should extend beyond traditional ADL and instrumental activities of daily living (IADL), incorporating dimensions like communication abilities (Shaikh et al., 2023). Even though communication is generally not considered an ADL, there are specific instruments to measure the functional aspects of communication, namely in brain disorders, acknowledging their relevance in ADL (e.g. CADL-3; Holland et al., 2017). Specifically, communication significantly influences independence, autonomy, and safety.

ADL refers to routine actions required for living independently (Klimczuk, 2016) and the functionality in ADL is classified into three levels, based on its complexity: (a) basic ADL (BADL), which can be defined as activities indispensable to life maintenance (Katz, 1983); (b) IADL, which are intermediate ADL involving everyday activities necessary to

**CONTACT** Joana O. Pinto joanafftopinto@gmail.com Laboratório de Neuropsicofisiologia, Faculdade de Psicologia e Ciências da Educação, Universidade do Porto, Rua Alfredo Allen, 4200-135, Porto, Portugal.

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self-maintenance in the community (Katz, 1983; Lawton, 1990); and (c) advanced ADL (AADL), which consist in individual volitional activities related to involvement in personally satisfying activities (Reuben & Solomon, 1989). BADL are related to personal body care and include bathing, toileting and toilet hygiene, dressing, eating and swallowing, feeding, functional mobility, personal hygiene, and grooming (American Occupational Therapy Association [AOTA], 2020; Klimczuk, 2016). IADL involve interaction with social environment (Romero-Ayuso et al., 2019), and include care of others, care of pets, child rearing, communication management, driving and community mobility, financial management, home establishment and management, meal preparation and clean-up, religious and spiritual expression, safety and emergency maintenance, and shopping (AOTA, 2020). AADL include participation in recreational, occupational, altruistic, or community activities (Reuben & Solomon, 1989). Both ADL and IADL are required to live independently, whereas AADL are beyond those that are needed to maintain independent living (Reuben & Solomon, 1989). According to Romero-Ayuso and colleagues (2019), while BADL rely more on motor/physical function, being less dependent and demanding on neurocognitive functioning, IADL and AADL are more dependent on the former.

The functionality in ADL is influenced by perceptual (including sensory), motor, and cognitive abilities (Mlinac & Feng, 2016). Therefore, ADL performance differ in its susceptibility to physical and cognitive decline, with BADL being more sensitive to impairment in physical functioning, and IADL and AADL being more susceptible to cognitive impairment (Cahn-Weiner et al., 2007; De Vriendt et al., 2013). IADL include both high physically-demanding and high cognitively-demanding activities (e.g. multitasking), which are referred to as cognitive IADL (i.e. IADL activities relying mostly on neurocognition) or functional cognition (Romero-Ayuso et al., 2019).

Existing ADL evaluation instruments can be divided into four categories: self-report, behavior rating, performance based, and technological approaches such as virtual reality and games (Romero-Ayuso et al., 2019). Despite the high number of available self- and informant-report instruments, some limitations have been identified: (a) these instruments are not adjusted to different contexts of living (e.g. institutionalized elderly) (e.g. Lawton IADL scale; Lawton & Brody, 1969); (b) do not include the different types of ADL (i.e. BADL, IADL, and AADL) (e.g. extended version of the Cognitive Scale of Basic and Instrumental Activities of Daily Living; Montoro-Membila et al., 2021); (c) comprise items representing disease symptoms rather than activities of daily living (e.g. recognizing familiar faces—Revised Interview for Deterioration in Daily Living Activities in Dementia 2; Giebel et al., 2016); (d) the AADL scales include items that are more informative of cognitive reserve than ADL performance (e.g. participating in recreational activities, leisure, hobbies—Daily Living Questionnaire; Rosenblum et al., 2017); (e) fail to assess functionality in several cognitive IADLs, such as care of pets and care of others (Romero-Ayuso et al., 2019); (f) fail to include items targeting sensory functions; (g) fail to include items extensively targeting neurocognitive functions (e.g. Everyday cognition; Farias et al., 2008); (h) fail to assess multitask ADL performance (Romero-Ayuso et al., 2019); (i) use small response scales, such as 4-point scale, which could compromise their sensitivity and reliability (Rosenblum et al., 2017); (j) neglect the effect of duality routine/novelty in ADL performance (Bouisson, 2002; Dube et al., 2022; Dubreuil et al., 2007); (k) neglect the role of patients' familiarity with the context in which the activity was performed (Romero-Ayuso et al., 2019); and (l) neglect the role of gendered expectations in IADL performance (Sheehan & Tucker-Drob, 2019). In short, existing instruments do not allow a comprehensive evaluation covering all relevant domains of ADL, as well as a person-tailored and in-depth evaluation of different levels of functional performance. Additionally, existing tools often do not comprise items targeting different neurocognitive functions or do not relate such items with specific neurocognitive functions, hindering the diagnosis of conditions that require accurate ADL assessments, such as major neurocognitive disorder. Moreover, better ADL measures will be valuable to support decisions about discharge from medical or rehabilitation centers, or to evaluate the ecological validity of neuropsychological interventions.

For the above reasons, the main objective of this work is to propose a new ADL inventory (ADLI) that can be used to assess functional impairment for adults (>18 years) and explore its preliminary results in healthy older adults. The ADLI is presented here, after a rapid review of the instruments for the evaluation ADL. The ADLI is intended to solve the previously stated limitations, allowing for a more complete assessment of ADL and more tailored to individual characteristics (i.e. not all items apply to all examinees).

## Method

The ADLI development followed the stages described in Irwing and Hughes (2018). Regarding the first stage—construct definition, specification of test need and test structure, we adopted a combined framework considering both AOTA and World Health Organization's (WHO) International Classification of Functioning, Disability, and Health (ICF) model (see Figure 1). The practical need for ADLI was previously explained in the Introduction. The steps taken in the overall planning and item development were: (1) compiling items from existing questionnaires; (2) organizing items by type of task (BADL, IADL, AADL) according to the AOTA framework (see Table 1); (3) create new items considering the neurocognitive requirements involved in performing each ADL, step-by-step; (4) organize items by implicit neurocognitive loading (level 1 or 2, the latter being higher); (5) create new items to assess activities not considered in the existing instruments, though listed by AOTA (e.g. care of a child); (6) identify the main neurocognitive function underlying each item considering a previous terminology by Pinto et al. (2023a); (7) pilot the self- and informant-report for a preliminary adjustment of its face validity; and (8) preliminary analysis of predictive and convergent validity. Regarding

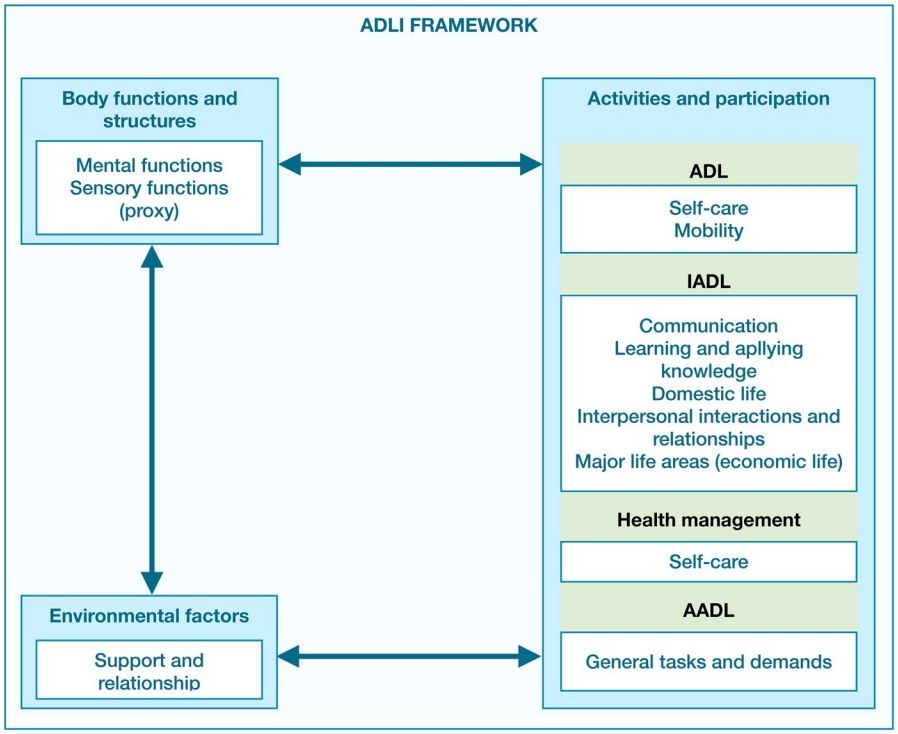


**Figure 1.** ADLI Framework. *Note*: blue squares = International Classification of Functioning, Disability and Health (ICF) categories; white squares = ICF subcategories; green squares = American Occupational Therapy Association (AOTA) occupations.

the next stages proposed by Irwing and Hughes (2018), further studies are needed to accomplish them.

