The CANDID initiative

Leveraging Cognitive Ageing Dementia Data from Around the World

A GBHI - HRS/TILDA collaboration

Cognitive data comparability guide

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1. Introduction

Background

A large-scale, global approach to brain health research is required to reduce the scale and impact of dementia worldwide. Interrogating multiple datasets from different countries facilitates the investigation of key research questions which cannot be addressed with a single dataset alone. Furthermore, the generation of harmonised data from different countries allows country-specific policies and initiatives to be compared and evaluated with respect to their impact on the population prevalence of dementia, quality of life and other outcomes.

The aim of the CANDID initiative (Leveraging Cognitive Ageing Dementia Data from Around the World) is to ease access to, and usability of, a platform of global datasets within the Health and Retirement Study (HRS) family of longitudinal aging studies. The HRS, a longitudinal, population-based study of 20,000 adults aged 51+ in the United States, has been collecting a vast array of health, economic and social data since 1992. Many other countries have followed suit, developing longitudinal, population-based studies using the HRS template, using harmonised survey questions and methods. These studies from around the world contain rich data pertinent to cognitive aging and brain health, which can be leveraged to answer important research questions on dementia prevalence, risk factors and care worldwide, and to inform policy and prevention strategies.

Description

The present document aims to guide the reader on how to access and use the cognitive variables publicly available across twelve HRS-family studies: the China Health and Retirement Longitudinal Study (CHARLS), the Costa Rican Longevity and Healthy Aging Study (CRELES), the English Longitudinal Study of Ageing (ELSA), the Brazilian Longitudinal Study of Health, Ageing and Well Being (ELSI), the Health and Retirement Study (HRS-USA), the Japanese Study of Aging and Retirement (JSTAR), the Korean Longitudinal Study of Ageing (KLoSA), the Longitudinal Aging Study in India (LASI), the Mexican Health and Aging Study (MHAS), the Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA), the Ageing and Retirement in Europe (SHARE) and The Irish Longitudinal Study on Ageing (TILDA).

The guide first introduces the twelve studies. It then defines and describes the cognitive tests and variables available across studies and provides comparability guidelines for best practice use of the cognitive variables across studies and waves. The twelve HRS-family studies and the time period (2010-2017) described in this guide were selected to cover a maximum range of comparable cognitive variables. This guide also provides instructions on how to access the studies' cognitive datasets via the Gateway to Global Aging Data website and/or via the respective studies websites. Links to relevant documentation and codebooks publicly available via the Gateway to Global Aging Data website and/or via the respective studies' websites are also included.

2. Overview of the HRS-family studies

The China Health and Retirement Longitudinal Study (CHARLS) is a nationally representative cohort of persons in China aged 45 or older and their spouses. The baseline survey was conducted in 2011-2012 and includes more than 17,500 individuals. The participants are followed up every two years, using a face-to-face computer-assisted personal interview (CAPI), and provide information on demographic background, family, health status and functioning, health care and insurance, work and retirement and income. Data collection also includes objective physical measurements at every 2-year follow-up, and blood samples taken every second follow-up period.

Further reading: [1]
Website: http://charls.pku.edu.cn/index/en.html

The Costa Rican Longevity and Healthy Aging Study (CRELES) is composed of two nationally-representative longitudinal surveys of older adults in Costa Rica. It comprises five waves of data. The original CRELES Pre-1945 cohort includes more than 2,800 Costa Rica residents born in 1945 or before. Data collection was conducted in 2005, 2007, and 2009. The CRELES 1945–1955 Retirement Cohort (RC) includes about 4,200 Costa Rica residents born in 1945–1955 and their spouses. Interviews were carried out in 2011 and 2013. CRELES data contains information on self-reported physical health, psychological health, living conditions, health behaviours, healthcare utilisation, social support, work and socioeconomic status. Objective physical measurements include anthropometrics and mobility. Urine and blood sample were collected during the 2005 and 2007 waves of the CRELES Pre-1945 and the 2010 wave of CRELES-RC. DNA is available for both cohorts.

Further reading: [2]
Website: http://www.creles.berkeley.edu

The English Longitudinal Study of Ageing (ELSA) is a panel study of a representative cohort of more than 18,000 persons aged 50 years and over in England. The study started in 2002 and the sample has been followed up every two years. Data are collected using computer-assisted personal interviews (CAPI) and self-completion questionnaires (SCQ), with additional nurse visits for objective physical measurements every four years. Topics include health and disability, economic characteristics, social networks and participation, household and family structure, biological markers and links to administrative data.

Further reading: [3]
Website: https://www.elsa-project.ac.uk

The Brazilian Longitudinal Study of Health, Ageing and Well Being (ELSI) is a longitudinal, nationally-representative study of about 10,000 people aged 50 years or older, residing in 5 Brazilian regions. The baseline survey was conducted between 2015 and 2016. Follow-up waves are planned every three years. Household and individual interviews and physical tests were administered at the respondents' homes. ELSI data include information on demographics, neighbourhood, discrimination, work and retirement, family transfers, health behaviours, cognitive and mental health, use of medications and of health services. Blood samples are available for a subsample of the study participants.

Further reading: [4]
Website: http://elsi.cpqrr.fiocruz.br/en/

The University of Michigan Health and Retirement Study (HRS) is a longitudinal panel study that has surveyed a representative sample of more than 30,000 Americans over the age of 50 and their spouses or partners since 1992. Biennial waves collect information on the changing health and economic circumstances associated with ageing, with a focus on income and wealth, physical, cognitive and mental health, use of healthcare services, work and retirement and family connections. Since 2006, data collection has expanded to include blood biomarkers and further measures on psychological health and social context.

Further reading: [5]
Website: http://hrsonline.isr.umich.edu

The Japanese Study of Aging and Retirement (JSTAR) is a panel survey of around 4,200 people aged 50-75 from five cities/wards across Japan. It was initiated in 2005 and conducted every two years for four waves. The data were collected via face-to-face by Computer-Assisted Personal Interview (CAPI). Additional information were also collected through a self-completed questionnaire (SCQ). The data contain information on the economic, social, and health conditions of the respondents.

Further reading: [6]
Website: http://www.rieti.go.jp/en/projects/jstar/index.html/

The Korean Longitudinal Study of Ageing (KLoSA) is a prospective, population-based study of more than 10,000 adults aged 45 years or older in the Republic of Korea (South Korea). The study was initiated in 2006 and participants have been surveyed biennially since then. The data are collected using a computer-assisted personal interview (CAPI) and self-completed questionnaires (SCQ) and include information on family, health, employment, income, wealth, subjective expectations, including subjective life expectancy.

Further reading: [7]
Website: http://survey.keis.or.kr/eng/klosa/klosa01.jsp

The Longitudinal Aging Study in India (LASI) is a nationally-representative, longitudinal survey which examines the health, economic, and social well-being of about 50,000 adults aged 45+ in India. The LASI pilot was launched in 2010. The first wave of data was collected in 2016. LASI consists of a household survey and an individual survey, via a computer-assisted personal interview (CAPI), which assess physical environment, household finances, demographics, family, social activities, health, health behaviours, work and pensions. The study also has objective physical measurements and collects blood samples.

Website: https://lasi.hsph.harvard.edu/lasi-survey

The Mexican Health and Aging Study (MHAS) is a longitudinal study of more than 15,000 adults 50 years and older in Mexico. The baseline survey was conducted in 2001, with follow-up interviews in 2003, 2012, 2015, and 2018. Data were collected through paper and pencil interviews and covers information on socioeconomic characteristics, migration, cognitive, mental and physical health, disability, use of healthcare services, housing characteristics and family networks. Anthropometric measures are also available for a subsample of respondents.

Further reading: [8]
Website: http://www.mhasweb.org

The Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA) is an ongoing longitudinal cohort study of ageing in a sample of the Northern Ireland population aged 50 years or older. Data collection began in 2014 with a baseline sample of 8,500 adults. The NICOLA assessment comprises three elements: every second year, a computer-assisted personal interview (CAPI) conducted at the participant's home by a trained interviewer and a self-completion questionnaire (SCQ), which together capture information on health and social care utilisation, health behaviours, medication, mental, physical and cognitive health, socioeconomic status and social circumstances, driving and travel. Every four years, participants take part in a health assessment where objective physical measurements such as their cardiovascular, cognitive and respiratory function as well as their physical and visual health are assessed. Biological samples with genetic analysis are also available.

Further reading: [9]
Website: http://www.qub.ac.uk/sites/NICOLA/

The Ageing and Retirement in Europe (SHARE) is a multinational survey which includes data of more than 140,000 individuals aged 50 or older and their partners from 27 European countries. The survey was initiated in 2004/2005 and follow-up waves were conducted every second year since then. Data include information on self-reported physical, psychological, cognitive and behavioural health, socio-economic circumstances and family network. Objective physical measurements and blood biomarkers are also available for some countries and waves.

Further reading: [10]
Website: http://www.share-project.org/home0.html

The Irish Longitudinal Study on Ageing (TILDA) is a prospective cohort study of community-dwelling adults aged 50 years and over and their spouses in Ireland. Baseline data from the 8,504 participants were collected between October 2009 and July 2011. Biennial data collection includes two components: a computer-assisted personal interview (CAPI) administered by trained social interviewers in the participants' own homes and a self-completion questionnaire (SCQ) completed in the participants' own time. A comprehensive health assessment delivered by trained research nurses in a dedicated health centre, or a modified version delivered in the participant's home also takes place every second wave which collects objective physical measurements. TILDA has rich data on neurocognitive function, mental and physical health, cardiovascular function, kidney function, locomotion, falls, fear of falling, vision, socioeconomic status and social circumstances obtained during multiple waves of data collection.

Further reading: [11, 12]
Website: https://tilda.tcd.ie

3. Overview of the period and waves included per HRS-family study

Table 1. Wave number per HRS study for the period 2010-2017.

Year	CHARLS	CRELES	ELSA	ELSI	HRS	JSTAR	KLoSA	LASI	MHAS	NICOLA	SHARE	TILDA
2010-2011	W1	W4	W5		W10	W3	W3				W4	W1
2012-2013	W2	W5	W6		W11	W4	W4		W3		W5	W2
2014-2015	W4		W7		W12		W5		W4	W1	W6	W3
2016-2017			W8	W1	W13		W6	W1		W2	W7	W4

4. Overview of the cognitive tests administered and variables available across HRS-family studies

Table 2a lists and briefly describes the cognitive tests administered and the cognitive domains measured across HRS studies. The reader should refer to the references listed in the table for more detailed descriptions of the cognitive tests and domains.

Table 2b provides an overview of the cognitive tests administered and cognitive domains measured across HRS studies.

Table 2a. Brief description of the cognitive tests administered, the mode of administration and the cognitive domains measured across HRS-family studies. The reader should refer to the references listed in the table for more detailed descriptions of the cognitive tests and domains.

Cognitive domain	Cognitive tests	Test overview
Global cognitive function [13, 14]	MMSE (Mini-Mental State Examination) [15]	Assesses an individual's global cognitive abilities. It is composed of 12 tests subsumed under six different cognitive domains including orientation (time, date, place), registration (3-word list immediate recall), attention and calculation (Serial 7s; WORLD backward spelling), verbal memory (3-word list delayed recall), language (naming, repetition, 3 stage command, written command, sentence writing) and visuo-constructional skills (figure copy).
	MoCA (Montreal Cognitive Assessment) [16]	Assesses an individual's global cognitive abilities. It is composed of 14 tests subsumed under six different cognitive domains including visuo-constructional/ executive function skills (figure copy, clock drawing and trails test), verbal memory (word delayed recall), attention/ working memory (sustained attention, serial 7s, forward and backward digit span), language/ executive function (naming, sentence repetition and phonemic fluency), conceptual thinking (verbal abstraction) and orientation (date and place).

Cognitive domain	Cognitive tests	Test overview
Memory	Self-rated memory	Assesses an individual's own perception of their memory. The respondent may be asked to rate their memory on a scale from excellent to poor.
	Word immediate recall [17-19]	Assesses an individual's episodic/verbal memory or ability to recall orally presented words. The respondent is presented a list of words and is asked to recall them immediately after being heard.
	Word delayed recall	Assesses an individual's episodic/ verbal memory or ability to recall orally presented words. The respondent is asked to recall a list of words after a time delay (e.g. 15 minutes after they heard the list of words for the first time).
	Prospective memory [20]	Assesses an individual's ability to remember to perform an action in the future, often in response to a particular cue. For example, the respondent may be asked to write their initials in the top, left-hand corner of a piece of paper at a later point in the interview when a page is presented to them.
	Picture-based memory test [21]	Assesses an individual's visual memory. For example, the respondent may be asked to recall objects that have been shown to them previously during the interview.
	Figure recall [22]	Assesses an individual's visual memory and visuospatial constructional abilities. For example, the respondent may be asked to recall a figure that they previously copied during the interview.

Cognitive domain	Cognitive tests	Test overview
Attention/ Working Memory/ Executive function	Letter cancellation [23]	Assesses visual-spatial scanning, sustained and selective attention, psychomotor speed and motor coordination. For example, the respondent may be asked to cross out all the Ps and Ws of a list of letters.
	Visual scanning/ Fig searching [22]	Assesses visuospatial skills, sustained and selective attention. For example, the respondent may be asked to circle as quickly as possible all the figures that look identical to a given model in a disorganized display.
	Digit span [24]	Assesses attention and verbal working memory. For example, the respondent may be asked to repeat a sequence of 5 numbers backward.
	SART (Sustained Attention to Response Task) [25]	A computer-based Go/No-Go paradigm task which measures sustained attention or an individual's ability to maintain vigilance over time. The participant is required to respond to a repeating stream of digits 1 to 9 (Go trials) and to withhold responding to the digit "3" (No-Go trials).
	Colour Trails test (1&2) [26]	Assesses visual scanning/processing speed and executive function (including working memory and sustained/divided attention); the respondent is asked to use a pencil to rapidly connect circles numbered in consecutive order (e.g. from 1 to 25).
	Choice Reaction Time [27]	Computer-based test which measures concentration and processing speed. The respondent is asked to depress a button on keyboard and wait for a stimulus (yes/no) to appear on a screen to press corresponding YES or NO keys on keyboard. Includes 100 repetitions.
	Verbal fluency [28, 29]	Assesses executive function which includes planning, mental flexibility and inhibition (or the ability to suppress inappropriate/ incorrect items). The participant is asked to generate as many words as possible, from a given semantic category (e.g. animals; also called "semantic fluency") or beginning with a particular letter (e.g. "F"; also called "phonemic fluency"), within a short time period. Also tests word knowledge.
	Three-stage command task [15]	Assesses executive function. For example, the respondent may be asked to take a paper in their right hand, fold it and put it on the floor.