Concerning the first step, a rapid review was performed focusing on the tools to evaluate ADL, using broader search strategies, and conducting a review of reviews (Grant & Booth, 2009). The existing instruments for the evaluation of ADL were identified through a previous systematic review in the field (Romero-Ayuso et al., 2019) and a manual search using terms related to the different types of ADL in full-text (no time-window defined for the literature search). The following characteristics were analyzed for each instrument: (a) type of instrument (self- and/or informant-report); (b) population; (c) types of ADL assessed (basic, instrumental, advanced); (d) activity assessed; (e) response scale; (f) inclusion of items targeting neurocognitive functions; (g) inclusion of items targeting sensory functions; (h) inclusion of items targeting performance in routine versus novel activities; (i) inclusion of items targeting performance in familiar versus novel contexts; (j) consideration of the potential impact of sensory deficits in the functionality; and (k) consideration of the potential impact of gendered expectations in the functionality.

## Participants

A total of 15 healthy older adults (7 female) were recruited by convenience using a snowball method (further characteristics are displayed in Table 2). The inclusion criteria included being at least 60 years old and having a score higher than 82 (cutoff that differentiates the control and mild cognitive impairment groups) in the Addenbrooke's Cognitive Examination – III (ACE-III; Hsieh et al., 2013; Portuguese version by Machado et al., 2015; Peixoto et al., 2018). The exclusion criteria were individuals with a prior history of substance abuse, who were illiterate, non-native Portuguese speakers, uncorrected visual or auditory impairments, motor disorders, and severe psychiatric symptoms.

## Instruments

### *Addenbrooke's Cognitive Examination-III (ACE-III)*

The ACE-III is a neurocognitive screening scale that assesses several neurocognitive domains (Hsieh et al., 2013; Portuguese version by Machado et al., 2015), including: attention, through orientation, immediate verbal recall of words, and serial subtraction tasks (with scores ranging from 0 to 18); memory, through delayed verbal recall, verbal learning, and semantic memory tasks (with scores ranging from 0 to 26); phonemic and semantic verbal fluency (with scores ranging from 0 to 14); language, through comprehension, repetition, naming, reading, and writing (with scores ranging from 0 to 26); visuospatial abilities, through visuoconstructional and spatial perception tasks (with scores ranging from 0 to 16) (Machado et al., 2015). For this study, both scores obtained in each domain and the total score, which ranges from 0 to 100 (with higher scores indicating better performance), were considered. The ACE-III showed good reliability ($\alpha$ = .914) indices in discriminating healthy older adults and older adults with neurocognitive impairment (Peixoto et al., 2018).

**Table 1.** ADL evaluated by existing questionnaires.

| ADL evaluated | Katz Index (Katz, 1983) | Barthel Index (Mahoney & Barthel, 1965) | FIM (Granger et al., 1986) | AADLS (Dias et al., 2019) | CSBIADL (Rodríguez-Bailón et al., 2015) | AM-PAC (Haley et al., 2004) | CSBI – EV (Montoro-Membila et al., 2022) | Lawton-Brody IADL (Lawton & Brody, 1969) | READL (Rossier et al., 2001) | FrSBe (Stout et al., 2003) | Let' s Shop (Frid et al., 2017) | A-ADL (De Vriendt et al., 2013) | Ecog (Farias et al., 2008) | DLQ (Rosenblum et al., 2017) | ADL-IS (Reisberg et al., 2001) | R-IDDD2 (Giebel et al., 2016) | ADL-Profile (Dutil et al., 1990) | AOAFAI (Sousa et al., 2014) | RTI-E (Allen, 1989) | DAD (Gélinas et al., 1999) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BADL** | X | X | X | | X | X | X | | | X | | | | X | X | X | X | X | X | X |
| Urinating | X | X | X | | X | | | | | X | | | | | | | | X | X | X |
| Evacuating | X | X | X | | X | | | | | X | | | | | | | | X | X | X |
| Personal hygiene | X | X | X | | X | X | X | | | X | | | | X | | X | X | X | X | X |
| Feeding | X | X | X | | | X | | | | | | | | | | | | X | X | X |
| Transiting between chair/bed | X | X | X | | | X | | | | | | | | | | | | | | |
| Walking | | X | X | | | X | | | | | | | | | X | | X | X | X | |
| Moving up/ downstairs | | X | X | | | X | | | | | | | | | | | | X | | |
| Dressing | X | X | X | | X | X | X | | | | | | | | | | X | X | X | X |
| **IADL** | | | | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| Shopping | | | | | X | | X | X | X | | X | | X | | | | | | X | |
| Preparing Meals | | | | | X | | X | X | X | | | X | X | X | X | X | X | X | X | X |
| Caring for and managing the house | | | | | X | | X | X | X | | | | X | X | | X | | X | X | X |
| Managing financial life | | | | | X | | X | X | | | | X | X | X | | X | X | X | | X |
| Taking care of your health | | | | | | | | | | | | | | | | | | | | |
| Managing medication | | | | | | | X | X | | | | | X | | X | X | X | | X | X |
| Managing personal care devices | | | | | | | | | | | | | | | | | | | | |
| Safety and assessing emergencies | | | | | | | | | | | | | | | | | | X | | |
| Communicating with others | | | | | | X | | X | | | | X | | | X | X | X | X | X | |
| Caring for children | | | | | | | | | | | | | | | | | | | X | |
| Caring for others | | | | | | | | | | | | X | | | | | | | | |
| Caring for animals | | | | | | | | | | | | | | | | | | X | | |
| Using transports | | | | X | | | | X | X | | | | X | X | X | X | X | X | X | |
| **AADL** | | | | | | | | | | | | X | X | X | X | X | X | X | | |

*Note.* ADL = Activities of Daily Living; BADL = Basic Activities of Daily Living; IADL = Instrumental Activities of Daily Living Scale; AADL = Advanced Activities of Daily Living Scale; FIM = Functional Independence Measure; AADLS = Advanced Activities of Daily Living Scale; CSBIADL - Cognitive Scale for Basic and Instrumental Activities of Daily Living; AM-PAC = Applied Cognition Scale Activity Measure for Post-Acute Care; CSBI-EV = Cognitive Scale for Basic and Instrumental - Extended Version; READL = Rivermead Extended ADL Assessment; Revised Interview for Deterioration in Daily Living Activities in Dementia 2; FrSBe = Frontal Systems Behavior Scale; A-ADL = Assessment of Advanced Activities of Daily Living; ECog = Everyday Cognition; DLQ = Daily Living Questionnaire; ADL-IS = Activities of Daily Living - International Scale; R-IDDD2 = Revised Interview for Deterioration in Daily Living Activities in Dementia 2;AOAFAI = The Adults and Older Adults Functional Assessment Inventory; RTI-E = Routine Task Inventory – Expanded; DAD = Disability Assessment for Dementia.

**Table 2.** Sociodemographic and clinical characteristics of the sample.

| Sociodemographic and clinical variables | Participants ($n = 15$) |
|---|---|
| Age in years ($M \pm SD$) | 75.87 ± 6.94 |
| Years of formal education ($M \pm SD$) | 8.53 ± 6.02 |
| Female (%) | 47% |
| ACE-III Total ($M \pm SD$) | 89.47 ± 5.30 |
| ACE-III Attention ($M \pm SD$) | 17.20 ± 0.78 |
| ACE-III Memory ($M \pm SD$) | 22.47 ± 3.11 |
| ACE-III Fluency ($M \pm SD$) | 9.73 ± 1.94 |
| ACE-III Language ($M \pm SD$) | 25.27 ± 1.10 |
| ACE-III Visuospatial ($M \pm SD$) | 14.80 ± 1.47 |

*Note.* ACE-III: Addenbrooke's Cognitive Examination – III.