Cognitive domain	Cognitive tests	Test overview
Numeracy / Numeric ability	Serial 7 subtraction [15, 30]	Assesses numeracy, concentration and working memory (or the ability to hold and manage information temporarily). In this test, the respondent is asked to subtract 7 to 100 and so on for a sequence of five subtractions.
	Backward counting	Assesses executive function and the ability to apply simple numerical concepts; in this test, counting backward (e.g. from 20 to 0).
	Computation/ Logic	Assesses numeracy.
	Fluid intelligence / Number series [31]	The number series test assesses quantitative reasoning or fluid intelligence. It involves reasoning with concepts that depend upon mathematical relationships. For example, the respondent may be asked to look at a series of numbers with a number missing from the series and determine the missing number in the series given the numerical pattern.
Language skills	Object naming [15, 32]	Assesses the ability to refer to an object/ person/ place/ concept by using its name.
	Repeat sentences/ phrases [15]	Assesses the ability to repeat phrases or sentences.
	Write sentences [15]	Assesses writing skills.
	Reading comprehension (Read and follow instructions) [15]	Assesses the ability to read and follow instructions. For example, the respondent may be asked to read on a piece of paper “close your eyes” and to act it out.
	Vocabulary [33]	Assesses established knowledge or crystallized intelligence.
	Word spelling [15]	Assesses the ability to spell a word forward and backward.
	Literacy [34]	Assesses read comprehension of instructions on medicine labels.
Orientation [15]	Day, Month, Year, Day of the week	Assesses an individual’s awareness of time, their position in places, knowledge of famous persons; For example, the respondent may be asked what day it is.
	Season	
	Person	
	Place	
Visuo-construction	Picture drawing [15]	Assesses an individual’s ability to integrate and coordinate visual and fine motor skills, it measures their ability to manipulate spatial information to make a design. For example, the respondent may be asked to copy a five-sided figure.

Table 2b. Overview of the cognitive tests administered, and the cognitive domains measured across HRS-family studies.

Cognitive tests	CHARLS	CRELES	ELSA	ELSI	HRS	JSTAR	KLoSA	LASI	MHAS	NICOLA	SHARE	TILDA
Global cognitive function												
MMSE							x			x		x
MOCA										x		x
Memory												
Self-rated memory	x		x	x	x				x	x	x	x
Word Immediate Recall	x	x	x	x	x	x	x	x	x	x	x	x
Word Delayed Recall	x	x	x	x	x	x	x	x	x	x	x	x
Prospective Memory			x	x						x		x
Visual Memory									x			x
Attention/ Working Memory/ Executive Function												
Letter cancellation			x									
Visual scanning									x			
Digit Span		x										
SART												x
Colour Trails Test										x		x
Choice Reaction Time												x
Verbal Fluency			x	x	x			x	x	x	x	x
Three-stage Command		x					x	x		x		x

Cognitive tests	CHARLS	CRELES	ELSA	ELSI	HRS	JSTAR	KLoSA	LASI	MHAS	NICOLA	SHARE	TILDA
Numeracy/ Numeric ability												
Serial 7s	x	x	x		x	x	x	x	x	x	x	x
Backward counting			x		x			x	x			
Computation questions			x		x	x		x			x	x
Fluid intelligence			x		x			x				
Language skills												
Object naming			x	x	x		x	x		x		x
Repeat sentences/ phrases							x			x		x
Write sentences							x	x		x		x
Reading comprehension							x	x		x		x
Vocabulary					x							
Word spelling										x		x
Literacy			x									
Orientation												
Date (day, month, year)	x	x	x	x	x	x	x	x	x	x	x	x
Day of the week	x	x	x	x	x	x	x	x		x	x	x
Season	x						x			x		x
Person			x	x	x							
Place						x	x	x		x		x
Visuo-construction												
Picture drawing	x						x	x	x	x		x

5. Cognitive variables comparability across studies and waves

Table 3 gives an overview of the comparative nature of the tests and cognitive variables measured across the studies. The cognitive variables which are directly comparable across studies are highlighted in green (+ symbol for black and white prints); those which may be comparable across studies after thoughtful consideration and recoding are indicated in orange (! symbol for black and white prints); those which are not comparable across studies are flagged in red (- symbol for black and white prints). The symbol H indicates that the cognitive data have been harmonised.

Note that we included in this guide the cognitive variables that have been harmonised across the studies and the variables which have not been harmonised. Harmonised variables use the same variable names across studies and responses are coded in the same way. Thus, the variables that have been harmonised are directly comparable between studies. Harmonised variable names and related codebooks are available from the Gateway to Global Ageing Data website and summarized in Tables 3.1 to 3.22. For the variables that have not been harmonised, we highlight some comparability limitations where applicable and indicate for which variable recoding may be necessary for cross-study investigations. We refer to original codebooks and variable names in Tables 3.1 to 3.22 too.

Tables 3.1 to 3.22 provide detailed description of the HRS cognitive variables that may be used for multi-study comparative investigations (variable name; test administration and instructions; scoring; comparability across studies and waves). The cognitive variables that have been measured in at least two studies and the waves that have been conducted between 2010 and 2017 have been included in these tables, period for which a maximum number of studies have comparable cognitive data and/or harmonised cognitive variables.

Table 4 displays the order in which the cognitive tests were administered per study.

Overview of the comparative nature of the tests and cognitive variables measured across HRS-family studies

Table 3. Cognitive variables measured across HRS-family studies.

+ (green background) indicates that the cognitive variables are directly comparable across studies; ! (orange background) indicates that the cognitive variables may be comparable across studies after thoughtful consideration; - (red background) indicates that the cognitive variables are not comparable across studies; A blank indicates that the cognitive variables were not measured. The symbol H indicates that the cognitive data are harmonised. The cognitive variables that were measured in at least two studies and the waves that were conducted between 2010 and 2017 are included.

Cognitive tests	CHARLS	CRELES	ELSA	ELSI	HRS	JSTAR	KLoSA	LASI	MHAS	NICOLA	SHARE	TILDA
Global cognitive function												
MMSE							+			+		+
MOCA										+		+
Memory												
Self-rated memory	+H		+H	+	+H				+H	+	+H	+H
Word Immediate Recall	+H		+H	+	+H	!H		+	!H	+	+H	+H
Word Immediate Recall (MMSE)		+ H					! H			+		+
Word Delayed Recall	+H		+H	+	+H	!H		+	!H	+	+H	+H
Word Delayed Recall (MMSE)		+ H					!H			+		+
Prospective Memory			+H	+						+		+
Attention/ Working Memory/ Executive Function												
Colour Trails Test										+		+
Verbal Fluency			+H	+	+H			+	+H	+	+H	+H
Three-stage Command		+H					+H	+		+		+

Cognitive tests	CHARLS	CRELES	ELSA	ELSI	HRS	JSTAR	KLoSA	LASI	MHAS	NICOLA	SHARE	TILDA
Numeracy/ Numeric ability												
Serial 7s	+H	+	+H		+H	+H	+H	+	+	+	+H	+H
Backward counting (20)			+H		+H			!	+H			
Computation questions			!H		!	!H		!			!H	!
Fluid intelligence			!		!			!				
Language skills												
Object naming			+H	+	+H							
Object naming (MMSE)							+	+		+		+
Repeat sentences/ phrases							+H			+		+
Write sentences							+H	+		+		+
Reading comprehension							+H	+		+		+
Word spelling										+		+
Orientation												
Date (day, month, year)	+H	+H	+H	+	+H	+H	!H	+	+H	+	+H	+H
Day of the week	+H	+H	+H	+	+H	+H	+H	+		+	+H	+H
Season	+						+			+		+
Person			+H	+	+H							
Place						+	-	+		+		+
Visuo-construction												
Picture drawing	+H						+H	+	-H	+		+

Detailed description of the cognitive variables

Tables 3.1 - 3.22. Detailed description of the cognitive variables that may be used for multi-study comparative investigations. The cognitive variables that were measured in at least two studies and the waves that were conducted between 2010 and 2017 are included. Where available, the harmonised variable name is also included in each case. See also [35].

Note: In harmonised variable, nomenclature 'R' denotes that the question/item pertains to the respondent (rather than a spouse or household), and 'w' denotes wave number.

GLOBAL COGNITIVE FUNCTION

Table 3.1 MMSE – Global Score

MMSE – Global Score Cross-study comparability: directly comparable between KLoSA, NICOLA and TILDA studies.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
KLoSA	**Derived variables:** w03mmse w04mmse w05mmse w06mmse (combines the scores of the MMSE components separately described below)	Mode of administration: The K-MMSE (Korean version of the MMSE [36]) consists of 6 modules (Orientation; Registration: Word Immediate Recall; Attention: Serial 7s; Recall: Word Delayed Recall; Language: Object naming, sentence repetition, 3-stage command, reading comprehension & sentence writing; Copying: picture drawing). The tests are described separately below. Instructions: See instructions per test in the tables below.	Ranges 0-30 (see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: Not available Waves comparability: directly comparable between waves

NICOLA	**Derived variables:** MMSE_Score (combines the scores of the MMSE components	Mode of administration: The MMSE consists of 6 modules (Orientation; Registration: Word Immediate Recall; Attention: Serial 7s & Word spelling; Recall: Word Delayed Recall; Language: Object naming, sentence repetition, 3-stage command, reading comprehension & sentence writing; Copying: picture drawing). The tests are described separately below. Instructions: See instructions per test in the tables below.	Ranges 0-30 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	**Derived variables:** COGmmse (combines the scores of the MMSE components separately described below)	Mode of administration: The MMSE consists of 6 modules (Orientation; Registration: Word Immediate Recall; Attention: Serial 7s & Word spelling; Recall: Word Delayed Recall; Language: Object naming, sentence repetition, 3-stage command, reading comprehension & sentence writing; Copying: picture drawing). The tests are described separately below. Instructions: See instructions per test in the tables below.	Ranges 0-30 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.2 MOCA – Global Score

MOCA – Global Score Cross-study comparability: directly comparable between NICOLA and TILDA studies.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
NICOLA	MOCA_score	Mode of administration: The MOCA consists of 14 tests subsumed under six different cognitive domains including visuo-constructional/ executive function skills (figure copy, clock drawing and trails test); verbal memory (word delayed recall); attention/ working memory (sustained attention, serial 7s, forward and backward digit span); language/ executive function (naming, sentence repetition and phonemic fluency); conceptual thinking (verbal abstraction); and orientation (date and place). Instructions: For more details, see Nasreddine ZS, Natalie A. Phillips, Valérie Bédirian, Simon Charbonneau, Victor Whitehead, Isabelle Collin, Jeffrey L. Cummings, and Howard Chertkow. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society.* 2005;53:695-699.	Ranges 0-30 (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
TILDA	COGmoca	Mode of administration: The MOCA consists of 14 tests subsumed under six different cognitive domains including visuo-constructional/ executive function skills (figure copy, clock drawing and trails test); verbal memory (word delayed recall); attention/ working memory (sustained attention, serial 7s, forward and backward digit span); language/ executive function (naming, sentence repetition and phonemic fluency); conceptual thinking (verbal abstraction); and orientation (date and place). Instructions: For more details, see Nasreddine ZS, Natalie A. Phillips, Valérie Bédirian, Simon Charbonneau, Victor Whitehead, Isabelle Collin, Jeffrey L. Cummings, and Howard Chertkow. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society. 2005;53:695-699.	Ranges 0-30 (see codebooks for more details)	Availability: W1, W3 Harmonised data availability: Not available Waves comparability: directly comparable between waves

MEMORY

Table 3.3 Self-rated memory

Self-rated memory Cross-study comparability: directly comparable between CHARLS, ELSA, ELSI, HRS, MHAS, NICOLA, SHARE and TILDA studies.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
CHARLS	DC004 **Harmonised variables:** RwSLFMEM (DC004)	Mode of administration: The respondent is asked to rate their memory at present. Instructions: DC004: How would you rate your memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook) RwSLFMEM: ranges from 1 (excellent) to 5 (poor).	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: directly comparable between waves
ELSA	CFMETM **Harmonised variables:** RwSLFMEM (CFMETM)	Mode of administration: The respondent is asked to rate their memory at present. Instructions: CFMETM: How would you rate your memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook) RwSLFMEM: ranges from 1 (excellent) to 5 (poor).	Availability: W7, W8 Harmonised data availability: W7, W8 Waves comparability: directly comparable between waves
ELSI	q3	Mode of administration: The respondent is asked to rate their memory at present. Instructions: q3: Currently, how do you classify your memory? Excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook)	Availability: W1

HRS	MD101 (W10) ND101 (W11) OD101 (W12) PD101 (W13) **Harmonised variables:** RwSLFMEM (D101)	Mode of administration: The respondent is asked to rate their memory at present. Instructions: D101: How would you rate your day-to-day memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook) RwSLFMEM: ranges from 1 (excellent) to 5 (poor).	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves
MHAS	E1A **Harmonised variables:** RwSLFMEM (E1A)	Mode of administration: The respondent is asked to rate their present memory. Instructions: E1A: How would you evaluate your memory nowadays? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook) RwSLFMEM: ranges from 1 (excellent) to 5 (poor).	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves
NICOLA	PH114	Mode of administration: The respondent is asked to rate their memory at present. Instructions: PH114: How would you rate your day-to-day memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook).	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves

SHARE	CF103 **Harmonised variables:** RwSLFMEM (CF103)	Mode of administration: The respondent is asked to rate their memory at present. Instructions: CF103: How would you rate your memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves
TILDA	PH114 **Harmonised variables:** RwSLFMEM (PH114)	Mode of administration: The respondent is asked to rate their memory at present. Instructions: PH114: How would you rate your day-to-day memory at the present time? Would you say it is excellent, very good, good, fair or poor?	5-levels (excellent, very good, good, fair, poor; see details on response codes in Codebook) RwSLFMEM: ranges from 1 (excellent) to 5 (poor).	Availability: W1, W2, W3, W4, W5 Harmonised data availability: W1, W2, W3 Waves comparability: directly comparable between waves

Table 3.4 Immediate word recall

Immediate word recall

Cross-study comparability: Number of words correctly recalled comparable between CHARLS, ELSA, ELSI, HRS, LASI, NICOLA and TILDA studies (same number of words: N=10; same amount of time to recall: up to 2 minutes), assuming that there are no substantial differences in performance resulting from the differences highlighted below:

Mode of administration: the list of words is read by the interviewer in CHARLS, HRS (over the phone) & LASI; the respondent listens to pre-recorded words played through a computer or the list of words is read by the interviewer in ELSA, ELSI, NICOLA & TILDA.

- *Reading pace*: Words are read with an interval of about 2 seconds in CHARLS, ELSA, ELSI, HRS; every three seconds in NICOLA and TILDA.
- *Number of lists*: There are four lists available randomly allocated in CHARLS, ELSA, HRS, NICOLA and TILDA; from three lists in LASI.
- *Number of trials*: There is one trial in ELSA, ELSI, HRS and LASI; two trials in NICOLA and TILDA (one may use variable from 1st trial to be comparable with other studies); three trials in CHARLS (if the respondent cannot recall any of the words; this is a limitation).

The amount of time given for recall in JSTAR is one minute; there is no time limit in SHARE (compared to up to 2 minutes in other studies). This is a limitation when using this variable in multi-study comparative investigations.