### Barthel Index

The Barthel Index (Mahoney & Barthel, 1965; Portuguese version by Araújo et al., 2007) is a tool intended for evaluating an individual's degree of independence across ten fundamental ADL: feeding, personal hygiene, toileting, bathing, dressing and undressing, bladder and bowel control, mobility, transferring from bed to chair, and ascending and descending stairs. Each basic activity of daily living (BADL) is evaluated according to the individual's ability to perform it independently, with assistance, or if they are unable to accomplish it at all. A higher total score (maximum of 100) indicates a greater capacity for independent functioning. The Portuguese version of the Barthel Index showed good internal ($\alpha = 0.96$) (Araújo et al., 2007).

### Instrumental activities of daily living scale (IADL)

The IADL (Lawton & Brody, 1969; Portuguese version by Araújo et al., 2008) assesses the independence level in performing eight IADL, namely telephone use, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medications, and ability to handle finances. Items are rated by an informant in a 4-point scale. Total score range between 0 and 23, with higher scores indicating higher independence level (Araújo et al., 2008). The internal consistency of the Portuguese version is good ($\alpha = .94$) (Araújo et al., 2008).

## Procedures

The present study is part of an ongoing study approved by the Ethical Commission (Ref.[a] 2024-02-01). All participants underwent an assessment using a semi-structured interview to examine the sociodemographic characteristics. The neuropsychological assessment took place within an enclosed room. The order of questionnaires was counterbalanced among the participants. The informant-report version of ADLI was completed by a family member in all cases.

Descriptive statistics were used to examine the sociodemographic and clinical characteristics of the sample. A preliminary analysis of the predictive validity of ADLI concerning ACE-III scores, as well as the convergent validity between the scores on the BADL and IADL sections of ADLI and Barthel Index and IADL scale scores, was conducted using Pearson's correlation coefficients. All analyses were conducted in IBM SPSS Statistics Version 29.0.2.0, with $\alpha = .05$ as the threshold for statistical significance. The *p*-values were corrected using the FDR method for multiple correlations.

## Results

### Description of the ADL Inventory (ADLI)

The ADLI that is being proposed here is based on the analysis of the main limitations of the existing instruments, as briefly described above. Items were consensually created based on a theoretical framework (see Figure 1) by a team of four researchers, three of them certified specialists in neuropsychology.

The ADLI was developed mainly for older adults. It may be useful in detecting functional impairment in both cognitively healthy and clinical samples (>18 years old). ADLI is designed to be part of neuropsychological assessment protocols and can also be used to inform occupational therapy. It is mainly concerned with helping a more ecologically valid neuropsychological assessment and informing the case formulation and intervention. Moreover, ADLI may be useful for estimating the ecological validity of neurocognitive tests, as one statistical method used for this purpose involves correlating the results of neurocognitive tests with self- and other-reported measures of everyday functioning (Pinto et al., 2023b). This instrument (see supplemental material) includes two versions: self- and informant-report forms. Using both forms filled independently by both the examinee and informant (regardless of their mental status), may contribute to more reliable conclusions (Graham et al., 2005; Howorth & Saper, 2003; Seltzer et al., 1997), but this remains to be tested for this instrument. Of note, several characteristics of the informants may influence their report (Morrell et al., 2019). Therefore, the type of relationship between the patient and the informant, as well as the frequency with which they communicate, should be reported. Thus, the informant-report form includes a question about the informant's relationship with the person being evaluated (examinee). The formulation of the items is also different between forms.

Besides sociodemographic questions, the ADLI is divided into four sections: (a) BADL items; (b) IADL items; (c) AADL items; and (d) items about factors influencing functionality in general. For the last three sections, items are organized in two levels of difficulty, with the level 1 being identified by a rose colour and the level 2 by a blue colour. The response scale ranges between 0 (incapable) to 10 (fully capable), allowing a better identification of changes in functionality over time, namely those associated with a neuropsychological intervention, where repeated evaluations are important. The response scale was based on the ICF model, where disability results from a complex interaction between capacity/incapacity, activity, and the individual's environment (WHO, 2007). ADLI allows the calculation of a score for each type of ADL (BADL, IADL, AADL) and a total score, resulting from the sum of the items, with higher values representing a better performance. The ADLI includes items that target: (a) different neurocognitive functions (i.e.

attention, language, calculation, memory, and executive functions); (b) multitasking; and (c) sensory-perception (see Table 3). The assignments of these categories to individual items were based on the terminology proposed by Pinto et al. (2023a). The content of this table may be useful to make a prognosis about neurocognitive functioning.

The time of ADLI administration will vary according to the current performance of each person in ADL, which determines the number of questions being answered as illustrated below and illustrated in Figure 2. While piloting the ADLI with older adults ($n = 10$) the administration time ranged between 10 and 30 min.

### *Sociodemographic data*

This part involves gathering information on: (a) the context of living (alone, with relatives/others, long-term, institution, or day-care); and (b) the need for ADL support.

**Section I**. The first section of the ADLI is based both on the Barthel Index (Mahoney & Barthel, 1965) and the Katz Index of Independence in Activities of Daily Living (Katz, 1983), including items related to: (a) urinating; (b) evacuating; (c) make personal hygiene; (d) feeding; (e) transfer between chair and bed; (f) walking; (g) climbing and descending stairs; and (h) dressing. Two of the items (urinating and evacuating) have different labels on the response scale (0 = incontinent; 10 = continent).

**Section II**. The second section is organized by the different IADL identified by the AOTA (2020): (a) shopping; (b) meal preparation; (c) home establishment and management; (d) financial management; (e) health management, including medication management and personal care device management; (f) safety and emergency maintenance; (g) communication with others; (h) care of children; (i) care of others; (j) care of pets and animals; and (k) using transportation. Furthermore, this section targeting IADL also includes items about health care, which were identified in the reviewed instruments (i.e. medication management and personal care device management). First, questions about the person's performance in the main daily tasks in the last six months are presented, and responses determine the progress in the inventory according to a decision-tree, as shown in Figure 2. Concerning the activities "Care of pets" and "Care of others", another question was added about whether the difficulty of the task is related to individual limitations or the characteristic of the person/animal receiving care (Romero-Ayuso et al., 2019). Second, the person (or informant) determines the level of difficulty in performing each activity.

**Section III**. Regarding AADL, which are the focus of this section, a previous study on the List of Advanced Activities in Daily Living (Oliveira et al., 2015) identified a three-factor structure: (a) leisure activities; (b) social activities; and (c) productive activities (Dias et al., 2019). However, most items of the said List overlap features that are considered in cognitive reserve instruments (e.g. Lifetime of Experiences Questionnaire; Valenzuela & Sachdev, 2006). Therefore, the items of Section III are mostly based on the advanced-Activities of Daily Living tool (De Vriendt et al., 2013), but only those regarding complex productive activities beyond what is required to maintain independent living were selected and adapted, whereas leisure and social activities were not considered here.

This section does not require following a decision tree to determine which items should be administered because it only includes nine predetermined items involving general AADL. These items are not influenced by gendered expectations and failing in them is not enough to justify institutionalization.

**Section IV**. This section includes items about factors that may have an impact on functionality, such as: (a) routine vs. novelty; (b) familiar vs. novel context; (c) sensory acuity deficits; and (d) gendered expectations.

## Preliminary analysis of ADLI

Descriptive statistics regarding ADL performance are displayed in Table 4. It is worth mentioning that the self-report version of ADLI systematically presents higher scores than the informant report.

Both self- and informant-report total scores, IADL, and AADL scores of ADLI present good predictive validity of visuospatial scores on ACE-III (all $r > .51$, $p < .05$) (see Table 5).

Regarding convergent validity, only scores obtained on the informant-report version of ADLI-BADL correlated with the Barthel Index ($r = .53$, $p < .05$), a commonly used measure to assess BADL. Regarding ADLI-IADL no significant correlation was found with the Lawton & Brody's IADL scale ($r = .37$, $p > .05$). Regarding self-report scores no significant correlations were observed either with the total score of Barthel Index or the Lawton & Brody's IADL scale (both $r < .23$, $p > .05$).