Comparability guidelines: The number of words in MHAS is 8 (as compared to 10 in other studies). This is a limitation when using this variable in multi-study comparative investigations. However, the limitation could be addressed expressing the number of words recalled as a proportion of the total number of words (i.e. N words recalled / N words in the list). Creating standardised scores (Z scores) is a further option, but as the resultant scores will be related to the distribution of the variable in that particular study/population, use of this approach should be determined by the research question. There are also three trials in MHAS (which make use of three different lists); one may use variables from the 1st trial to be comparable with other studies.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
CHARLS	DC006_x (x= number attributed per word) **Harmonised variables:** RwIMRC (combines all DC006-x)	Mode of administration: The interviewer reads out a list of 10 words. The respondent is asked to recall as many words as possible. The interviewer can repeat the list of words up to three times if the respondent did not recall any of the words. The interviewer is asked to read the list slowly with an interval of about 2 second between each words. Word list: 4 lists of 10 words randomly assigned. Time to recall: Approximately up to 2 minutes Number of trials: There are up to three trials if the respondent did not recall any of the words. Instructions: DC008: We are going to read a list consisting of 10 words and we would like you to memorize as many as you can. We deliberately made the list long to make it difficult for anyone to memorize all the words. Most people will only remember few of them. Please listen carefully as we read the list as we cannot repeat it. When we finish reading the list, we will ask you to recall and tell us as many of the words as you can remember, and they don't have to be in the order that you heard them. Is this explanation clear? DC006: Please tell me any of the words that you remember now.	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: correctly recalled: directly comparable between waves; slight differences between waves for items incorrectly or not recalled (see details in Harmonised Codebook)

ELSA	CFLISEN **Harmonised variables:** RwIMRC (CFLISEN	Mode of administration: The respondent first listens to pre-recorded sentences played through the computer. If the respondent can hear clearly what is being said, he/she then listens to a list of pre-recorded words played through the computer. If the respondent cannot hear clearly what is being said, then the interviewer reads out the list of words. The interviewer is given the instructions to a slow steady rate approximately one word every 2 second. The respondent is asked to recall as many words as possible. Wrd list: There are 4 word-list available, randomly assigned. Each list contains 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: There is one trial only. Instructions: CFLISST: I will now read a set of 10 words. I would like you to recall as many as you can. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words as they cannot be repeated. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? CFLIS: The computer will now read a set of 10 words. I would like you to recall as many as you can. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words as they cannot be repeated. When it has finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? CFLISEN: Now please tell me the words you can recall.	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W5, W6, W7, W8 Harmonised data availability: W5, W6, W7, W8 Waves comparability: directly comparable between waves

ELSI	q13	Mode of administration: The respondent first listens to pre-recorded sentences played through the computer. If the respondent can hear clearly what is being said, he/she then listens to a list of pre-recorded words played through the computer. If the respondent cannot hear clearly what is being said, then the interviewer reads out the list of words. The interviewer is given the instructions to pause 2 seconds after each word. The respondent is asked to recall as many words as possible. Word list: 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 trial Instructions: In the following task, you will listen to a list of words that you should memorize, because in a moment I will ask you to repeat these words. First, I need to check whether the sound is clear enough so you can hear it. Please, listen to this message: Please, let me know if you can clearly hear this message. Now you'll listen to a list of 10 words. Once finished, I'll ask you to repeat the words you remember. The list is intentionally long to make it difficult to anyone to remember all the words. Most people only remember a few words. Please, pay close attention to the 10 words because I can't repeat them. When I'm finished, I'll ask you to repeat out loud all words you can remember, regardless the order. Is it clear what we are going to do? Shall we begin? Or Now I will read a list of 10 words and then I'll ask you to repeat the words you remember. The list is intentionally long to make it difficult to anyone to remember all the words. Most people only remember a few words. Please, pay close attention to the list of 10 words because I can´t repeat it. When I'm finished, I'll ask you to repeat out loud all words you can remember, regardless the order. Is it clear what we are going to do? Shall we begin? Q13: Now, when I ask, please tell me the words that you can remember. You may begin.	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1

HRS	MD103/6(W10) ND103/6 (W11) OD103/6 (W12) PD103/6 (W13) **Harmonised variables:** RwIMRC	Mode of administration: The interviewer reads out a list of 10 words to the respondent. The interviewer is given the instructions to read at a slow steady rate approximately one word every 2 second. The respondent is asked to recall as many words as possible. Word list: There are 4 word-list available, randomly assigned. Each list contains 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: There is one trial only. Instructions: D103: I will read a set of 10 words and ask you to recall as many as you can. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words because I cannot repeat them. When I finish, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? D106: Now please tell me the words you can recall.	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves

JSTAR	B-005 (W3-3cities) F-008 (W3-7 cities; W4) **Harmonised variables:** RwIMRC	Mode of administration: The interviewer reads out a list of 10 words to the respondent. The interviewer is given the instructions to read at a slow steady rate and clearly, pausing after each word. The respondent is asked to recall as many words as possible. Word list: W3-3cities: one list of 10 words;W3-7cities and W4: 3 lists of 10 words randomly assigned. Time to recall: The respondent is given as much time as needed to recall the words, up to 1 minute. Number of trials: There is one trial only. Instructions: B-004/ F-007: “Next, let me test your ability to memorize words. I will read out a series of words slowly just once. Since there are so many, most people would not be able to memorize all of them at once. When I have finished reading out all of them, I will let you know. Then, please try to recall as many as possible of these words. You do not have to do this in the same order as they were read out. Please try your best to listen and memorize them. Now, do you have a clear idea about how to proceed with this question?” B-005/ F-008: “I will now read out the words, just once for each: dog – knife – train – baseball – cat – pot – airplane – horse – swimming – bicycle. Are you ready? Now, please recall and say as many as possible of the words I have just read out.”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W3 (3 cities), W3 (7 cities), W4 (10 cities) Harmonised data availability: W3 (3 cities), W3 (7 cities) Waves comparability: directly comparable between waves

LASI	MH012/ MH013	Mode of administration: The interviewer reads out a list of 10 words to the respondent. The respondent is asked to recall as many words as possible. Word list: 3 lists (randomly selected) of 10 words Time to recall: Not available Number of trials: 1 trial. Instructions: MH010: “I will read a list of words and ask you to recall as many as you can. We have purposely made the list long so that it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully as I read the set of words because I cannot repeat them. When I finish, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear?”” MH012/ MH013: “Now please tell me the words you can recall from.”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
MHAS	E7A (1st trial) E7B (2nd trial) E7C (3rd trial) **Harmonised variables:** RwIMRC_M	Mode of administration: The interviewer reads out a list of 8 words to the respondent. The interviewer is given the instruction to read the words clearly, one every two seconds. The respondent is asked to recall as many words as possible. Word list: three lists (randomly selected) of 8 words Time to recall: Not available Number of trials: 3 trials (a different list each time) Instructions: E7A: “I am going to read a list of words. Listen carefully. When I have finished, you must repeat all the words you can. The order does not matter.” E7B: “I am going to read the same list again. Once more, when I have stopped, tell me all the words you can, including the ones you said before”. E7C: “I am going to read the same list again. Once more, when I have stopped, tell me all the words you can, including the ones you said before”.	Number of words correctly recalled E7A/B/C: Ranges from 0 to 8 RwIMRC_M: mean of the score from all the three trials	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves

NICOLA	PH117 PH118 PH119 PH120	Mode of administration: The respondent first listens to pre-recorded sentences played through the computer. If the respondent can hear clearly what is being said, he/she then listens to a list of pre-recorded words played through the computer (PH117/PH118). If the respondent cannot hear clearly what is being said, then the interviewer reads out the list of words (PH119/PH120). The interviewer is given the instructions to pause 3 seconds after each word. The respondent is asked to recall as many words as possible. Word list: There are 4 word-list available, randomly assigned. Each list contains 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: There are two trials (PH117 & PH118 or PH119 & PH120); the second trial comes just after the first trial. Instructions: PH117: “The computer will now read a set of 10 words. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words, as they cannot be repeated. When it has finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? … After the word list has been read out: Now please tell me all the words you can recall.” PH118: “The computer will now read the same set of 10 words out again. When it has finished, I will ask you to recall aloud as many of the words as you can, in any order, including the words you recalled earlier. Is this clear? … After the word list has been read out: Now please tell me all the words you can recall.”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available

		PH119: “I am going to read a list of 10 words from my computer screen. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words, as they cannot be repeated. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? … Now please tell me all the words you can recall.” PH120: “Now I am going to read the same words out again. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order, including the words you recalled earlier. Is this clear? … Now please tell me all the words you can recall.”		
SHARE	CF104 CF105 CF106 CF107 CF008TOT **Harmonised variables:** RwIMRC (CF008TOT)	Mode of administration: The interviewer reads out a list of 10 words to the respondent. The respondent is asked to recall as many words as possible. Word list: 4 lists (randomly selected) of 10 words Time to recall: Not available Number of trials: 1 Instructions: CF007: Now, I am going to read a list of words from my computer screen. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully, as the set of words cannot be repeated. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? CF101: Ready? CF104/105/106/107: Now please tell me all the words you can recall.	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves

TILDA	PH117 PH118 PH119 PH120 **Derived variables:** COGimmediaterecall1 (combines PH117 & PH119) COGimmediaterecall2 (combines PH118 & PH120) **Harmonised variables:** RwIMRC (derived variable; combines PH117 & PH119)	Mode of administration: The respondent first listens to pre-recorded sentences played through the computer. If the respondent can hear clearly what is being said, he/she then listens to a list of pre-recorded words played through the computer (PH117/PH118). If the respondent cannot hear clearly what is being said, then the interviewer reads out the list of words (PH119/PH120). The interviewer is given the instructions to pause 3 seconds after each word. The respondent is asked to recall as many words as possible. Word list: There are 4 word-list available, randomly assigned. Each list contains 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: There are two trials (PH117 & PH118 or PH119 & PH120); the second trial comes just after the first trial. Instructions: PH117: “The computer will now read a set of 10 words. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words, as they cannot be repeated. When it has finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? … After the word list has been read out: Now please tell me all the words you can recall.” PH118: “The computer will now read the same set of 10 words out again. When it has finished, I will ask you to recall aloud as many of the words as you can, in any order, including the words you recalled earlier. Is this clear? … After the word list has been read out: Now please tell me all the words you can recall.”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1, W2, W3, W4, W5 Harmonised data availability: W1, W2, W3 Waves comparability: directly comparable between waves

		PH119: “I am going to read a list of 10 words from my computer screen. We have purposely made the list long so it will be difficult for anyone to recall all the words. Most people recall just a few. Please listen carefully to the set of words, as they cannot be repeated. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order. Is this clear? … Now please tell me all the words you can recall.” PH120: “Now I am going to read the same words out again. When I have finished, I will ask you to recall aloud as many of the words as you can, in any order, including the words you recalled earlier. Is this clear? … Now please tell me all the words you can recall?”		

Table 3.5 Word immediate recall (MMSE – Registration component)

Word immediate recall (MMSE – Registration component)

Cross-study comparability: directly comparable between CRELES, NICOLA and TILDA (number of words: N=3; number of trials: 1).

Comparability guidelines: There are up to 5 trials in KLoSA. This is a limitation for cross-study comparative investigations. One may use Trial 1 only for cross-study investigations.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
CRELES	B2A, B2B, B2C (A-C= attributed per word) B2 (combines B2A, B2B, B2C) **Harmonised variables:** RwIMRC_CR (B2)	Mode of administration: Based on the MMSE. The interviewer reads out a list of 3 words. The respondent is asked to recall as many words as possible. Word list: 3 words. Number of trials: 1 Instructions: B2: Now I am going to name 3 objects. After I name them, I am going to ask you to repeat aloud the words that you can remember in whatever order.	B2A/ B2B/ B2C: Binary (remembered or not) B2: Number of words correctly recalled B2/ RwIMRC_CR: Ranges 0-3 (see details on response codes in Codebook)	Availability: W4, W5 Harmonised data availability: W4, W5 Waves comparability: directly comparable between waves

KLoSA	C406 **Harmonised variables:** RwIMRC_K (C406)	Mode of administration: K-MMSE component. The respondent is asked to repeat back three words that the interviewer says. The interviewer is instructed to read the items at a slow and steady pace and stop for one second before reading the next word. Word list: 3 words Number of trials: Up to 5 trials Instructions C406: “Please listen carefully as I read three words because I cannot repeat them. When I finish, I will ask you to recall aloud as many of the words as you can, in any order. Are you ready?”	Number of words recalled Range 0-3 (see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: Not available Waves comparability: directly comparable between waves
NICOLA	PH132	Mode of administration: MMSE component. The respondent is asked to repeat back three words that the interviewer says. Word list: MMSE; 3 words Number of trials: 1 Instructions PH132: Please listen carefully. I’m going to say three words. You say them back after I stop. Ready? Here there are. APPLE, PENNY, TABLE. Now repeat those words back to me.	Number of words recalled Range 0-3 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH132	Mode of administration: MMSE component. The respondent is asked to repeat back three words that the interviewer says. The interviewer is instructed to pause 1 second after each of the three words. Word list: MMSE; 3 words Number of trials: 1 Instructions PH132: Please listen carefully. I’m going to say three words. You say them back after I stop. Ready? Here there are. APPLE, PENNY, TABLE. Now repeat those words back to me.	Number of words recalled Range 0-3 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves.

Table 3.6 Delayed word recall

Delayed word recall

Cross-study comparability: Number of words correctly recalled comparable between CHARLS, ELSA, ELSI, HRS, LASI, NICOLA and TILDA studies (same number of words: N=10; same amount of time to recall: up to 2 minutes; same number of trials: N=1), assuming that there are no substantial differences in performance resulting from the differences highlighted below:

- *Mode of administration:* Earlier during the interview, the list of words was read by the interviewer in CHARLS, HRS (over the phone), LASI & SHARE; in ELSA, ELSI, NICOLA & TILDA, the respondent listened to pre-recorded words played through a computer or the list of words was read by the interviewer.
- *Reading pace:* Earlier during the interview, the words were read with an interval of about 2 seconds in CHARLS, ELSA, ELSI, HRS; every three seconds in NICOLA and TILDA.
- *Number of lists:* The words were taken from four lists randomly allocated in CHARLS, ELSA, HRS, NICOLA, SHARE and TILDA; from three lists in LASI.
- *Number of trials:* For delayed recall, there is one trial for all studies. Note, however, that there was one trial in ELSA, ELSI, HRS, LASI and SHARE; two trials in NICOLA and TILDA; and three trials in CHARLS. This is a limitation for multi-study comparative investigations.
- *Tests administered between immediate and delayed recalls:* Tests are different between studies; they are relatively similar between CHARLS, ELSA and HRS, with three tests separating immediate and delayed recalls; one to two tests for JSTAR; 8 tests for LASI; there is a full health module in NICOLA and TILDA separating immediate and delayed recalls with two additional cognitive tests for TILDA.

The amount of time given for recall in JSTAR is one minute; there is no time limit in SHARE (compared to up to 2 minutes in other studies). This is a limitation when using these variables in multi-study comparative investigations. The number of tasks administered between immediate and delayed recalls is similar to CHARLS, ELSA and HRS.