## Discussion

Considering the need for an objective quantifiable approach to assess functionality in Activities of Daily Living (ADL) across diverse affected areas (Shaikh et al., 2023), the main objective of this work is to propose the Activities of Daily Living Inventory (ADLI), a self- and informant-report tool to evaluate ADL. The ADLI aims to improve the evaluation of individuals' functionality in Basic ADL (BADL), Instrumental ADL (IADL), and Advanced ADL (AADL), reducing uncertainty in functional assessment and improving the recommendations regarding compensatory strategies informed by the results of the functionality assessment (Shaikh et al., 2023). Additionally, this study was also intended to explore the preliminary results of ADLI in healthy older adults.

The main characteristics of the ADLI are: (a) inclusion of self- and informant-report forms; (b) organization by type of ADL (i.e. BADL, IADL, and AADL); (c) inclusion of items focused on different sensory and cognitive functions; (d) individualization of the progression along IADL items considering the person's functionality; (e) consideration of two different levels of difficulty in IADL based on their demands (i.e. physical or cognitive IADL); (f) consideration of the

**Table 3.** Domains targeted in each ADLI item.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Urinating | ✓ | | | | | | | | |
| Defecating | ✓ | | | | | | | | |
| Doing your personal hygiene | ✓ | | | | | | | | |
| Maintaining an adequate level of hygiene. | | | | | | | ✓ prospective memory, retrieval of information | | ✓ planning, action sequencing |
| Using the appropriate cleaning product (such as shampoo and shower gel). | | ✓ visual perception | | | | | | | |
| Feeding | ✓ | | | | | | | | |
| Recognizing food by its taste. | | ✓ taste perception | | | | | | | |
| Recognizing food by its smell. | | ✓ olfactory perception | | | | | | | |
| Eating food on your own initiative or ordering food at the right time. | | | | | | | ✓ retrieval of information | | |
| Deciding what to eat based on the time of the day. | | | | | | | ✓ retrieval of information | | ✓ organization, planning |
| Transiting between chair/bed | ✓ | | | | | | | | |
| Walking | ✓ | | | | | | | | |
| Orienting yourself inside the house. | | | ✓ spatial orientation | | | | ✓ retrieval of information | | |
| Orienting yourself in known/familiar streets. | | | ✓ spatial orientation | | | | ✓ retrieval of information | | |
| Orienting yourself in unfamiliar streets. | | | ✓ spatial orientation | | | | | | ✓ planning, decision making |
| Crossing the street safely. | | | | ✓ divided attention | | | | | ✓ shifting |
| Holding a conversation while walking without stopping to talk. | | | | ✓ divided attention | | | | | * |
| Moving up/downstairs | ✓ | | | | | | | | |
| Dressing | ✓ | | | | | | | | |
| Choosing the outfit on your own initiative. | | | | | | | | | ✓ decision making |
| Choosing clothes suitable for the current season and state of time. | | | ✓ temporal orientation | | | | | | ✓ decision making, judgment |
| Identifying the need to go shopping. | | | | | | | | | ✓ organization |
| Thinking or writing the list of all products you need to buy. | | | | | | | | | ✓ organization |
| Selecting products from your shopping list in the supermarket. | | ✓ visual perception | | ✓ selective attention | | | | | |
| Adjusting the shopping list, including other products which were not on the previous list but that you need. | | | | | | | | | ✓ decision making, updating |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Identifying advantageous discounts by adjusting the quantity of products on the list or including others. | | | | | | | | | ✓ decision making, updating, judgment |
| Buying clothing or footwear adjusted to your size, style, needs, and season. | | ✓ size perception | ✓ temporal orientation | | | | | | ✓ decision making |
| Deciding between two products (such as appliances) which is the best purchase for your needs. | | | | | | | | | ✓ decision making judgment |
| Buying a gift for a person based on their preferences. | | | | | | | ✓ retrieval of information | | ✓ decision making |
| Identifying the need to prepare meals | | | | | | | | | ✓ organization |
| Identifying the function of the different kitchen utensils and using them correctly. | | ✓ visual and tactile perception | | | | | ✓ retrieval of information | | |
| Choosing the right food/ingredients for each meal (such as breakfast, lunch, etc.). | | | ✓ temporal orientation | | | | | | ✓ organization, decision making |
| Preparing a cold meal. | | | | | | | ✓ retrieval of information | | ✓ planning, organization |
| Cooking a simple and familiar hot meal. | | | | | | | ✓ retrieval of information | | ✓ planning, organization |
| Planning a full meal (starter, main course, dessert). | | | | | | | ✓ retrieval of information | | ✓ planning, organization |
| Properly calculating the preparation time of meals to serve them at the usual time. | | | | | | ✓ calculation | | | ✓ time estimation |
| Cooking an elaborate recipe following written, verbal, or video instructions. | | | | ✓ divided attention | ✓ comprehension | | | | ✓ action sequencing |
| Cooking an elaborate recipe of memory. | | | | | | | ✓ retrieval of information | | ✓ planning, organization |
| Cooking a new recipe. | | | | | | | | | ✓ planning, organization, decision making |
| Adjusting a recipe depending on the number of guests by increasing or decreasing the amount of ingredients. | | | | | | ✓ calculation | | | ✓ problem solving |
| Preparing a meal while maintaining other physical activity, such as washing dishes. | | | | ✓ divided attention | | | | | * |
| Preparing a meal while maintaining a mental activity, such as chatting on the phone. | | | | ✓ divided attention | | | | | * |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Solving problems that may occur during the preparation of meals, such as pouring too much salt, burning the stout, or not having all the necessary ingredients. | | | | | | | | | ✓ problem solving judgment |
| Planning meals weekly depending on the others in order to maintain a balanced diet. | | | | | | | | | ✓ planning, organization |
| Identifying the need to care for and manage the house | | | | | | | | | ✓ organization |
| Identifying cleaning utensils and their function. | | ✓ visual and tactile perception | | | | | ✓ retrieval of information | | |
| Utilizing cleaning utensils adequately. | | | | | | | ✓ retrieval of information | | |
| Performing simple household tasks, such as making the bed or washing the dishes. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Keeping the house/bedroom (if institutionalized) tidy. | | | | | | | ✓ retrieval of information | | ✓ action sequencing, planning, organization |
| Keeping the house/bedroom (if institutionalized) clean. | | | | | | | ✓ retrieval of information | | ✓ action sequencing, planning, organization |
| Separating the clothes you want to wash (i.e. colors or white). | | ✓ color perception | | ✓ selective attention | | | | | ✓ decision making |
| Using household appliances (e.g., washing machine clothes, dishwasher). | | | | | | | ✓ retrieval of information | | |
| Planning home management by setting regular cleaning tasks (such as floor and dust) and sporadic cleaning tasks (such as glass). | | | | | | | | | ✓ planning, organization, time estimation |
| Learning how to use new appliances. | | | | ✓ sustained attention | | | ✓ encoding and retention of information | | |
| Identifying the different bills and coins. | | ✓ visual perception | | | | | ✓ retrieval of semantic memory | | |
| Separating the money needed to pay small expenses, such as coffee. | | ✓ visual perception | | | | ✓ calculation | | | |
| Counting the money needed to pay the expenses of higher value, such as the house rent. | | ✓ visual perception | | | | ✓ calculation | | | |
| Identifying the amount that frequently bought products cost. | | | | | | | ✓ retrieval of information | | |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Calculating change. | | | | ✓ sustained attention | | ✓ calculation | | | |
| Paying with a credit/debit card. | | | | | | | ✓ retrieval of information | | |
| Remembering your credit/debit card code. | | | | | | | ✓ retrieval of information | | |
| Withdrawing money from an ATM. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Checking the account balance at an ATM. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Making transfers or payments at the ATM. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Managing finances and meeting the payment deadlines of the different expenses. | | | | | | ✓ calculation | | | ✓ planning, organization |
| Analyzing a receipt/invoice to see if the amount paid corresponds to the advertised amount. | | | | | ✓ receptive language abilities | | ✓ retrieval of information | | |
| Analyzing whether the cost price of a product is fair based on prices in other stores. | | | | | | ✓ calculation | ✓ retrieval of information | | ✓ judgment |
| Consulting your online bank account. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Shopping online. | | | | | | | | | ✓ action sequencing |
| Making financial investments. | | | | | | ✓ calculation | | | ✓ planning, organization |
| Taking care of your physical health, distinguishing problems, and looking for an adequate solution (i.e. in a small problem, such as a superficial cut, putting a band aid on; in a serious problem, such as a deep cut, calling emergency services). | | | | | | | | | ✓ planning, decision making, problem solving, judgment |