Comparability guidelines: The number of words in MHAS is 8 (as compared to 10 in other studies). This is a limitation when using this variable in multi-study comparative investigations. However, the limitation could be addressed expressing the number of words recalled as a proportion of the total number of words (i.e. N words recalled / N words in the list). Creating standardised scores (Z scores) is a further option, but as the resultant scores will be related to the distribution of the variable in that particular study/population, use of this approach should be determined by the research question. There are 5 tests separating immediate and delayed recalls.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
CHARLS	DC027_x (x; number attributed per word) **Harmonised variables:** RwDLRC (combines all DC027_x)	Mode of administration: The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 Instructions: DC027: “A little while ago, you were read a list of words, and you repeated the ones you could remember. Please tell me of the words that you can remember now?”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: correctly recalled: directly comparable between waves; slight differences between waves for items incorrectly or not recalled (see details in Harmonised Codebook)

ELSA	CFLISD **Derived variables:** CFRECAL **Harmonised variables:** RwDLRC	Mode of administration: The respondent is asked to recall the words the computer (or the interviewer) read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 Instructions: CFLISD: “A little while ago, you were read a list of words, and you repeated the ones you could remember. Please tell me of the words that you can remember now?”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook) CFRECAL: number of words recalled in the delayed word recall as a percentage of the number recalled in the immediate recall.	Availability: W5, W6, W7, W8 Harmonised data availability: W5, W6, W7, W8 Waves comparability: directly comparable between waves
ELSI	q17	Mode of administration: The respondent is asked to recall the words the computer (or the interviewer) read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 Instructions: A few minutes ago, the computer/or I read a list of words that you repeated. Could you tell me which of these words do you remember? I’ll tell you when to start. Q17: “Now, please tell me the words that you can remember (start the timer).”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1

HRS	MD148 (W10) ND148 (W11) OD148 (W12) PD148 (W13) **Harmonised variables:** RwDLRC	Mode of administration: The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 Instructions: D148: “A little while ago, I read you a list of words, and you repeated the ones you could remember. Please tell me of the words that you can remember now.”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves
JSTAR	B-011 (W3- 3 cities) F-013 (W4) **Harmonised variables:** RwDMRC	Mode of administration: The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given up to 1 minute to recall the words. Number of trials: 1 Instructions: B-011: “Now, let me remind you that I had asked you to memorize the items I read out prior to the calculation test. Once again, please recall as many of them as possible”. F-013: “Some time ago, I read out some words and had you memorize them. Could you say these words again as quickly as possible?”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W3 (3 cities) & W4 Harmonised data availability: W3 (3 cities) Waves comparability: directly comparable between waves

LASI	MH056	Mode of administration: The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: 2 min Number of trials: 1 Instructions: MH055: “A little while ago, I read you a list of words, and you repeated the ones you could remember. Please tell me any of the words that you can remember now”	MH056: records the number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
MHAS	E14 **Harmonised variables:** RwDLRC_M (E14)	Mode of administration: The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 8 words. Time to recall: Not available Number of trials: 1 Instructions: E14: “Do you remember the long list of words that I read before? Please tell me all the words of the list that you can remember, in whatever order.”	Number of words correctly recalled Range: 0-8 (see details on response codes in Codebook)	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves
NICOLA	PH712 PH713	Mode of administration: The respondent is asked to recall the words the interviewer or the computer read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: up to 2 minutes Number of trials: 1 Instructions: PH712/ PH713: “Please tell me of the words that you can remember now”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available

SHARE	CF113 CF114 CF115 CF116 CF016TOT **Harmonised variables:** RwDLRC (CF016TOT)	Word list: The respondent is asked to recall 10 words. Time to recall: Not available Number of trials: 1 Instructions: CF113/ 114/ 115/ 116: “A little while ago, the computer read you a list of words, and you repeated the ones you could remember. Please tell me any of the words that you can remember now?”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves
TILDA	PH712 PH713 **Derived variables:** COGdelayedrecall (combines PH712 & PH713) **Harmonised variables:** RwDLRC (combines PH712 & PH713)	Mode of administration: The respondent is asked to recall the words the computer (or the interviewer) read out earlier during the interview. Word list: The respondent is asked to recall 10 words. Time to recall: The respondent is given as much time as needed to recall the words, up to 2 minutes. Number of trials: 1 Instructions: PH712: “A little while ago, the computer read you a list of words twice, and you repeated the ones you could remember. Please tell me of the words that you can remember now” PH713: “A little while ago, the computer read you a list of words twice, and you repeated the ones you could remember. Please tell me of the words that you can remember now”	Number of words correctly recalled Range: 0-10 (see details on response codes in Codebook)	Availability: W1, W2, W3, W4, W5 Harmonised data availability: W1, W2, W3 Waves comparability: directly comparable between waves

Table 3.7 Word delayed recall (MMSE – Recall component)

Word delayed recall (MMSE – Recall component) Cross-study comparability: comparable between CRELES, NICOLA and TILDA (number of words: N=3; number of trials: 1). The words were repeated up to five times in KLoSA during immediate recall. This is a limitation for cross-study comparative investigations. One may use the scores for Trial 1 only for multi-studies investigations.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
CRELES	B5 (letter A/B/C, attributed per word) B5 (combines B5A/B5B/ B5C) **Harmonised variables:** RwDLRC_CR (B5)	Mode of administration: Based on the MMSE; The respondent is asked to recall the words the interviewer read out earlier during the interview. Word list: The respondent is asked to recall 3 words. Number of trials: 1 Instructions: B5: "A moment ago I named three objects and you repeated the ones you remembered, Tell me which ones you remember now."	B5/ RwDLRC_CR: Number of words correctly recalled B5/ RwDLRC_CR: Ranges 0-3 (see details on response codes in Codebook) B5A/B/C: Binary (remembered / did not remember)	Availability: W4, W5 Harmonised data availability: W4, W5 Waves comparability: directly comparable between waves
KLoSA	C412 **Harmonised variables:** RwDLRC_K (C412)	Mode of administration: K- MMSE component. The respondent is asked to recall the three words they heard earlier during the test. Word list: The respondent is asked to recall 3 words. Number of trials: 1 Instructions: C412: "A little while ago, I read you a list of words and you repeated the ones you could remember. Please tell me any of the words that you remember now."	Number of words given correctly Range 0-3 (see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves

NICOLA	PH135	Mode of administration: MMSE component. The respondent is asked to recall the three words they heard and repeated earlier during the test. Word list: The respondent is asked to recall 3 words. Number of trials: 1 Instructions PH135: “What were those three words I asked you to remember?”	Number of words given correctly Range 0-3 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH135	Mode of administration: MMSE component. The respondent is asked to recall the three words they heard and repeated earlier during the test. Word list: The respondent is asked to recall 3 words. Number of trials: 1 Instructions PH135: “What were those three words I asked you to remember?”	Number of words given correctly Range 0-3 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.8 Prospective memory

Prospective memory Cross-study comparability: Task 1: Directly comparable between ELSA, ELSI, NICOLA & TILDA Task 2: Directly comparable between NICOLA & TILDA				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
ELSA	CFMEM CFMEMS **Derived variables:** CFMERSP (combines CFMEM & CFMEMS) **Harmonised variables:** RwPRMT1 (task 1; combines CFMEM & CFMEMS)	**Task 1:** Mode of administration: the respondent is told during the interview that they will be asked at a later stage during the interview to write their initials on the top left hand corner of a piece of paper attached to a clipboard when presented to them. When comes to that part of the interview, the interviewer hands the respondent the page and says: "these are for you". If the respondent does not do anything within the next 5 seconds, then the interviewer gives a prompt: "You were going to do something when I gave you the clipboard and pencil. Can you remember what it was?". CFMEM records if a prompt was given or not; CFMEMS records what the respondent did. Time given: The interviewer is required to wait for 5 seconds before giving a prompt. Instructions CFMEM: "These are for you" CFMEMS: The interviewer is asked to note what the respondent did when handed the clipboard and pencil.	CFMEM: records whether the interviewer gave a prompt CFMEM: Binary (prompt given or not) (see details on response codes in Codebook) CFMEMS: records what the respondent did when handed the clipboard and pencil. CFMEMS: 5-level variable depending on what the respondent actually did (see details on response codes in Codebook) CFMERSP: binary (Successful: Correct response without prompt/ Unsuccessful; see details on response codes in Codebook)	Availability: W5 Harmonised data availability: W5 Waves comparability: W1-W5

ELSI	q15 q16	**Task 1:** Mode of administration: the respondent is told during the interview that they will be asked at a later stage during the interview to write their initials on the upper left corner of a sheet of paper when presented to them. When comes to that part of the interview, the interviewer hands the respondent the paper and pencil and says: “this is for you”. If the respondent does not do anything within the next 5 seconds, then the interviewer gives a prompt: “You were going to do something when I handed over this paper and pencil to you. Do you remember what?”. Q15 records if a prompt was given or not; q16 records what the respondent did. Time given: The interviewer is required to wait for 5 seconds before giving a prompt. Instructions “In a few moments I’ll give you this piece of paper and a pencil. When you receive the clipboard you should write the initials of your name in the upper left corner of the paper. Please, write the initials of your name and last name. It is clear what you have to do?” “this is for you”.	q15: records whether the interviewer gave a prompt q15: Binary (prompt given or not) (see details on response codes in Codebook) q16: records what the respondent did when handed the clipboard and pencil. q16: 5-level variable depending on what the respondent actually did (see details on response codes in Codebook)	Availability: W1
NICOLA	PH418/PH419 (task 1) PH714/PH715 (task 2)	**Task 1** Mode of administration: the respondent is told during the interview that they will be asked at a later stage during the interview to write their initials in the top left hand corner of a page when presented to them. When comes to that part of the interview, the interviewer hands the respondent the page and says: “these are for you”. If the respondent does not do anything, then the interviewer gives a prompt: “Do whatever you think you are supposed to do”. PH418 records if a prompt was given or not; PH419 records what the respondent did.	PH418: records whether the interviewer gave a prompt. PH418: Binary (prompt given or not) (see details on response codes in Codebook). PH419: records what the respondent did when handed the pen and paper.	Availability: W1 Harmonised data availability: Not available

		PH418: “These are for you” PH419: The interviewer is asked to note what the respondent did when handed the pen and paper. **Task 2** <u>Mode of administration:</u> the respondent is told during the interview that they will be asked at the end of the interview to remind the interviewer to record the time. When comes to that part of the interview, the interviewer says: “that is the end of the memory and concentration tasks”. If the respondent does not do anything within the next 5 seconds, then the interviewer gives a prompt: “You were going to do something when I said that. Can you remember what it was?”. PH714 records if a prompt was given or not; PH715 records what the respondent did. <u>Time given:</u> The interviewer is required to wait for 5 seconds before giving a prompt. <u>Instructions</u> PH714: “that is the end of the memory and concentration tasks”. PH715: The interviewer is asked to note what the respondent did.	PH419: 5-level variable depending on what the respondent actually did (see details on response codes in Codebook) PH714: records whether the interviewer gave a prompt PH714: Binary (prompt given or not) (see details on response codes in Codebook) PH715: records what the respondent did. PH715: 3-level variable depending on what the respondent actually did (see details on response codes in Codebook).	
TILDA	PH418/PH419 (task 1) PH714/PH715 (task 2) Derived variables: COGprosmem1 (ph715) COGprosmem2 (ph419)	**Task 1** <u>Mode of administration:</u> the respondent is told during the interview that they will be asked at a later stage during the interview to write their initials in the top left hand corner of a page when presented to them. When comes to that part of the interview, the interviewer hands the respondent the page and says: “these are for you”. If the respondent does not do anything within the next 5 seconds, then the interviewer gives a prompt: “You were going to do something when I gave you the paper and pen. Can you remember what it was?”. PH418 records if a prompt was given or not; PH419 records what the respondent did.	PH418: records whether the interviewer gave a prompt PH418: Binary (prompt given or not) (see details on response codes in Codebook).	<u>Availability:</u> W1, W2, W3, W4, W5 <u>Harmonised data availability:</u> Not available <u>Waves comparability:</u> directly comparable between waves

		Time given: The interviewer is required to wait for 5 seconds before giving a prompt. Instructions PH418: “These are for you” PH419: The interviewer is asked to note what the respondent did when handed the pen and paper. **Task 2** Mode of administration: the respondent is told during the interview that they will be asked at the end of the interview to remind the interviewer to record the time. When comes to that part of the interview, the interviewer says: “that is the end of the memory and concentration tasks”. If the respondent does not do anything within the next 5 seconds, then the interviewer gives a prompt: “You were going to do something when I said that. Can you remember what it was?”. PH714 records if a prompt was given or not; PH715 records what the respondent did. Time given: The interviewer is required to wait for 5 seconds before giving a prompt. Instructions PH714: “that is the end of the memory and concentration tasks”. PH715: The interviewer is asked to note what the respondent did.	PH419: records what the respondent did when handed the pen and paper. PH419: 5-level variable depending on what the respondent actually did (see details on response codes in Codebook) COGprosmem2: binary (fail/pass; see details on response codes in Codebook) PH714: records whether the interviewer gave a prompt PH714: Binary (prompt given or not) (see details on response codes in Codebook) PH715: records what the respondent did. PH715: 3-level variable depending on what the respondent actually did (see details on response codes in Codebook) COGprosmem1: binary (fail/pass; see details on response codes in Codebook)	

Table 3.9 Colour trails test

Colour trails test 2 Cross-study comparability: Directly comparable between NICOLA & TILDA				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
NICOLA	TimeTaken NumberErrors ColourErrors NearMisses Prompts	Mode of administration: The respondent is asked to use a pencil and rapidly connect circles numbered 1 through 25 in sequence while alternating between pink and yellow colours. A stopwatch is used to record the length of time taken to complete the test. Other measures of performance include number of sequence errors, number of colour sequence errors, near-misses and number of prompts given by the examiner. Instructions: Not available	Numeric (see codebooks for more details)	Availability: W1 Harmonised data availability: Not available

TILDA	COGtrail2time COGtrail2errors COGtrail2colorerrors COGtrail2nearmisses COGtrail2prompts	Mode of administration: The respondent is asked to use a pencil and rapidly connect circles numbered 1 through 25 in sequence while alternating between pink and yellow colours. A stopwatch is used to record the length of time taken to complete the test. Other measures of performance include number of sequence errors, number of colour sequence errors, near-misses and number of prompts given by the examiner. Instructions: Practice: In this box are different coloured circles with numbers in them. I want you to take the pencil and connect the circle in order by going from this colour 1, to this colour 2, to this colour 3, and so on, until you reach the lst number to the hand telling you to stop. Notice that the colour changes each time you go to the next number. I want you to work as quickly as you can. Do not lift the pencil from the paper once you have started. If you make a mistake, I will point it out. When I do, I want you to move your pencil back to the last correct circle and continue from there. As before, the line you draw must go through the circles in the correct order. I will be timing you for this test. Is that OK? Do you have any questions? Okay let's practice. Put your pencil here where this hand tells you to start. When I say BEGIN, connect the circles in order as quickly as you can, changing from one colour to the next, until you reach the hand telling you to stop. Ready? Begin. Test: Now I have a sheet with several more numbers and coloured circles. Connect the circles like you did just a moment ago. Again, work as quickly as you can and do not lift the pencil from the paper as you go. Make sure that your lines touch the circles. I will be timing you from this test. Is that OK? Do you have any questions? You will start here, where the hand tells you to start, and end where the hand tells you to stop. Ready? Begin.	Numeric (see codebooks for more details)	Availability: W1, W3 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3. 10 Verbal fluency

Verbal fluency Cross-study comparability: Comparable between ELSA, ELSI, HRS, LASI, MHAS, NICOLA, SHARE & TILDA. There are slight differences between studies in terms of animals counted as correct (e.g. some studies may accept mythical animals or different breeds within a species, others not). This is a limitation that may be highlighted in the discussion section of a paper.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
ELSA	CFANI **Derived variables:** CFANIG (CFANI) **Harmonised variables:** RwVERBF	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. The interviewer is asked to count acceptable animals (real or mythical) only. Repetitions, redundancies and proper nouns do not count. Time given: 1 minute (timed) Instructions: CFANI: Now I would like you to name as many different animals as you can think of. You have one minute to do this. Ready? go.	Number of acceptable animals named in one minute CFANI: Range: 0-100 (see details on response codes in Codebook) CFANIG: Range 1-8 (categorical variable; see details on response codes in Codebook; derived variables)	Availability: W5, W7, W8 Harmonised data availability: W5, W7, W8 Waves comparability: directly comparable between waves

ELSI	q14	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. Time given: 1 minute (timed) Instructions: Q14: Now, I'll ask you to tell me the name of as many different animals as you can remember. Try to remember the highest number of different animals that you are capable of. You will have 1 (one) minute to tell the name of these animals. I'll tell you when to start. Let's start.	Number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W1
HRS	MD194 (W10) ND194 (W11) OD194 (W12) PD194 (W13)	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. Time given: 1 minute (timed) Instructions: D194: Now I want to see how many animals you can name. You will have 60 seconds. Are you ready? Begin.	Number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W10, W11, W12, W13 Harmonised data availability: Not available Waves comparability: directly comparable between waves
LASI	MH016	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. The interviewer is asked to count acceptable animals (real or mythical) only. Repetitions, redundancies and proper nouns do not count as acceptable. Time given: 1 minute (timed) Instructions: MH015: Now we are going to ask you to think of animals and name as many as you can. If you wish you may also include birds along with animals. I'm going to give you one minute and I want to see how many animals you can name."	MH016: Records number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available

MHAS	E9A Harmonised variables: RwVERBF	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. Repetitions do not count. Time given: 1 minute (timed) Instructions: E9A: “I am going to ask you to name all the animals you can, you have one minute to complete the task.”	Number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves
NICOLA	AnimalRecall	Mode of administration: The respondent is asked to name as many different animals as possible in one minute.	Number of acceptable animals named in one minute Range: 0-N (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
SHARE	CF009 **Harmonised variables:** RwVERBF	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. Time given: 1 minute (timed) Instructions: CF009: Now I would like you to name as many different animals as you can think of. You have one minute to do this. Ready? go.	Number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves

TILDA	PH125 **Derived variables:** COGanimal_naming) **Harmonised variables:** RwVERBF	Mode of administration: The respondent is asked to name as many different animals as possible in one minute. The interviewer tells the respondent when to begin and to stop. The interviewer is asked to count acceptable animals (real or mythical) only. Repetitions, redundancies and proper nouns do not count. Time given: 1 minute (timed) Instructions: PH125: Now I would like you to name as many different animals as you can think of. You have one minute to do this. Ready? go	Number of acceptable animals named in one minute (see details on response codes in Codebook)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves

Table 3.11 Three-stage command (MMSE – Language component)

Three-stage command (MMSE – Language component) Cross-study comparability: Comparable between CRELES, KLoSA, LASI, NICOLA and TILDA.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
CRELES	B4 **Harmonised variables:** RwEXECU	Mode of administration: MMSE component. The respondent is asked to do follow a three-stage command._ Instructions B4: “I am going to give you a sheet of paper. Take thepaper with your RIGHT H AND, fold it in HALF with BOTH HANDS and place it ON YOUR LAP	Number of instructions correctly completed. Range 0-3 (see details on response codes in Codebook)	Availability: W4, W5 Harmonised data availability: W4, W5 Waves comparability: directly comparable between waves

KLoSA	C416 **Harmonised variables:** RwACTION	Mode of administration: MMSE component. The respondent is asked to do follow a three-stage command. Instructions: C416: “Now listen carefully and follow my directions. Are you ready? When I give you a piece of paper, please turn it over, fold it in half, and give it back to me.”	Number of instructions correctly completed. Range 0-3 (see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable
LASI	MH050	Mode of administration: MMSE component. The respondent is asked to do follow a three-stage command. Instructions C416: “Now listen carefully and follow my directions. Are you ready? When I give you a piece of paper, please turn it over, fold it in half, and give it back to me.”	Number of instructions correctly completed. 4 levels (no task completed; one task completed; two tasks completed; all tasks completed; see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
NICOLA	PH138	Mode of administration: MMSE component. The respondent is asked to do follow a three-stage command. Instructions PH138: “Please listen carefully because I am going to ask you to do something. Take this paper in your right hand, fold it in half and put it on the floor.”	Number of instructions correctly completed. Range 0-3 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves

TILDA	PH138	Mode of administration: MMSE component. The respondent is asked to do follow a three-stage command. Instructions PH138: "Please listen carefully because I am going to ask you to do something. Take this paper in your right hand, fold it in half and put it on the floor."	Number of instructions correctly completed. Range 0-3 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

NUMERACY/ NUMERIC ABILITY

Table 3.12 Serial 7's (MMSE – Attention & calculation component)

Serial 7's (MMSE – Attention & calculation component)

Cross-study comparability: The tests are directly comparable between CHARLS, ELSA, HRS, JSTAR, KLoSA, LASI, NICOLA, MHAS, SHARE and TILDA. Note that the instructions are slightly different in TILDA compared to other studies. In TILDA, the reviewer encourages the respondent to "keep going"; in the other studies, the reviewer repeats the instruction "and 7 from that?" for the five subtractions. This should be highlighted as a limitation in cross-study investigations. Repeated instructions imply performing the same subtraction task several times. This is different from a single instruction for which the respondent must perform the task while recalling the instructions at each subtraction.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
CHARLS	DC019 DC020 DC021 DC022 DC023 Harmonised variables: RwSER7 (combines all the above)	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: DC019: Now let's try some subtraction of numbers. What does one hundred minus 7 equal? DC020: and 7 from that? DC021: and 7 from that? DC022: and 7 from that? DC023: and 7 from that?	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: directly comparable between waves;

ELSA	CFSVA CFSVB CFSVC CFSVD CFSVE **Harmonised variables:** RwSER7 (combines all the above; 'w' stands for wave number)	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: CFSVA: Now let's try some subtraction of numbers. One hundred minus 7 equals what? CFSVB: and 7 from that? CFSVC: and 7 from that? CFSVD: and 7 from that? CFSVE: and 7 from that?	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W7, W8 Harmonised data availability: W7, W8 Waves comparability: directly comparable between waves
HRS	Wave 10: MD142, MD143, MD144, MD145, MD146 Wave 11: ND142, ND143, ND144, ND145, ND146 Wave 12: OD142, OD143, OD144, OD145, OD146 Wave 13: PD142, PD143, PD144, PD145, PD146 **Harmonised variables:** RwSER7 (combines D142 to D146; 'w' stands for wave number)	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: D142: Now let's try some subtraction of numbers. One hundred minus 7 equals what? D143: and 7 from that? D144: and 7 from that? D145: and 7 from that? D146: and 7 from that?	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves

JSTAR	B-008-1 B-008-2 B-008-3 B-008-4 B-008-5 (-n stands for subtraction number) **Harmonised variables:** RwSER7 (combines all; 'w' stands for wave number)	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: B-007: Next, I will ask you to perform some simple calculations. May I continue? B-008-1: Please subtract 7 from 100. B-008-2: Please subtract 7 from that number. B-008-3: Please subtract 7 from that number. B-008-4: Please subtract 7 from that number. B-008-5: Please subtract 7 from that number	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W3 (3 cities) & W4 Harmonised data availability: W3 (3 cities) Waves comparability: directly comparable between waves
KLoSA	C407 C408 C409 C410 C411 **Harmonised variables:** RwSER7 (combines all; 'w' stands for wave number)	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: no longer than 3 minutes Instructions: C407: Let's do some subtraction this time. What are 100 minus 7? C408: And 7 from that? C409: And 7 from that? C410: And 7 from that? C411: And 7 from that?	Number of subtractions given correctly Binary: correct/ incorrect (see details on response codes in Codebook) RwSER7: Range 0-5 (see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves

LASI	MH040 MH041 MH042 MH043 MH044	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: MH040: 100 minus 7 equals what? MH041/ MH042/ MH043/ MH044: And 7 from that equals what?	Number of subtractions given correctly Binary: correct/ incorrect (see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
MHAS	E15A E15B E15C E15D E15E	Mode of administration: The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions: E15A: What is 100 minus 7? E15B-E: Now keep subtracting 7.	Binary: correct/ incorrect (see details on response codes in Codebook)	Availability: W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves
NICOLA	PH133	Mode of administration: MMSE component. The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions PH133: “Now I’d like you to subtract 7 from 100. Then keep subtracting 7 from each answer until I tell you to stop. Is that ok? What is 100 minus 7?”	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves

TILDA	PH133 **Harmonised variables:** RwSER7 (‘w’ stands for wave number)	Mode of administration: MMSE component. The respondent is asked to subtract 7 from 100 and keep subtracting 7 from each answer for a total of 5 subtractions. Time given: Not available Instructions PH133: “Now I’d like you to subtract 7 from 100. Then keep subtracting 7 from each answer until I tell you to stop. Is that ok? What is 100 minus 7?”	Number of subtractions given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: W2, W3 Waves comparability: directly comparable between waves

Table 3.13 Backward counting (from 20)

Backward counting (from 20)				
Cross-study comparability: Directly comparable between ELSA, HRS and MHAS (Number of trials: N=2; same coding for answers given). In LASI, there is one trial only. The answer is coded slightly differently from ELSA, HRS and MHAS, with a three-level variable: correct/ incorrect/ cannot count. In ELSA, HRS, MHAS the variable for the first trial has 3 levels: correct/ incorrect/ wants to start again; the variable for the second trial is binary: correct/ incorrect. This is a limitation for multi-study comparative investigations. To facilitate comparative analysis using all four studies, only the first trial in each could be considered, and a binary 'correct'/'incorrect or other' variable could be generated (collapsing individuals who restarted and/or who cannot count into this latter category for purposes of cross-country comparison).				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
ELSA	CFC20C/ CFC20FRST CFC20F/ CFC20FSCND **Harmonised variables:** RwBWC20 (combines CFC20C & CFC20F) 'w' stands for wave number	Mode of administration: The respondent is asked to count backward as quickly as they can from 20. Number of trials: 2 trials Instructions: CFC20A: For this next question, please try to count backward as quickly as you can from the number I will give you. I will tell you when to stop. Please start with 20. CFC20C: You may stop now thank you. CFC20D: Let's try again. The number to count backward from is 20. CFC20F: You may stop now thank you.	The respondent counted correctly/ incorrectly from 19 to 10 or 20 to 11. CFC20C: 3-level: correct/ incorrect/ wants to start again (see codebooks for more details) CFC20F: Binary: correct/ incorrect (see codebooks for more details) CFC20FRST: counting backward; first attempt (binary) CFC20FSCND: counting backward; second attempt (binary) RwBWC20: 3 level (correct for both trials; correct for the second trial only; incorrect; see codebooks for more details)	Availability: W7, W8 Harmonised data availability: W7, W8 Waves comparability: directly comparable between waves

HRS	MD124/129 (W10) ND124/129 (W11) OD124/129 (W12) PD124/129 (W13) **Harmonised variables:** RwBWC20 (combines D124 & D129) 'w' stands for wave number	Mode of administration: The respondent is asked to count backward as quickly as they can from 20. Number of trials: 2 trials Instructions: D120: For this next question, please try to count backward as quickly as you can from the number I will give you. I will tell you when to stop. Please start with 20. D124: You may stop now thank you. D125: Let's try again. The number to count backward from is 20. D129: You may stop now thank you	The respondent counted correctly/ incorrectly from 19 to 10 or 20 to 11. D124: 3-level: correct/ incorrect/ wants to start again (see codebooks for more details) D129: Binary: correct/ incorrect (see codebooks for more details)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves
LASI	MH036	Mode of administration: The respondent is asked to count backward as quickly as they can from 20. Number of trials: 1	The respondent counted correctly/ incorrectly from 19 to 10 or 20 to 11. MH036: 3-level: correct/ incorrect/ cannot count (see codebooks for more details)	Availability: W1 Harmonised data availability: Not available
MHAS	E12A E12B **Harmonised variables:** RwBWC20 'w' stands for wave number	Mode of administration: The respondent is asked to count backward as quickly as they can from 20. Number of trials: 2 trials Instructions: E12: In the following exercise, please count from 20 to 0. Do it as fast as possible. I'm going to count the time and I will tell you when you can stop. E12B: Let's try again.	The respondent counted correctly/ incorrectly from 19 to 10 or 20 to 11. E12A: 3-level: correct/ incorrect/ wants to start again (see codebooks for more details) E12B: Binary: correct/ incorrect (see codebooks for more details)	Availability: W3, W4 Harmonised data availability: W3 Waves comparability: directly comparable between waves

Table 3.14 Computation

Computation

Cross-study comparability: **Not** directly comparable between ELSA, HRS, JSTAR, LASI, SHARE and TILDA.

Comparability guidelines: The computation score is based on 2 questions in LASI, 3 to 6 questions in ELSA, 3 questions in HRS and TILDA, 4 questions in JSTAR and SHARE. This is a limitation for multi-study comparative investigations. However, this limitation may be overcome by standardizing the scores: Number of correct answers / number of questions asked, as the questions across studies are similar:

Subtraction (change back): ELSA

- Division 1 (cost of an item / 2): ELSA, JSTAR, LASI and SHARE;
- Division 2 (lottery prize / 5): ELSA, HRS, LASI and TILDA;
- Fraction (2/3): ELSA, JSTAR and SHARE;
- Percentage (10% of 1,000): ELSA, HRS, JSTAR, SHARE and TILDA;
- Percentage (10% interest rate): ELSA, HRS, JSTAR, SHARE and TILDA.