| Taking care of your emotional health, using different strategies depending on the intensity and duration of problems (such as controlling your breathing in case of mild anxiety; or seeking professional help in case of severe depression). | | | | | | | | | ✓ planning, decision making, problem solving, judgment |
| Scheduling routine checkups with the necessary regularity, taking into account your health status. | | | ✓ temporal orientation | | | | | | ✓ planning, decision making, time estimation judgment |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Identifying the different medications that you are taking. | | ✓ visual perception | | | | | ✓ retrieval of information | | |
| Following medical prescriptions by taking the correct medications at the set time. | | ✓ visual perception | ✓ temporal orientation | | | | ✓ retrieval of information | | ✓ planning, time estimation |
| Following medical prescriptions for the dose (quantity) of each medication. | | ✓ visual perception | | | | ✓ calculation | ✓ retrieval of information | | ✓ planning |
| Recognizing the therapeutic indication of the different medications (i.e. what each one is for). | | ✓ visual perception | | | | | ✓ retrieval of information | | |
| Monitoring the quantity of medications available according to your needs, ensuring you do not run out of any medication. | | | | | | ✓ calculation | | | ✓ Planning, organization |
| Acting appropriately if you find that you have taken too much medication or have forgotten to take a medication. | | | | | | | | | ✓ problem solving, decision making |
| Properly managing the taking of a medication prescribed for emergencies (such as taking only them in case of severe pain). | | | | | | | | | ✓ problem solving decision making |
| Adjusting the organization of the medication when the medical prescription is changed. | | | | | | | ✓ encoding, retention, and retrieval of information | | ✓ organization |
| Identifying the need to manage personal care devices. | | | | | | | | | ✓ organization |
| Locating contact lenses/glasses and/or hearing aids. | | | ✓ spatial orientation | | | | ✓ retrieval of information | | |
| Properly using contact lenses/glasses and/or hearing aids. | | | | | | | ✓ retrieval of information | | ✓ action sequencing |
| Properly maintaining contact lenses/glasses and/or hearing aids. | | | | | | | | | ✓ planning |
| Identifying emergency contacts. | | | | | | | ✓ retrieval of information | | |
| Assessing potentially dangerous situations (such as leaving a pan on the heat unsupervised) and managing them properly. | | | | | | | | | ✓ judgment |
| Adequately ensuring your safety (by locking the door, avoiding walking alone at night, etc.). | | | | | | | | | ✓ judgment, planning, decision making |
| Adequately identifying fraudsters and people who may interfere with your safety. | | | | | | | | | ✓ judgment |
| Acting in the event of a domestic emergency (such as a small fire or flood). | | | | | | | | | ✓ judgment, action sequencing, problem solving, decision making |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Acting in case of a medical emergency (calling a doctor or emergency services). | | | | | | | ✓ retrieval of semantic memory | | ✓ judgment, action sequencing, problem solving, decision making |
| Telling your own phone/mobile phone number or email from memory. | | | | | | | ✓ retrieval of information | | |
| Telling phone/mobile phone numbers or emails from family members from memory. | | | | | | | ✓ retrieval of information | | |
| Telling your address from memory. | | | | | | | ✓ retrieval of information | | |
| Dialing numbers and making calls from a phone or mobile phone. | | | | | | | | | ✓ action sequencing |
| Sending written messages using a mobile phone. | | | | | ✓ expressive language abilities | | | | ✓ action sequencing |
| Writing messages or letters manually for family members. | | | | | ✓ expressive language abilities | | | | |
| Using social media as a mean of communication. | | | | | ✓ expressive language abilities | | | | ✓ action sequencing |
| Making video calls. | | | | | | | | | ✓ action sequencing |
| Receiving and sending emails. | | | | | ✓ expressive language abilities | | | | |
| Using your computer to establish communications. | | | | | | | | | ✓ action sequencing |
| Writing letters to family members using the computer. | | | | | ✓ expressive language abilities | | | | ✓ action sequencing |
| Writing formal letters (such as complaints) using the computer. | | | | | ✓ expressive language abilities | | | | ✓ action sequencing |
| Performing simple tasks for the proper provision of care to children of any age (such as changing the diaper, helping in the bath and eating). | | | | ✓ sustained attention | | | | | ✓ judgment, action sequencing |
| Preventing risks in the care of children of any age (such as falls and use of inappropriate toys for the child's age). | | | | ✓ sustained attention | | | | | ✓ planning, organization |
| Managing your routine according to the provision of care to children of any age (such as taking advantage of hours when the child is sleeping to perform certain tasks). | | | | | | | | | ✓ planning, organization, time estimation |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Performing complex tasks necessary for an adequate care for children of any age (such as managing medication and helping with homework). | | | | ✓ sustained attention | | | | | ✓ judgment, action sequencing * |
| Providing care to children of any age while maintaining another activity (such as cooking). | | | | ✓ divided attention | | | | | |
| Performing simple tasks for adequate care of an adult/elderly (such as changing a diaper, helping in the bath, feeding). | | | | ✓ sustained attention | | | | | ✓ judgment, action sequencing |
| Preventing risks in providing care to an adult/elderly (such as falls). | | | | ✓ sustained attention | | | | | ✓ planning, organization |
| Managing your routine according to the provision of care to an adult/elderly person (such as taking advantage of hours when the person is sleeping to perform certain tasks). | | | | | | | | | ✓ planning, organization, time estimation |
| Assuming complete care of a care-dependent adult/elderly. | | | | | | | | | ✓ judgment, planning, organization * |
| Providing care to an adult/elderly person while maintaining other activity such as cooking. | | | | ✓ divided attention | | | | | |
| Taking care of the physiological needs of the animal. | | | | ✓ sustained attention | | | | | ✓ judgment, planning, time estimation |
| Taking care of the animal's safety (such as using a leash, so the animal does not run off to the road). | | | | ✓ sustained attention | | | | | ✓ judgment planning |
| Managing your daily routine according to the provision of care to the animal (such as trips to the street to walk the animal). | | | | | | | | | ✓ planning, organization, time estimation |
| Managing health-related care for the animal. | | | | | | | | | ✓ planning, organization, time estimation |
| Calling a taxi and indicating the destination address. | | | ✓ spatial orientation | | | | ✓ retrieval of information | | |
| Taking a ticket or pass to travel by public transport. | | | ✓ spatial orientation | | | | | | ✓ action sequencing |
| Getting around on public transport, locating the main stops. | | | ✓ spatial orientation | ✓ sustained attention | | | | | |
| Driving on familiar streets. | | | ✓ spatial orientation | | | | ✓ retrieval of information | | ✓ action sequencing |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Driving on unknown streets. | | | ✓ spatial orientation | | | | | | ✓ action sequencing, planning, decision making |
| Selecting the best route to reach a particular destination by car. | | | ✓ spatial orientation | | | | | | ✓ action sequencing, planning, decision making |
| Planning the best transport to be used in compliance with the price, schedules, and your commitments. | | | ✓ spatial orientation | | | ✓ calculation | | | ✓ planning, decision making, time estimation |
| Changing the route in case of heavy traffic, accidents, or other constraints. | | | ✓ spatial orientation | | | | | | ✓ planning, problem solving, decision making, time estimation |
| Acting in the event of a malfunction of your vehicle or accident. | | | | | | | | | ✓ judgment, problem solving, decision making |
| Using a map or GPS for traveling to to an unknown place. | | | ✓ spatial orientation | ✓ divided attention | | | | | ✓ action sequencing |
| Managing car maintenance. | | | | | | | | | ✓ judgment, problem solving, decision making |
| Traveling by plane. | | | | | | | | | ✓ action sequencing * |
| Listening to music, singing, and/or chatting while driving. | | | | ✓ divided attention | | | | | |
| Scheduling your appointments/tasks throughout the week considering their priority, difficulty, and duration. | | | | | | | | | ✓ planning, organization, time estimation |
| Fulfilling the date and time of certain commitments (such as medical appointments). | | | ✓ temporal orientation | | | | ✓ prospective memory | | ✓ planning, organization, time estimation |
| Resuming an interrupted activity (such as resuming a conversation after being interrupted by a phone call). | | | | | | | ✓ retrieval of information | | ✓ shifting |
| Performing tasks that imply mental effort (like chatting) in noisy places. | | | | ✓ selective attention | | | | | ✓ inhibition |
| Repairing objects in poor condition (such as fixing an appliance or sewing a piece of clothing). | | | | | | | | ✓ mechanical reasoning | ✓ problem solving |