Some re-coding of answers may be necessary prior to standardization, as in some studies the interviewer had multiple answer choices to choose from while in others the interviewer rated the answer as correct or incorrect.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
ELSA	CFSUMB CFSUMC CFSUMD CFSUMA CFSUME CFSUMF CFMSCR (combines all the above) **Harmonised variables:** RwNUMER_E (combines all questions; based on CFMSCR) 'w' stands for wave number	Mode of administration: The respondent is asked a set of questions to assess how they use numbers in everyday life. Number of questions asked: between 3 and 6 Instructions CFSUMB: In a sale, a shop is selling all items at half price. Before the sale, a sofa costs £300. How much will it cost in the sale? CFSUMC: If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease? CFSUMD: A second-hand car dealer is selling a car for £6000. This is two-thirds of what it cost new. How much did the car cost new? CFSUMA: If you buy a drink for 85 pence and pay with one pound coin, how much change should you get back? CFSUME: If 5 people all have the winning numbers in the lottery and the prize is £200 million, how much will each of them get? CFSUMF: Let's say you have £200 in a savings account. The account earns ten per cent interest each year. How much would you have in the account at the end of two years?	Answer given is correct or incorrect; Binary (correct/ incorrect) RwNUMER_E: summary score indicating how well the respondent answered the numeracy questions; ranges from 0 to 6 (see Codebooks for more details)	Availability: W6, W7, W8 Harmonised data availability: W6, W7, W8 Waves comparability: directly comparable between waves

HRS	Wave 10: MD178/ MD179/ MD180 Wave 11: ND178/ ND179/ ND180 Wave 12: OD178/ OD179/ OD180 Wave 13: PD178/ PD179/ PD180	Mode of administration: The respondent is asked a set of questions to assess how they use numbers in everyday life. Number of questions asked: 3 Instructions D178: Next I would like to ask you some questions which assess how people use numbers in everyday life. If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease? D179: If 5 people all have the winning numbers in the lottery and the prize is two million dollars, how much will each of them get? D180: Let's say you have $200 in a savings account. The account earns 10 percent interest per year. How much would you have in the account at the end of two years.	D178: Number of people (binary: correct/ incorrect; see Codebooks for more details) D179: Amount (binary: correct/ incorrect; see Codebooks for more details) D180: Amount (binary: correct/ incorrect; see Codebooks for more details)	Availability: W10, W11, W12, W13 Harmonised data availability: Not available Waves comparability: directly comparable between waves
JSTAR	B-010-1 (W3- 3 cities) B-010-2 B-010-3 B-010-4 F-012-1 (W4) F-012-2 F-012-2 F-012-2 **Harmonised variables:** RwNUMER 'w' stands for wave number	Mode of administration: The respondent is asked a set of questions to assess how their ability to calculate percentage. Number of questions asked: 4 Instructions: B-010-1: I would like you to calculate mentally, so please listen to the question carefully. Suppose that 10% of people catch a certain disease. If there are 1,000 people, how many of them catch the disease? F-012-1: First, I want you to calculate using mental arithmetic. So, please listen carefully. Suppose 10% of a group of people catch a disease. If there are 1000 people, how many people catch the disease? B-010-2: Next, suppose that a store is planning to sell everything at half price and there is a product being sold for 300 yen. How much will it be sold for during the half-price sale? F-012-3: Now, the next question is, a store sells a second-hand dictionary for 6000 yen, which is two-thirds of the original price. What would be the price of a new dictionary?	Answer given is correct or incorrect; Binary (correct/ incorrect) RwNUMER: Amount of correct answers; see Codebooks for more details)	Availability: W3 (3 cities) & W4 Harmonised data availability: W3 (3 cities) Waves comparability: directly comparable between waves

		B-010-4: This is the last question in the calculation test. Suppose you have 2,000 yen in your bank account. This bank account pays compound interest at the rate of 10% every year. How much will you have after 2 years? F-012-4: Now, to the last question. Suppose you have 2000 yen in a bank account. The account deposit gains 10 percent compound interest every year. After 2 years, how much will your deposit be?		
LASI	MH046 MH047	Mode of administration: The respondent is asked a set of questions to assess how they use numbers in everyday life. Number of questions asked: 2 Instructions: MH046: A shop is having a sale and selling all items at half price. Before the sale, a safari costs 300 Rs. How much will it cost in the sale? MH047: If 5 people all have the winning numbers in the lottery and the prize is 1,000 Rs, how much will each of them get?	Answer given is correct or incorrect; Binary (correct/ incorrect)	Availability: W1 Harmonised data availability: Not available
SHARE	CF102 CF103 CF104 CF105 NUMERACY **Harmonised variables:** RwNUMER_S 'w' stands for wave number	Mode of administration: The respondent is asked a set of questions to assess how they use numbers in everyday life. Number of questions asked: 4 Instructions: CF011: Next I would like to ask you some questions which assess how people use numbers in everyday life. CF102: If the chance of getting a disease is 10 per cent, how many people out of 1000 (one thousand) would be expected to get the disease? CF103: In a sale, a shop in selling all items at half price. Before the sale, a sofa costs 300. How much will it cost in the sale? CF104: A second-hand car dealer is selling a car for 6,000. This is two-thirds of what it costs new. How much did the car cost new? CF105: Let's say you have 2000 in a savings account. The account earns ten per cent interest each year. How much would you have in the account at the end of two years?	NUMERACY/ RwNUMER_S: Amount of correct answers (see Codebooks for more details)	Availability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves (not asked to all respondents; see Codebooks for more details)

TILDA	NU001 NU002 NU003	NU001: If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease? NU002: If 5 people all have the winning numbers in the lottery and the prize is two million euro, how much will each of them get? NU003: Let's say you have €200 in a savings account. The account earns 10 percent interest per year. How much would you have in the account at the end of two years?	NU001: Number of people (see Codebooks for more details) NU002: Amount (see Codebooks for more details) NU003: Amount (see Codebooks for more details)	Availability: W3 Harmonised data availability: Not available

Table 3.15 Fluid intelligence

Fluid intelligence				
Cross-study comparability: **Not** directly comparable between ELSA, HRS, and LASI. Comparability guidelines: The fluid intelligence score is based on 6 questions in HRS, 8 questions in ELSA and 15 questions in LASI. This is a limitation for multi-study comparative investigations. However, this limitation may be overcome by expressing the number of correct answers recalled as a proportion of the number of questions asked (i.e. N correct answers / N questions). Creating standardised scores (Z scores) is a further option, but as the resultant scores will be related to the distribution of the variable in that particular study/population, use of this approach should be determined by the research question.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
ELSA	CF200PRE to CF235O2	Mode of administration: The respondent is asked to complete several series of numbers. Number of questions: 8 in total; the questions differ depending on how many the respondent is able to answer and how many of the responses are correct (see Codebooks for more details). Instructions: CF200PRE: Next I'm going to read you several numbers and I'd like you to write them down from left to right. There will be a blank number in the series that I read to you. Draw a dash or short blank line when I say 'blank'. Then look at the series of numbers, and based on the pattern of numbers tell me what number goes in the blank. Sometimes the blank will be at the end of the series, and sometimes the blank will be in the middle. For example, if I said the numbers '2. . . 4. . . 6. . .BLANK' then what number would go in the blank?	Binary (correct/incorrect; see Codebooks for more details)	Availability: W6 Harmonised data availability: Not available

CF240: Let's try another one. I'm going to read you a series of numbers. There will be a blank number in the series that I read to you. I would like you to write down the numbers from left to right and then tell me what number goes in the blank based on the pattern of numbers. 1. . . 2. . . BLANK. . . 4

CF242: I am now going to ask you six more questions like the one you just did. Sometimes the blank will be at the end of the series, and sometimes it may be at the beginning or in the middle. You may be asked a question with more than one blank in the sequence. The numbers might increase, like 2, 4, 6, or decrease, like 6, 4, 2. Some of the problems may be easy but others may be hard. Just do the best you can. It is more important to answer the item correctly than to answer quickly, so take a little time to think before answering. It is okay if you do not know the answer because some of the items are intended to be very difficult. You can go on to the next item at any time. Are you ready to begin?

CF201G1: Please write down the following numbers from left to right: 8 . . . BLANK . . . 12. . . 14. Now look at the numbers that you just wrote down and tell me the number that belongs in the blank.

CF202H1: Next, please write down the following numbers: 23 . . . 26 . . . 30 . . 35 . . . BLANK.

CF203I1: Next, please write down the following numbers: 18 . . 17 . . . 15 . . . BLANK . . . 8.

CF204A1: 6 . . .7 . . . BLANK . . . 9.
CF205B1: 6 . . . BLANK . . . 4 . . . 3.
CF206C1: 5 . . .8 . . . 11 . . . BLANK.
CF207D1: BLANK . . . 4 . . . 6 . . . 8.
CF208E1: 1 . . . 3 . . . 3 . . . 5 . . . 7 . . . 7 . . .BLANK.
CF209F1: 18 . . . 10 . . . 6 . . . BLANK . . . 3.
CF210J1: 17 . . . BLANK . . . 12 . . . 8
CF211K1: 10 . . . BLANK . . . 3 . . . 1 .
CF212L1: 17 . . .16 . . . 14 . . . 10 . . . BLANK .

		CF213M1: BLANK . . .20 . . . 26 . . . 38 . . . 62 CF214N1: 5 . . . BLANK . . . 11 . . . 19 . . . 35 . CF21501: 70 . . . BLANK . . . BLANK . . . 84 . CF221G2: 7 . . . 10 . . . 13 . . . BLANK CF222H2: BLANK . . . 13 . . . 15 . . . 18 . . . 22 . CF223I2: 18 . . . 17 . . . BLANK . . . 12 . . . 8 . CF224A2: 4 . . .5 . . . 6 . . . BLANK . CF225B2: 5 . . .4 . . . 3 . . . BLANK . CF226C2: 11 . . . BLANK . . . 15 . . . 17 . CF227D2: BLANK . . . 15 . . . 13 . . . 11 . CF228E2: 10 . . . 6 . . . 3 . . . BLANK . CF229F2: 11 . . . 9 . . . 6 . . . BLANK . CF230J2: 1 . . . 3 . . . 9 . . . BLANK . CF231K2: 13 . . . 15 . . . 19 . . . BLANK . CF232I2: 3 . . . 3 . . . 4 . . . 6 . . . 6 . . . 7. .BLANK . . . BLANK . CF233M2: 6 . . . BLANK . . . 15 . . . 27 . . .51 . CF234N2: BLANK . . .18 . . . 24 . . . 36 . . . 60 . CF235O2: 60 . . . 33 . . . 24 . . . 21 . . . BLANK .		
HRS	W10: MD202 – MD211 W11: ND202 – ND211 W12: OD202 – OD211 W13: PD202 – PD211	Mode of administration: The respondent is asked to complete several series of numbers. Number of questions: 6 in total; (see Codebooks for more details). Instructions: D202: Please write down the following numbers: 18 . . . 10 . . . 6. . . BLANK . . . 3. Now look at the numbers that you just wrote down and tell me the number that belongs in the blank. D203: 17 . . . BLANK . . . 12 . . . 8. D204: 6 . . . 7 . . . BLANK . . . 9. D205: 6 . . . BLANK . . . 4 . . . 3. D206: 5 . . . 8 . . . 11 . . . BLANK. D211: 18 . . . 17 . . . 15 . . . BLANK . . . 8 D211: 10 . . . BLANK . . . 3 . . . 1.	Binary (correct/incorrect; see Codebooks for more details)	Availability: W10, W11, W12, W13 Harmonised data availability: Not available Waves comparability: directly comparable across waves

LASI	MH021 – MH035	Mode of administration: The respondent is asked to complete several series of numbers. Number of questions asked: 15 Instructions MH021: Fill in the blank [7, 8, , 10] MH022: Fill in the blank [8, , 10, 12] MH023: Fill in the blank [18, 10, 6, , 3] MH024: Fill in the blank [1, 2, 3,] MH025: Fill in the blank [6, 5, 4,] MH026: Fill in the blank [12, , 16, 18] MH027: Fill in the blank [5, , 3, 2] MH028: Fill in the blank [4, 7, 10,] MH029: Fill in the blank [, 4, 6, 8] MH030: Fill in the blank [1, 3, 3, 5, 7, 7,] MH031: Fill in the blank [3, , 8, 12, 17] MH032: Fill in the blank [17, , 12, 8] MH033: Fill in the blank [10, , 3, 1] MH034: Fill in the blank [18, 17, 15, , 8] MH035: Fill in the blank [3, 3, 4, 6, 6, 7, ,]		Availability: W1 Harmonised data availability: Not available

Table 3.16 Object naming

Object naming (for some studies, MMSE – Language component)

Cross-study comparability: Comparable between ELSA, HRS, and ELSI; comparable between KLoSA, LASI, NICOLA and TILDA.

The respondent is asked to name two objects based on the interviewer's description in ELSA, HRS and ELSI. The first object to name (scissors) is the same across the three studies; the second object to name is the same in ELSA and HRS (a cactus), slightly different in ELSI (a banana) but comparable to the object described in ELSA and HRS.

The respondent is asked to name two objects based on what the interviewer shows them in KLoSA, LASI, NICOLA and TILDA. The first and second objects shown (a pen/pencil and a watch) are the same in KLoSA, NICOLA and TILDA; in LASI it can be anything (including a pen/pencil and a watch) but comparable to the objects shown in KLoSA, NICOLA and TILDA.

Comparability guidelines: While object naming slightly differs between these studies, this variable can be used for cross-studies investigations. One may highlight this as a limitation in the discussion section of an academic paper.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
ELSA	CFNMSC CFNMCA **Harmonised variables:** RwSCIS (CFNMSC) RwCACT (CFNMSA) 'w' stands for wave number	Mode of administration: The respondent is asked to name two objects based on the interviewer's description. Instructions: CFNMSC: Now I'm going to ask you for the names of some people and things. What do people usually use to cut paper? CFNMCA: What do you call the kind of prickly plant that grows in the desert?	CFNMSC/ CFNMSA: Binary (correct/ incorrect; see Codebooks for more details)	Availability: W7, W8 Harmonised data availability: W7, W8 Waves comparability: directly comparable between waves
ELSI	q18 q19	Mode of administration: The respondent is asked to name two objects based on the interviewer's description. Instructions: q18: Finally, I will ask you the purpose of some objects and the names of some people. What do people usually use to cut paper? q19: What is the plant that has a long and green leaf that gives a yellow and long fruit and that we peel to eat it?	q18/ q19: Binary (correct/ incorrect; see Codebooks for more details)	Availability: W1

HRS	Wave 10: MD155/ MD156 Wave 11: ND155/ ND156 Wave 12: OD155/ OD156 Wave 13: PD155/ PD156 **Harmonised variables:** RwSCIS (D155) RwCACT (D156) 'w' stands for wave number	Mode of administration: The respondent is asked to name two objects based on the interviewer's description. Instructions: D155: Now I'm going to ask you for the names of some people and things. What do people usually use to cut paper? D156: What do you call the kind of prickly plant that grows in the desert?	D155/ D156: Binary (correct/ incorrect; see Codebooks for more details)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves
KLoSA	C413 C414	Mode of administration: K-MMSE component. The respondent is asked to name two objects that the interviewer shows them (a watch and a pencil). Instructions C413: "What is this?" C414: "What is this?"	Number of objects identified correctly Binary (correct/incorrect; see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: Not available Waves comparability: directly comparable between waves

LASI	MH019 MH020	Mode of administration: The respondent is asked to name two objects that the interviewer shows them (the items can be cell phones, hats, rings, umbrella, whatever is within a close reach). Instructions MH019: “What is this?” MH020: “What is this?”	Object identified correctly/ incorrectly Binary (correct/incorrect; see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
NICOLA	PH136	Mode of administration: MMSE component. The respondent is asked to name two objects that the interviewer shows them (a pen or pencil and a watch). Instructions PH136: “What is this?”	Number of objects identified correctly Range 0-2 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH136	Mode of administration: MMSE component. The respondent is asked to name two objects that the interviewer shows them (a watch and a pencil). Instructions PH136: “What is this?”	Number of objects identified correctly Range 0-2 (see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.17 Sentence repetition (MMSE – Language component)

Sentence repetition (MMSE – Language component) Cross-study comparability: Comparable between KLoSA, NICOLA and TILDA; The sentence to repeat in NICOLA and TILDA is the same.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
KLoSA	C415 **Harmonised data:** RwRPSNT 'w' stands for wave number	M Mode of administration: K-MMSE component. The respondent is asked to repeat a sentence (out of 5 sentences; randomly selected). Instructions C415: "Now you have to exactly repeat what I say. Are you ready? Please listen carefully."	Binary (sentence repeated correctly/ incorrectly; see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves
NICOLA	PH137	Mode of administration: MMSE component. The respondent is asked to repeat a sentence. Instructions PH137: "Now I am going to ask you to repeat what I say. Ready? No ifs, ands or buts."	Binary (sentence repeated correctly/ incorrectly; see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH137	Mode of administration: MMSE component. The respondent is asked to repeat a sentence. Instructions PH137: "Now I am going to ask you to repeat what I say. Ready? No ifs, ands or buts."	Binary (sentence repeated correctly/ incorrectly; see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.18 Read and follow a written command (MMSE – Language component)

Read and follow a written command (MMSE – Language component) Cross-study comparability: Directly comparable between NICOLA and TILDA. Comparability guidelines: Recoding of answers is necessary for KLoSA and LASI. In NICOLA and TILDA, the score is binary (closed vs. did not close their eyes) whereas in KLoSA and LASI, the answer accounts for whether the respondent completed one task (read or close their eyes), two tasks (read and close their eyes) or whether they did not complete any. Once the recoding has been completed, this variable can be used for cross-studies investigations.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
KLoSA	C417 **Harmonised variables:** RwTASK 'w' stands for wave number	Mode of administration: K- MMSE component. The respondent is asked to read and obey a written command on a piece of paper stating to close their eyes. Instructions C417: "Please read the sentence aloud and act it out."	Three levels (completed one task; did both tasks; did not complete any; see details on response codes in Codebook) Ranges 0-2	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves
LASI	BH048	Mode of administration: MMSE component. The respondent is asked to read and obey a written command on a piece of paper stating to close their eyes. Instructions BH048: "I will show you a sentence. Please read the sentence aloud and act it out."	Four levels (completed one task; did both tasks; did not complete any; is illiterate; see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available
NICOLA	PH139	Mode of administration: MMSE component. The respondent is asked to read and obey a written command on a piece of paper stating to close their eyes. Instructions PH139: "Please read this [CLOSE YOUR EYES] and do what it says."	Binary (closed/ did not close their eyes; see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves

TILDA	PH139	Mode of administration: MMSE component. The respondent is asked to read and obey a written command on a piece of paper stating to close their eyes. Instructions PH139: "Please read this [CLOSE YOUR EYES] and do what it says."	Binary (closed/ did not close their eyes; see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.19 Sentence writing (MMSE – Language component)

Sentence writing (MMSE – Language component) Cross-study comparability: Directly comparable between KLoSA, LASI, NICOLA and TILDA				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
KLoSA	C418 **Harmonised variables:** RwWRITE 'w' stands from wave number	Mode of administration: K- MMSE component. The respondent is asked to write a sentence on a piece of paper. Instructions PH140: "Please write one sentence about how you're feeling today or about today's weather."	Binary (wrote/ did not write a sentence; see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves
LASI	MH049	Mode of administration: The respondent is asked to write a sentence on a piece of paper. Instructions MH049: "Please write one sentence about how you're feeling today or about today's weather."	Three levels (wrote/ did not write a sentence; is illiterate; see details on response codes in Codebook	Availability: W1 Harmonised data availability: Not available

NICOLA	PH140	Mode of administration: MMSE component. The respondent is asked to write a sentence on a piece of paper. Instructions PH140: “Please write a sentence.”	Binary (wrote/ did not write a sentence; see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH140	Mode of administration: MMSE component. The respondent is asked to write a sentence on a piece of paper. Instructions PH140: “Please write a sentence.”	Binary (wrote/ did not write a sentence; see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3.20 Spelling (MMSE – Attention & calculation component)

Spelling (MMSE – Attention & calculation component) Cross-study comparability: Directly comparable between NICOLA and TILDA.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
NICOLA	PH134	Mode of administration: MMSE component. The respondent is asked to spell the word WORLD forwards and backwards. Instructions PH134: "Now can you please spell WORLD for me. Now can you spell WORLD backwards."	Number of letters given correctly Range 0-5 (see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH134	Mode of administration: MMSE component. The respondent is asked to spell the word WORLD forwards and backwards. Instructions PH134: "Now can you please spell WORLD for me. Now can you spell WORLD backwards."	Binary (wrote/ did not write a sentence; see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Table 3. 21 Orientation (MMSE – Orientation component)

Orientation (MMSE – Orientation component)

Cross-study comparability and comparability guidelines:

Day, month and year variables: Directly comparable between CHARLS, CRELES, ELSA, ELSI, HRS, JSTAR, LASI, MHAS, NICOLA, SHARE AND TILDA. KLoSA has one variable only for the day, month and year ranging from 0 to 3. The separate Day, Month and Year variables in other studies could be combined to match KLoSA scoring to allow for multi-study comparative investigations.

Day of the week: Directly comparable between CHARLS, CRELES, ELSA, ELSI, HRS, JSTAR, KLoSA, LASI, NICOLA, SHARE and TILDA. This question is not asked in the other studies.

Season: Directly comparable between CHARLS, KLoSA, NICOLA and TILDA. This question is not asked in the other studies.

Person: President and Vice-President directly comparable between ELSI and HRS. These questions are not asked in the other studies. In ELSA, the respondent is asked to name the Monarch and the Prime Minister which is comparable to President and Vice-President.

Place: City/Village directly comparable between JSTAR, LASI, NICOLA and TILDA; Building directly comparable between LASI, NICOLA and TILDA. Country, County and Floor directly comparable between NICOLA and TILDA. These questions are not asked in the other studies. In KLoSA, the respondent is asked to give their address; the variable ranges from 0 to 4 and is not directly comparable with other studies Place variables.

Study	Variable name	Test administration and instructions	Scoring	Waves availability and comparability
CHARLS	DC001S1 DC001S2 DC001S3 DC002 DC003 **Harmonised variables:** RwYR (DC001S1) RwMO (DC001S2) RwDW (DC002) RwDY (DC001S3) RwOrient (combines RwYR, rwMO, rwDW, rwDY)	Mode of administration: The respondent is asked to report on the day's date. The respondent is also asked to indicate the season. Instructions: DC001: Please tell me today's date DC002: please tell me the day of the week. Is it Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, or Sunday? DC003: What is the current season (among Spring, Summer, Fall, or Winter)?	Binary (correct/ incorrect) DC001 contains responses for day (CD001S3), month (DC001S2) and year (DC001S1) RwOrient: ranges from 0 to 4	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: directly comparable between waves; slight differences between waves for the coding of incorrect/ refuse/ don't know responses (see Harmonised codebooks for more details)

CRELES	B1 (A/B/C/D) **Harmonised variables:** RwYR (B1D) RwMO (B1C) RwDW (B1A) RwDY (B1B) RwOrient (combines RwYR, rwMO, rwDW, rwDY)	<u>Mode of administration:</u> The respondent is asked to report on the day's date. <u>Instructions:</u> B1: Please tell me today's date	B1A/B/C/D: Binary scores (correctly/ incorrectly given; see details on response codes in Codebook) B1 contains responses for day, month, year and day of the week; ranges from 0 to 4 Harmonised variables: Binary (correct/ incorrect) RwOrient: ranges from 0 to 4	<u>Availability:</u> W4, W5 <u>Harmonised data availability:</u> W4, W5 <u>Waves comparability:</u> directly comparable between waves
ELSA	CFDATD CFDATM CFDATY CFDAY CFNMQN CFNMPM CFNMUS **Harmonised variables:** RwYR (CFDATY) RwMO (CFDATM) RwDW (CFDAY) RwDY (CFDATD) RwOrient (combines RwYR, rwMO, rwDW, rwDY) RwMNRC (CFNMQN) RwPM (CFNMPM) RwPRES (CFNMUS) 'w' stands for wave number	<u>Mode of administration:</u> The respondent is asked to report on the day's date. The respondent is also asked to give the name of the monarch, prime minister and president of the United States at W7 & W8. <u>Instructions:</u> CFDATD: Please tell me today's date (day) CFDATM: Please tell me today's date (month) CFDATY: Please tell me today's date (year) CFDAY: And please tell me what day of the week it is today? CFNMQN: Who is the reigning monarch now? CFNMPM: Who is the prime minster now? CFNMUS: Who is the president of the United States now?"	Binary scores (correctly/ incorrectly given; see details on response codes in Codebook) RwOrient: ranges from 0 to 4	<u>Availability:</u> W5, W6, W7, W8 <u>Harmonised data availability:</u> W5, W6, W7, W8 <u>Waves comparability:</u> directly comparable between waves

ELSI	q7 (day) q8 (month) q9 (year) q20 (president) q21 (vice-president)	Mode of administration: The respondent is asked to report on the day's date. The respondent is also asked to give the name of the president and vice president of Brazil. Instructions: q5: Could you tell me today's date? Please tell me day, month and year. q6: In which day of the week are we? q7: response for the day q8: response for the month q9: response for the year q10: response for the day of the week q20: Who is the president of Brazil? q21: Who is the Vice President of Brazil?	q7/q8/q9/q10/q20/q2: Binary scores (correctly/ incorrectly given; see details on response codes in Codebook)	Availability: W1
HRS	Wave 10: MD152/ MD153/MD154/MD157/ MD158 Wave 11: ND152/ ND153/ND154/ND157/ ND158 Wave 12: OD152/ OD153/OD154/OD157/ OD158 Wave 13: PD152/ PD153/PD154/PD157/ PD158 **Harmonised variables:** RwYR (D153) RwMO (D151) RwDW (D154) RwDY (D151) RwPRES (D157) RwVP (D158) 'w' stands for wave number	Mode of administration: The respondent is asked to report on the day's date. The respondent is also asked to give the name of the president and vice president of the United States. Instructions: D152: Please tell me today's date (day) D151: Please tell me today's date (month) D153: Please tell me today's date (year) D154: And please tell me what day of the week it is today? D157: Who is the president of the United States now? D158: Who is the Vice President?	Binary scores (correctly/ incorrectly given; see details on response codes in Codebook)	Availability: W10, W11, W12, W13 Harmonised data availability: W10, W11, W12, W13 Waves comparability: directly comparable between waves

JSTAR	B-003-1 B-003-2 B-003-3 B-003-4 B-003-5 B-003-6 Harmonised variables: RwYR (B-003-1) RwMO (B-003-2) RwDW (B-003-4) RwDY (B-003-3) RwORIENT (combines all the above) 'w' stands	Mode of administration: The respondent is asked to report on the day's date and place. Instructions: B-003-1: First, I would like to ask about today's date. What year are we in currently? B-003-2: What month are we in currently? B-003-3: What is the date today? B-003-4: What day of the week is it today? B-003-5: What prefecture are we in? B-003-6: What city/ward/town/village are we in?	Binary scores (correctly/ incorrectly given; see details on response codes in Codebook) RwOrient: ranges from 0 to 4	Availability: W3 (3 cities) Harmonised data availability: W3 (3 cities)
KLoSA	C401 C402 C403 C404 C405 Harmonised variables: RwDAT (C401) RwDW (C402) RwORIENT (combines C401, C402) 'w' stands for wave number	Mode of administration: The respondent is asked to report on the day's date, place and season. Instructions: C401: Please tell me today's date. C402: What day of the week is it today? C403: What is the current season? C404: What is this place used for? C405: What is your address? Please tell me the city, Gun, Dong, Apt, St number.	C401: Ranges 0-3 (day/ month/year are all correct; 2 out of day/month/year are correct; 1 out of day/month/ year s correct; day/month/ year are all incorrect) C402/403/404: Binary (correct/ incorrect) C405: Ranges 0-4 (city/gun/ dong/ street all correct; 3 out of city/gun/dong/ street correct; 2 out of city/gun/ dong/ street correct; 1 out of city/gun/dong/ street correct; city/gun/dong/ street all incorrect) RwORIENT: Ranges 0-4 (see codebooks for more details)	Availability: W1

LASI	MH002 MH003 MH004 MH005 MH006 MH007 MH008 MH009	Mode of administration: The respondent is asked to report on the day's date. Instructions: MH002: Please tell me today's date. (day) MH003: Please tell me today's date. (month) MH004: Please tell me today's date. (year) MH005: Please tell me which day of week is today. MH006: What is this place used for? MH007: Name of village/ town/ city MH008: Street number/ colony name/ landmark/ neighbourhood MH009: What is the name of your district?	Binary (correct/ incorrect)	Availability: W1 Harmonised data availability: Not available
MHAS	E11 E11A E11B E11C **Harmonised variables:** RwYR (E11C) RwMO (E11B) RwDY (E11A) RwOrient_M (combines RwYR, rwMO, & rwDY) 'w' stands for wave number	Mode of administration: The respondent is asked to report on the day's date. Instructions: E11: Can you tell me which day is today?	E11: records day, month and year E11A: records day; binary (correct/ incorrect) E11B: records month; binary (correct/ incorrect) E11C: records year; binary (correct/ incorrect) RwOrient_M: ranges from 0 to 3	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves

NICOLA	PH121 PH122 PH123 PH124 PH126 PH127 PH128 PH129 PH130	Mode of administration: MMSE; The respondent is asked to report on the day's date and place. Instructions: PH121: Please tell me what year it is PH122: What month it is? PH123: Can you tell me what day of the week it is? PH124: Can you tell me what today's date is? PH126a: Please tell me what season it is PH127: What is the name of this country? PH128: What is the name of this county? PH129: What is the name of this city/ town? PH130: What is this building? PH131: What floor are we on?	Binary scores (Given correctly/Given incorrectly; see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves;
SHARE	CF003 CF004 CF005 CF006 **Harmonised variables:** RwYR (CF005) RwMO (CF004) RwDW (CF006) RwDY (CF103) RwOrient (combines RwYR, rwMO, rwDW, rwDY) 'w' stands for wave number	Mode of administration: The respondent is asked to report on the day's date. Instructions: CF103: Which day of the month is it? CF004: Which month is it? CF005: Which year is it? CF006: Can you tell me what day of the week it is?	Binary scores (Given correctly/Given incorrectly; see details on response codes in Codebook) RwOrient: ranges from 0 to 4	AAvailability: W4, W5, W6, W7 Harmonised data availability: W4, W5, W6, W7 Waves comparability: directly comparable between waves. Not all respondents are asked the questions. See Codebooks for more details.

TILDA	PH121 PH122 PH123 PH124 PH126 (W2-) PH127 (W2-) PH128 (W2-) PH129 (W2-) PH130 (W2-) **Harmonised variables:** RwYR (PH121) RwMO (PH122) RwDW (PH123) RwDY (PH126) RwOrient (combines RwYR, rwMO, rwDW, rwDY) 'w' stands for wave number	Mode of administration: (MMSE from W2); The respondent is asked to report on the day's date and place. Instructions: PH121: Please tell me what year it is PH122: What month it is? PH123: Can you tell me what day of the week it is? PH124: Can you tell me what today's date is? PH126: Please tell me what season it is PH127: What is the name of this country? PH128: What is the name of this county? PH129: What is the name of this city/ town? PH130: What is this building? PH131: What floor are we on?	Binary scores (Given correctly/Given incorrectly; see details on response codes in Codebook) RwOrient: ranges from 0 to 4	Availability: W1, W2, W3, W4, W5 Harmonised data availability: W1, W2, W3 Waves comparability: directly comparable between waves; PH126-131 available from wave 3.