(*Continued*)

**Table 3.** Continued.

| Domains-targeted items | Physical functioning | Sensory-perception | Orientation | Attention | Language | Numerical reasoning | Memory | Reasoning | Executive functions |
|---|---|---|---|---|---|---|---|---|---|
| Performing a task that requires physical effort (such as cleaning the floor) while performing a task that requires mental effort (such as explaining to another person the route to reach a destination). | | | | ✓ divided attention | | | | * | |
| Performing two mentally demanding tasks at the same time (such as making a word search puzzle while talking on the phone). | | | | ✓ divided attention | | | | * | |
| Anticipating unforeseen events (such as a transport strike) and finding alternatives. | | | | | | | | | ✓ planning, organization |
| Dealing with unforeseen events (such as organizing a birthday party in the garden and it starts raining), finding alternatives. | | | | | | | | | ✓ planning, organization, problem solving, decision making |

*items taping multitasking activities.

impact of factors such as routine versus novelty, familiar versus new context, sensory acuity deficits, and gendered expectations; and (g) use of a sufficiently large response scale to identify different levels of performance in ADL ranging from 0 (incapable) to 10 (fully capable).

The results of the predictive validity analysis indicated that scores from the IADL and AADL sections of ADLI, as well as its total scores for both self- and informant-report versions, are significantly correlated with the visuospatial scores on Addenbrooke's Cognitive Examination – III (ACE-III), suggesting that ADLI demonstrates a satisfactory level of predictive validity. The visuospatial score of ACE-III comprises: (a) three visuoconstructive tasks - copying intersecting infinity loops and a cube and drawing a clock; and (b) spatial perceptive tasks - counting dots and identifying incomplete letters. Considering the interdependence between neurocognitive functions (Luria, 1976), it may be argued that visuoconstructive tasks also require memory and executive functions such as planning. Additionally, spatial perceptive tasks also rely on the spatial distribution of attention. In fact, the visuospatial tasks of the ACE scale could be considered quite demanding, thus relying on several interdependent neurocognitive functions. Likewise, both IADL and AADL may reflect several neurocognitive functions, which may explain the observed predictive validity of the ADLI regarding the ACE-III visuospatial scores.

The results of the convergent validity revealed that only the informant-report version of the ADLI was correlated with a validated scale of BADL (Barthel Index). Although preliminary, this result may be explained by the difficulty of older adults in evaluating their performance accurately. Since difficulties described in BADL are more easily identified, plausibly leading to more reliable self-reports, a significant correlation with informant-report scores in basic ADLI activities is not surprising. However, an additional note is needed: as we did not find the same evidence for the IADL scale and for the self-report version of the ADLI, we hypothesize that ADLI is more demanding on self-awareness, which may be compromised with aging and brain disorders. As in other instruments, self-reports in this inventory can both overestimate or underestimate the level of functionality, namely due to biased responses or limited awareness of the respondent. Therefore, a combination of functional assessment methods (self- and informant-report, behavior rating, and performance-based) is recommended to identify functional impairment (Rosenblum et al., 2017). The low correlation coefficient between ADLI and previously validated instruments could also be explained by the small sample size we recruited for this pilot study and the low variability that is expected in healthy participants.

ADLI may not be in its final version, but making the ADLI available in this early stage is aligned with the open science movement, allowing its study for independent research groups. Additionally, sharing ADLI in its current form allows independent researchers to test it, hopefully in different clinical conditions. We also invite other researchers to comment on this version as a means to improve it.

As a recommendation for future studies using ADLI, upcoming research should focus on: (a) determining its

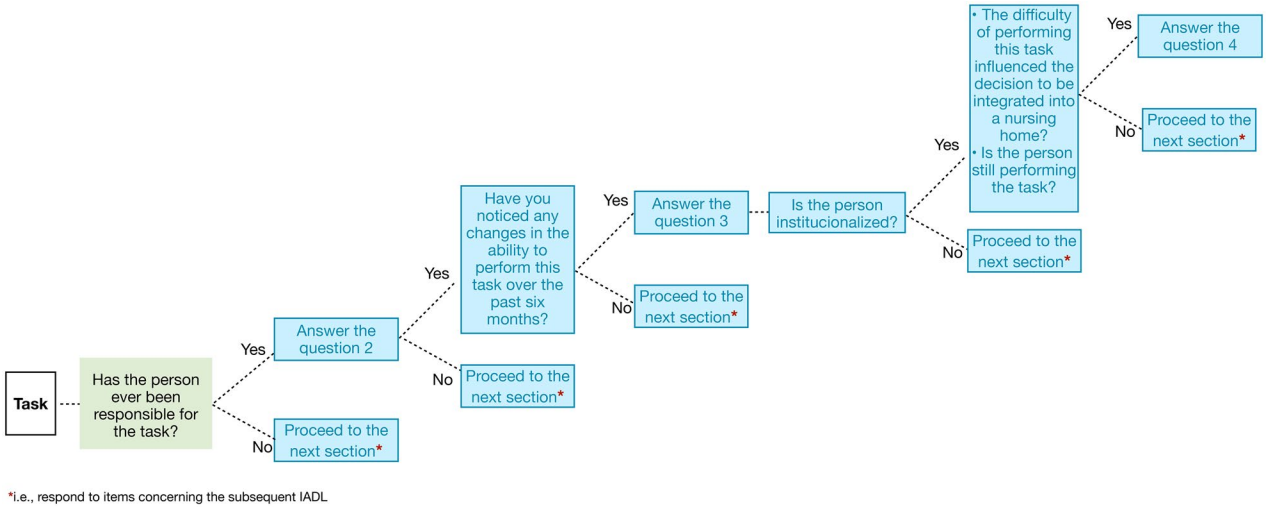


**Figure 2.** Decision tree guiding which questions need to be answered.

**Table 4.** Descriptive statistics: ADL performance.

| ADL Questionnaires | Participants ($n = 15$) |
|---|---|
| Barthel Index Total ($M \pm SD$) | 19.93 ± 0.26 |
| IADL scale ($M \pm SD$) | 21.47 ± 2.36 |
| ADLI self-report Total ($M \pm SD$) | 1793.47 ± 191.94 |
| ADLI – BADL ($M \pm SD$) | 203.07 ± 9.78 |
| ADLI – IADL ($M \pm SD$) | 522.67 ± 65.84 |
| ADLI – AADL ($M \pm SD$) | 533.87 ± 64.07 |
| ADLI informant-report Total ($M \pm SD$) | 1216.60 ± 162.07 |
| ADLI – BADL ($M \pm SD$) | 202.87 ± 9.44 |
| ADLI – IADL ($M \pm SD$) | 496.27 ± 86.94 |
| ADLI - AADL ($M \pm SD$) | 517.47 ± 74.16 |

*Note.* IADL = Instrumental Activities of Daily Living; ADLI = Activities of Daily Living Inventory; BADL = Basic Activities of Daily Living; AADL = Advanced Activities of Daily Living.

**Table 5.** Predictive validity of ADLI.

| | Bivariate correlations | | | | | |
|---|---|---|---|---|---|---|
| Variables | ACE-III total | ACE-III attention | ACE-III memory | ACE-III fluency | ACE-III language | ACE-III visuospatial |
| Self-report | | | | | | |
| ADLI—total | .43 | −.11 | .34 | .03 | .22 | .69* |
| ADLI—BADL | .09 | .20 | .04 | .12 | −.11 | .13 |
| ADLI—IADL | .36 | −.17 | .29 | .02 | .11 | .66* |
| ADLI—AADL | .45 | −.09 | .36 | .03 | .18 | .68* |
| Informant-report | | | | | | |
| ADLI—total | .34 | −.15 | .38 | −.11 | .15 | .55* |
| ADLI—BADL | .11 | −.06 | .05 | .02 | .07 | .23 |
| ADLI—IADL | .33 | −.15 | .39 | −.13 | .12 | .52* |
| ADLI—AADL | .35 | −.15 | .36 | −.10 | .18 | .57* |

*$p < .05$.

*Note.* ACE-III: Addenbrooke's Cognitive Examination-III; ADLI: Activities of Daily Living Inventory; BADL: basic activities of daily living; IADL: instrumental activities of daily living; AADL: advanced activities of daily living.

psychometric properties in clinical and subclinical samples; (b) determining its sensitivity to major neurocognitive impairment; (c) assessing the consistency between self- and informant-report (Milanovic et al., 2022); (d) confirming the hierarchy (basic-advanced) of functional impairment (Brown et al., 2021) and its relationship with neurocognition, for example taking Luria's hierarchy of neurocognitive functions into consideration (Luria, 1976); (e) determining cutoff scores for normal/abnormal performance according to age, sex, and context of living; and (f) determining cutoff scores on the main screening tests (e.g. Montreal Cognitive Assessment and ACE-III) below which self-report is non-informative.

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## ORCID

Joana O. Pinto http://orcid.org/0000-0002-0643-8439

## References

Allen, C. K. (1989). Treatment plans in cognitive rehabilitation. *Occupational Therapy Practice*, *1*, 1–8.

American Occupational Therapy Association. (2020). Occupational therapy practice framework: Domain & process (4th ed.). *American Journal of Occupational Therapy*, *74*(Suppl. 2), 7412410010. https://doi.org/10.5014/ajot.2020.74S2001

Araújo, F., Pais-Ribeiro, J., Oliveira, A., Pinto, C., & Martins, T. (2008). Validação da escala de Lawton e Brody numa amostra de idosos não institucionalizados. In I. Leal, J. Pais-Ribeiro, I. Silva & S. Marques (Eds.), *Actas do 7o Congresso Nacional de Psicologia da Saúde.* (pp. 217–220). ISPA.

Araújo, F., Ribeiro, J. L., Oliveira, A., & Pinto, C. (2007). Validação do Índice de Barthel numa amostra de idosos não institucionalizados. *Revista Portuguesa De Saúde Publica*, *25*(2), 59–66.

Bouisson, J. (2002). Routinization preferences, anxiety, and depression in an elderly French sample. *Journal of Aging Studies*, *16*(3), 295–302. https://doi.org/10.1016/s0890-4065(02)00051-8

Brown, R. T., Diaz-Ramirez, L. G., Boscardin, W. J., Cappola, A. R., Lee, S. J., & Steinman, M. A. (2021). Changes in the hierarchy of functional impairment from middle age to older age. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *77*(8), 1577–1584. https://doi.org/10.1093/gerona/glab250

Cahn-Weiner, D. A., Farias, S. T., Julian, L., Harvey, D. J., Kramer, J. H., Reed, B. R., Mungas, D., Wetzel, M., & Chui, H. (2007). Cognitive and neuroimaging predictors of instrumental activities of daily living. *Journal of the International Neuropsychological Society: JINS*, *13*(5), 747–757. https://doi.org/10.1017/s1355617707070853

D., Vriendt, P., Cornelis, E., Cools, W., & Gorus, E. (2021). The usefulness of evaluating performance of activities in daily living in the diagnosis of mild cognitive disorders. *International Journal of Environmental Research and Public Health*, *18*(21), 11623. https://doi.org/10.3390/ijerph182111623

De Vriendt, P., Gorus, E., Cornelis, E., Bautmans, I., Petrovic, M., & Mets, T. (2013). The advanced activities of daily living: A tool allowing the evaluation of subtle functional decline in mild cognitive impairment. *The Journal of Nutrition, Health & Aging*, *17*(1), 64–71. https://doi.org/10.1007/s12603-012-0381-9

Dias, E. N., da Silva, J. V., Pais-Ribeiro, J. L., & Martins, T. (2019). Validation of the advanced activities of Daily Living Scale. *Geriatric Nursing*, *40*(1), 7–12. https://doi.org/10.1016/j.gerinurse.2018.05.008

Domensino, A. F., Evans, J., & van Heugten, C. (2022). From word list learning to successful shopping: The neuropsychological assessment continuum from cognitive tests to cognition in everyday life. *Applied Neuropsychology Adult*, 1–8. Advanced online publication. https://doi.org/10.1080/23279095.2022.2079087

Dube, J. M., Persin, M. J., Bass, D. P., Prentice, K. P., McKinney, B. A., Morales, Y. L., Guillory, L. A., Coldiron, A. M., & Barnett, M. D. (2022). A-211 the impact of task novelty on a virtual reality-based Procedural Learning Task. *Archives of Clinical Neuropsychology*, *37*(6), 1367–1367. https://doi.org/10.1093/arclin/acac060.211

Dubreuil, P., Adam, S., Bier, N., & Gagnon, L. (2007). The ecological validity of traditional memory evaluation in relation with controlled memory processes and routinization. *Archives of Clinical Neuropsychology*, *22*(8), 979–989. https://doi.org/10.1016/j.acn.2007.08.002

Dutil, E., Forget, A., Vanier, M., & Gaudreault, C. (1990). Development of the ADL profile. *Occupational Therapy in Health Care*, *7*(1), 7–22. https://doi.org/10.1080/j003v07n01_03

Farias, S. T., Mungas, D., Reed, B. R., Cahn-Weiner, D., Jagust, W., Baynes, K., & DeCarli, C. (2008). The measurement of Everyday Cognition (ECog): Scale development and psychometric properties. *Neuropsychology*, *22*(4), 531–544. https://doi.org/10.1037/0894-4105.22.4.531

Frid, S. A., Josman, N., & Endevelt, R. (2017). Development and standardization of the "LET'S shop" questionnaire: An assessment of shopping habits and executive functions in people with obesity. *Food Science & Nutrition*, *5*(3), 446–453. https://doi.org/10.1002/fsn3.412

Gaugler, J. E., Duval, S., Anderson, K. A., & Kane, R. L. (2007). Predicting nursing home admission in the U.S: A meta-analysis. *BMC Geriatrics*, *7*(1), 13. https://doi.org/10.1186/1471-2318-7-13

Gélinas, I., Gauthier, L., McIntyre, M., & Gauthier, S. (1999). Development of a functional measure for persons with Alzheimer's disease: the disability assessment for dementia. *The American Journal of Occupational Therapy: Official publication of the American Occupational Therapy Association*, *53*(5), 471–481. https://doi.org/10.5014/ajot.53.5.471

Giebel, C. M., Challis, D., & Montaldi, D. (2016). The newly revised interview for deteriorations in daily living activities in dementia (R-IDDD2): Distinguishing initiative from performance at assessment. *International Psychogeriatrics*, *29*(3), 497–507. https://doi.org/10.1017/s1041610216002003

Graham, D. P., Kunik, M. E., Doody, R., & Snow, A. L. (2005). Self-reported awareness of performance in Dementia. *Cognitive Brain Research*, *25*(1), 144–152. https://doi.org/10.1016/j.cogbrainres.2005.05.001

Granger, C. V., Hamilton, B. B., Keith, R. A., Zielezny, M., & Sherwin, F. S. (1986). Advances in functional assessment for medical rehabilitation. *Topics in Geriatric Rehabilitation*, *1*(3), 59–74. https://doi.org/10.1097/00013614-198604000-00007

Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Haley, S. M., Coster, W. J., Andres, P. L., Ludlow, L. H., Ni, P., Bond, T. L., Sinclair, S. J., & Jette, A. M. (2004). Activity outcome measurement for postacute care. *Medical Care*, *42*(1 Suppl), I49–I61. https://doi.org/10.1097/01.mlr.0000103520.43902.6c

Holland, A. L., Fromm, D., & Wozniak, L. (2017). Communication Activities of Daily Living–Third Edition (CADL-3). *Pro-Ed*,.

Howorth, P., & Saper, J. (2003). The dimensions of insight in people with dementia. *Aging & Mental Health*, *7*(2), 113–122. https://doi.org/10.1080/1360786031000072286

Hsieh, S., Schubert, S., Hoon, C., Mioshi, E., & Hodges, J. R. (2013). Validation of the Addenbrooke's Cognitive Examination III in frontotemporal dementia and Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders*, *36*(3-4), 242–250. https://doi.org/10.1159/000351671

Irwing, P. & Hughes, D. J. (2018). Tets development. In P. Irwing, T. Booth, & D. L. Hughes (Eds.), The Wiley handbook of psychometric testing: *A multidisciplinary reference on survey, scale and test development* (pp. 3–47). John Wiley & Sons

Katz, S. (1983). Assessing self-maintenance: Activities of daily living, mobility, and instrumental activities of Daily Living. *Journal of the American Geriatrics Society*, *31*(12), 721–727. https://doi.org/10.1111/j.1532-5415.1983.tb03391.x

Klimczuk, A. (2016). Activities of Daily Living. In *The Wiley Blackwell Encyclopedia of Family Studies*, 22–25. https://doi.org/10.1002/9781119085621.wbefs143

Lawton, M. P. (1990). Aging and performance of Home Tasks. *Human Factors*, *32*(5), 527–536. https://doi.org/10.1177/001872089003200503

Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of Daily Living. *The Gerontologist*, *9*(3), 179–186. https://doi.org/10.1093/geront/9.3_Part_1.179

Luria, A. R. (1976). *The Working Brain: An Introduction to Neuropsychology*. Basic Books.

Machado, A., Baeta, E.´., Pimentel, P., & Peixoto, B. (2015). Psychometric and normative indicators of the Portuguese version of the Addenbrooke's Cognitive Examination- III. Preliminary study on a sample of healthy subjects. *Acta Neuropsychologica*, *13*(2), 127–136. https://doi.org/10.5604/17307503.1168287

Mahoney, F. I., & Barthel, D. W. (1965). Barthel Index. [Database record]. APA PsycTests. https://doi.org/10.1037/t02366-000

Milanovic, M., Wood-Ross, C., Butters, M. A., Fischer, C. E., Flint, A. J., Gerretsen, P., Herrmann, N., Lanctôt, K. L., Mah, L., Mulsant, B. H., Pollock, B. G., Rajji, T. K., & Bowie, C. R. (2022). Self- versus informant-report of cognitive decline in mild cognitive impairment: Concordance with cognitive and functional performance. *Neuropsychology*, *37*(7), 827–836. https://doi.org/10.1037/neu0000842

Mlinac, M. E., & Feng, M. C. (2016). Assessment of activities of daily living, self-care, and Independence. *Archives of Clinical Neuropsychology*, *31*(6), 506–516. https://doi.org/10.1093/arclin/acw049

Montoro-Membila, N., Arnedo Montoro, M., Funes, M. J., & Rodríguez-Bailón, M. (2021). The cognitive scale of basic and instrumental activities of daily living for multidomain mild cognitive impairment and dementia patients: Validation of its extended version. *Journal of the International Neuropsychological Society*, *28*(6), 628–641. https://doi.org/10.1017/S1355617721000758

Montoro-Membila, N., Arnedo Montoro, M., Funes, M. J., & Rodríguez-Bailón, M. (2022). The cognitive scale of basic and instrumental activities of daily living for multidomain mild cognitive impairment and dementia patients: Validation of its extended version. *Journal of the International Neuropsychological Society: JINS*, *28*(6), 628–641. https://doi.org/10.1017/s1355617721000758

Morrell, L., Camic, P. M., & Genis, M. (2019). Factors associated with informant- reported cognitive decline in older adults: A systemised literature review. *Dementia (London, England)*, *18*(7-8), 2760–2784. https://doi.org/10.1177/1471301218759836

Oliveira, E. M., Silva, H. S., Lopes, A., Cachioni, M., Falcão, D. V., Batistoni, S. S., Neri, A. L., & Yassuda, M. S. (2015). Atividades avançadas de vida diária (AAVD) e desempenho cognitivo entre idosos. *Psico-USF*, *20*(1), 109–120. https://doi.org/10.1590/1413-82712015200110

Peixoto, B., Machado, M., Rocha, P., Macedo, C., Machado, A., Baeta, É., Gonçalves, G., Pimentel, P., Lopes, E., & Monteiro, L. (2018). Validation of the Portuguese version of Addenbrooke's Cognitive Examination III in mild cognitive impairment and dementia.

*Advances in Clinical and Experimental Medicine*, *27*(6), 781–786. https://doi.org/10.17219/acem/68975

Pinto, J. O., Dores, A. R., Peixoto, B., & Barbosa, F. (2023b). Ecological validity in neurocognitive assessment: Systematized review, content analysis, and proposal of an instrument. *Applied Neuropsychology. Adult*, 1–18. Advance online publication https://doi.org/10.1080/23279095.2023.2170800

Pinto, J. O., Peixoto, B., Dores, A. R., & Barbosa, F. (2023a). Proposal of a common terminology for the neuropsychological rehabilitation. *Journal of Neuropsychology*, *17*(3), 431–449. https://doi.org/10.1111/jnp.12310

Reisberg, B., Finkel, S., Overall, J., Schmidt-Gollas, N., Kanowski, S., Lehfeld, H., Hulla, F., Sclan, S. G., Wilms, H. U., Heininger, K., Hindmarch, I., Stemmler, M., Poon, L., Kluger, A., Cooler, C., Bergener, M., Hugonot-Diener, L., Robert, P. H., Antipolis, S., & Erzigkeit, H. (2001). The alzheimer's disease activities of Daily Living International Scale (ADL-IS). *International Psychogeriatrics*, *13*(2), 163–181. https://doi.org/10.1017/s1041610201007566

Reuben, D. B., & Solomon, D. H. (1989). Assessment in geriatrics. *Journal of the American Geriatrics Society*, *37*(6), 570–572. https://doi.org/10.1111/j.1532-5415.1989.tb05691.x

Rodríguez-Bailón, M., Montoro-Membila, N., Garcia-Morán, T., Arnedo-Montoro, M., L., & Funes Molina, M. J. (2015). Preliminary cognitive scale of basic and instrumental activities of daily living for dementia and mild cognitive impairment. *Journal of Clinical and Experimental Neuropsychology*, *37*(4), 339–353. https://doi.org/10.1080/13803395.2015.1013022

Romero-Ayuso, D., Castillero-Perea, Á., González, P., Navarro, E., Molina-Massó, J. P., Funes, M. J., Ariza-Vega, P., Toledano-González, A., & Triviño-Juárez, J. M. (2019). Assessment of cognitive instrumental activities of Daily Living: A Systematic Review. *Disability and Rehabilitation*, *43*(10), 1342–1358. https://doi.org/10.1080/09638288.2019.1665720

Rosenblum, S., Josman, N., & Toglia, J. (2017). Development of the daily living questionnaire (DLQ): A Factor Analysis Study. *The Open Journal of Occupational Therapy*, *5*(4), 1–17. https://doi.org/10.15453/2168-6408.1326

Rossier, P., Wade, D. T., & Murphy, M. (2001). An initial investigation of the reliability of the RIVERMEAD extended ADL index in patients presenting with neurological impairment. *Journal of Rehabilitation Medicine*, *33*(2), 61–70. https://doi.org/10.1080/165019701750098885

Seltzer, B., Vasterling, J. J., Yoder, J., & Thompson, K. A. (1997). Awareness of deficit in alzheimer's disease: Relation to caregiver burden. *The Gerontologist*, *37*(1), 20–24. https://doi.org/10.1093/geront/37.1.20

Shaikh, K. T., Bolton, K., Shaikh, U., Troyer, A. K., Rich, J. B., & Vandermorris, S. (2023). Evaluating functional abilities within the context of memory assessment: A practice survey of neuropsychologists. *The Clinical Neuropsychologist*, *38*(3), 557–587. Advance online publication https://doi.org/10.1080/13854046.2023.2249178

Sheehan, C. M., & Tucker-Drob, E. M. (2019). Gendered expectations distort male–female differences in instrumental activities of daily living in later adulthood. *The Journals of Gerontology: Series B*, *74*(4), 715–723. https://doi.org/10.1093/geronb/gbw209

Sousa, L. B., Prieto, G., Vilar, M., Firmino, H., & Simões, M. R. (2014). The adults and older adults functional assessment inventory. *Research on Aging*, *37*(8), 787–814. https://doi.org/10.1177/0164027514564469

Stout, J. C., Ready, R. E., Grace, J., Malloy, P. F., & Paulsen, J. S. (2003). Factor analysis of the Frontal Systems Behavior Scale (FRSBE). *Assessment*, *10*(1), 79–85. https://doi.org/10.1177/1073191102250339

Valenzuela, M. J., & Sachdev, P. (2006). Assessment of complex mental activity across the lifespan: Development of the lifetime of experiences questionnaire (LEQ). *Psychological Medicine*, *37*(7), 1015–1025. https://doi.org/10.1017/s003329170600938x

World Health Organization. (2007). *International Classification of Functioning, Disability, and Health: Children & Youth Version: ICF-CY*.