Table 3.22 Picture drawing

Picture drawing (in some studies from MMSE – Copying component) Cross-study comparability: Directly comparable between CHARLS, KLoSA, LASI, NICOLA and TILDA (drawing: intersecting pentagons; binary score). Comparability guidelines: In MHAS, the respondent is asked to copy a geometrical figure; the score ranges from 0 to 6 which is not comparable with CHARLS, KLoSA, LASI, NICOLA and TILDA.				
Study	**Variable name**	**Test administration and instructions**	**Scoring**	**Waves availability and comparability**
CHARLS	DC025 **Harmonised variables:** RwDRAW ('w' stands for wave number)	Mode of administration: MMSE component. The respondent is asked to copy a pair of intersecting pentagons. Instructions DC025: "Do you see this picture? Please draw that picture on this paper	Binary (copied/ did not copy the design correctly; see details on response codes in Codebook)	Availability: W1, W2, W4 Harmonised data availability: W1, W2, W4 Waves comparability: directly comparable between waves
KLoSA	C419 **Harmonised variables:** RwDRAW ('w' stands for wave number)	Mode of administration: K- MMSE component. The respondent is asked to copy a pair of intersecting pentagons Instructions C419: "Do you see this picture? Please draw that picture on this paper."	Binary (copied/ did not copy the design correctly; see details on response codes in Codebook)	Availability: W3, W4, W5, W6 Harmonised data availability: W3, W4, W5, W6 Waves comparability: directly comparable between waves
LASI	MH051	Mode of administration: The respondent is asked to copy a pair of intersecting pentagons. Time given: Not available Instructions MH051: Do you see this picture? Please draw that picture on this paper.	Binary (copied/ did not copy the design correctly; see details on response codes in Codebook)	Availability: W1 Harmonised data availability: Not available

MHAS	E8 **Harmonised variables:** RwDRAW1 ('w' stands for wave number)	Mode of administration: (not from MMSE) The respondent is asked to copy a geometrical figure. Time given: 90 seconds Instructions E8: Draw this picture in the space below. Try to draw the picture in order to make it exactly as mine. I will count the time. I will indicate to you when you can start and when you can stop.	The respondent's ability to copy the figure. Ranges from 0 to 6 (see details in Codebooks)	Availability: W3, W4, W5 Harmonised data availability: W3 Waves comparability: directly comparable between waves
NICOLA	PH141	Mode of administration: MMSE component. The respondent is asked to copy a pair of intersecting pentagons. Instructions PH141: "Please copy this design."	Binary (copied/ did not copy the design correctly; see details on response codes in Codebook)	Availability: W1, W2 Harmonised data availability: Not available Waves comparability: directly comparable between waves
TILDA	PH141	Mode of administration: MMSE component. The respondent is asked to copy a pair of intersecting pentagons. Instructions PH141: "Please copy this design."	Binary (copied/ did not copy the design correctly; see details on response codes in Codebook)	Availability: W2, W3, W4, W5 Harmonised data availability: Not available Waves comparability: directly comparable between waves

Cognitive tests administration per HRS-family study

Table 4. Order in which cognitive tests were administered by study.

Study	Cognitive test order
CHARLS	Wave 1/2/4: Orientation; Self-rated memory; Word Immediate Recall; Depression; Serial 7's; Picture drawing; Delayed Recall
CRELES	Wave 4/5: Orientation; Word Immediate Recall; Backward digit span; 3-stage Command; Word Delayed Recall (Picture drawing only at Waves 1 to 3)
ELSA	Wave 5: Orientation; Word Immediate Recall; Verbal Fluency; Prospective Memory; Letter Cancellation; Word Delayed Recall; Literacy test Wave 6: Orientation; Word Immediate Recall; Fluid Intelligence; Word Delayed Recall; Literacy test; Computation Wave 7: Self-rated memory; Orientation; Word Immediate Recall; Verbal Fluency; Count backward; Serial 7's; Naming; Orientation; Word Delayed Recall; Literacy test; Computation Wave 8: Self-rated memory; Orientation; Word Immediate Recall; Verbal Fluency; Count backward; Serial 7's; Naming; Orientation; Word Delayed Recall; Literacy test; Computation
ELSI	Wave 1: Self-rated memory; Orientation; Word Immediate Recall; Verbal Fluency; Prospective Memory; Word Delayed Recall; Object Naming; Orientation
HRS	Waves 10/11/12/13: Self-rated memory; Word Immediate Recall; CESD; Count backward; Serial 7's; Word Delayed Recall; Orientation; Object Naming; Orientation; Meaning of words; Computation; Verbal Fluency; Fluid intelligence
JSTAR	Wave 3 (3 cities): Orientation; Word Immediate Recall; Serial 7s; Computation; Word Delayed Recall; Brain games Wave 3 (7 cities): Section B: Brain games; Section F: Word Immediate Recall Wave 4 (10 cities): Section B: Brain games; Section F: Word Immediate Recall; Serial 7s; Computation; Word Delayed Recall
KLoSA	Wave3/4/5/6: MMSE (Orientation; Word Immediate Recall; Serial 7s; Word Delayed Recall; Object Naming; Sentence repetition; 3-stage command; Reading comprehension; Sentence writing; Picture drawing)
LASI	Wave 1: Orientation; Word Immediate Recall; Verbal Fluency; Object Naming; Fluid Intelligence; Counting Backward; Serial 7s; Computation; Reading comprehension; Sentence Writing; 3-stage Command; Picture drawing (two tests); Word Delayed Recall

Study	Cognitive test order
MHAS	Wave 3: Self-rate memory; Reading; Word Immediate Recall; Picture drawing; Verbal fluency; Visual route; Orientation; Count Backward; Visual memory; Word Delayed Recalled Wave 4: Self-rate memory; Reading; Word Immediate Recall; Picture drawing; Verbal fluency; Visual route; Orientation; Count Backward; Visual memory; Word Delayed Recalled; Serial 7s Wave 5: Self-rated memory; Reading; Word Immediate Recall; Picture drawing; Verbal fluency; Visual route; Orientation; Visual memory; Word Delayed Recalled; Serial 7s
NICOLA	Wave 1 (CAPI): Self-rated memory; Word Immediate Recall; Health question module; Word Delayed recall (CAPI) Wave 1 (Health Assessment): MMSE; Colour Trails; MOCA; Verbal Fluency Wave 2 (CAPI): Self-rated memory; MMSE
SHARE	Wave 4/5/6/7: Orientation; Self-rated memory; Word Immediate Recall; Verbal Fluency; Computation; Serial 7s; Word Delayed Recall
TILDA	Wave 1 (CAPI): Self-rated memory; Immediate recall; Orientation (4 questions); Verbal Fluency; Questions on health conditions; Prospective memory task 1; Questions on pain, oral health, incontinence & medical tests; Delayed recall; Prospective memory Task 2 Wave 1 (Health Assessment): MMSE, Picture Memory Test, SART, Colour trails test, Choice Reaction Time, MOCA Wave 1/3 (Health Assessment): SART, Colour trails test, Choice Reaction Time, MOCA Waves (CAPI): Self-rated memory; MMSE (Orientation; Word Immediate Recall; Serial 7s; Word Delayed Recall; Object Naming; Sentence repetition; 3-stage command; Reading comprehension; Sentence writing; Picture drawing); Immediate recall; Verbal Fluency; Questions on health conditions; Prospective memory task 1; Questions on pain, oral health, incontinence & medical tests; Delayed recall; Prospective memory Task 2 Wave 3 (CAPI): Self-rated memory; MMSE (Orientation; Word Immediate Recall; Serial 7s; Word Delayed Recall; Object Naming; Sentence repetition; 3-stage command; Reading comprehension; Sentence writing; Picture drawing); Immediate recall; Verbal Fluency; Questions on health conditions; Prospective memory task 1; Questions on pain, oral health, incontinence & medical tests; Delayed recall; Prospective memory Task 2; Numeracy Waves 4-5 (CAPI): Self-rated memory; MMSE (Orientation; Word Immediate Recall; Serial 7s; Word Delayed Recall; Object Naming; Sentence repetition; 3-stage command; Reading comprehension; Sentence writing; Picture drawing); Immediate recall; Verbal Fluency; Questions on health conditions; Prospective memory task 1; Questions on pain, oral health, incontinence & medical tests; Delayed recall; Prospective memory Task 2

6. Access to documentation (questionnaires and codebooks)

The questionnaires, cognitive variable codebooks, harmonised codebooks and respective hyperlinks used in this guide are given below for each HRS study. When available, the official reference for the documentation is given.

Note:
Links to online resources are accurate as of January 2021 but file paths may be subject to change.

CHARLS

- ***CHARLS Website***: http://charls.pku.edu.cn/index/en.html
  Questionnaires and codebooks available at: the 'Doc' page of the CHARLS website

  - Wave 1 : "China Health and retirement Longitudinal Study – Baseline Questionnaire". August 2011. China Center for Economic Research, Peking University (http://charls.pku.edu.cn/pages/doc/2011_national_baseline/en.html)
  - Wave 2: "China Health and retirement Longitudinal Study – Follow up Questionnaire 2013". January 2015. China Center for Economic Research, Peking University (http://charls.pku.edu.cn/pages/doc/2013_tracking-_survey/en.html)
  - Wave 4: "China Health and retirement Longitudinal Study – Follow up Questionnaire 2015". June 2015. China Center for Economic Research, Peking University (http://charls.pku.edu.cn/pages/data/111/en.html)

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ CHARLSW1, CHARLSW2, CHARLSW4 / Section D. Health Status and Functioning

  - Wave 1: https://g2aging.org/printview.php?moduleid=1361
  - Wave 2: https://g2aging.org/printview.php?moduleid=1673
  - Wave 4: https://g2aging.org/printview.php?moduleid=2289

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised CHARLS codebook: https://g2aging.org/?section=downloads

  Beaumaster, S., S. Chien, S. Lau, A. Lin, D. Phillps, J. Wilkens, and J. Lee. "Harmonised CHARLS Documentation, Version C." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2018).

CRELES

- ***CRELES Website***: http://www.creles.berkeley.edu

  Questionnaires and codebooks available at: the 'Documentation' page of the CRELES website (http://www.creles.berkeley.edu/documentation.html); CRELES Pre-1945; Main questionnaires and variable codebooks only available from Wave 1-3 from this website;

  - Wave 1: "CRELES. Costa Rican Longevity and Healthy Aging Study. Elderly Questionnaire. Round 1." A Joint Project of the Central American Center on Population (CCP) and the Institute for Health Research (INISA). University of Costa Rica. (http://www.creles.berkeley.edu/pdf/Elderly_form_w1.pdf)
  - Wave 1: Rosero-Bixby et al (2013) "CRELES Pre-1945. Costa Rican Longevity and Healthy Aging Study. Codebook, Wave 1." Berkeley, CA: Department of Demography, University of California, Berkeley (http://www.creles.berkeley.edu/pdf/Codebook_w1.pdf)
  - Wave 2: "CRELES. Costa Rican Longevity and Healthy Aging Study. Elderly Questionnaire. Round 2." A Joint Project of the Central American Center on Population (CCP) and the Institute for Health Research (INISA). University of Costa Rica. (http://www.creles.berkeley.edu/pdf/Elderly_form_w2.pdf)
  - Wave 2: Rosero-Bixby et al (2013) "CRELES Pre-1945. Costa Rican Longevity and Healthy Aging Study. Codebook, Wave 2." Berkeley, CA: Department of Demography, University of California, Berkeley (http://www.creles.berkeley.edu/pdf/Codebook_w2.pdf)
  - Wave 3: "CRELES. Costa Rican Longevity and Healthy Aging Study. Elderly Questionnaire. Round 3." A Joint Project of the Central American Center on Population (CCP) and the Institute for Health Research (INISA). University of Costa Rica. (http://www.creles.berkeley.edu/pdf/ElderlyPeople_w3_v2.pdf)

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ CRELES W4, CRELESW5 Section B. Cognitive evaluation

  - Wave 4: see Module items (https://g2aging.org/?section=module&moduleid=1985&display=flowchart)
  - Wave 5: see Module items (https://g2aging.org/?section=module&moduleid=2006&display=flowchart)

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised CRELES codebook: https://g2aging.org/?section=downloads

  Rosero-Bixby et al. "Harmonised CRELES Documentation, Version B." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2016).

ELSA

- ***ELSA Website***: https://www.elsa-project.ac.uk
  Questionnaires and codebooks available at: the 'Study Documentation page of the ELSA website (https://www.elsa-project.ac.uk/study-documentation); For each wave, download all documents;

  - Wave 5 : "English Longitudinal Study of Ageing. Wave 5 interview questionnaire – 2010 to 2011". Prepared by NatCen. August 2012; Cox et al "ELSA Wave 5 – Derived Variables, Version 1, User Guide". NatCen.
  - Wave 6: "English Longitudinal Study of Ageing. Wave 6 interview questionnaire – 2012 to 2013". Prepared by NatCen. March2014;
  - Wave 7: "English Longitudinal Study of Ageing. Wave 7 interview questionnaire – 2014 to 2015". Prepared by NatCen. July 2015;
  - Wave 8: "English Longitudinal Study of Ageing. Interview questionnaire – Wave 8 – 2016/2017". Prepared by NatCen. May 2018;

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ ELSAW5, ELSAW6, ELSAW7, ELSAW8/ Section CF. Cognitive Function

  - Wave 5: https://g2aging.org/printview.php?moduleid=1524
  - Wave 6: https://g2aging.org/printview.php?moduleid=1538
  - Wave 7: https://g2aging.org/printview.php?moduleid=2204
  - Wave 8: https://g2aging.org/printview.php?moduleid=2387

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised ELSA codebook: https://g2aging.org/?section=downloads

  Beaumaster, S., et al. "Harmonised ELSA Documentation, Version F.2." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2019).

ELSI

- ***ELSI Website***: http://elsi.cpqrr.fiocruz.br/en/
  Questionnaires and codebooks available at: the 'Questionnaires and interview handbook/ Individual interview of the ELSI website (http://elsi.cpqrr.fiocruz.br/en/questionnaires-and-interview-handbook/individual-interview/)

  - Wave 1: ELSI Brazilian Longitudinal Study of Aging : Individual questionnaire (http://elsi.cpqrr.fiocruz.br/en/wp-content/uploads/sites/2/2018/03/Questionnaire-individual.pdf);

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ ELSI/ ELSI2015_Individual Section Q. Cognition

  - Wave 1: https://g2aging.org/?section=module&moduleid=2530&display=flowchart

HRS

- ***HRS Website***: https://hrs.isr.umich.edu/about

  Questionnaires and codebooks available at: the 'Data Product – Cognitive Data' page of the HRS website (https://hrs.isr.umich.edu/data-products/cognition-data); 'Documentation of Cognitive Functioning Measures in the Health and Retirement Study.' (https://hrs.isr.umich.edu/publications/biblio/5620) & below:

  - Wave 10: Cognition Codebook (http://hrsonline.isr.umich.edu/modules/meta/2010/core/codebook/h10d_ri.htm)
  - Wave 10: HRS 2010 – SECTION D: COGNITION (http://hrsonline.isr.umich.edu/modules/meta/2010/core/qnaire/online/05hr10D.pdf?_ga=2.78712029.836032106.1592309981-645463317.1592309981)
  - Wave 11: Cognition Codebook (http://hrsonline.isr.umich.edu/modules/meta/2012/core/codebook/h12d_ri.htm)
  - Wave 11: HRS 2012 – SECTION D: COGNITION (http://hrsonline.isr.umich.edu/modules/meta/2012/core/qnaire/online/05hr12D.pdf?_ga=2.182864879.836032106.1592309981-645463317.1592309981)
  - Wave 12: Cognition Codebook (http://hrsonline.isr.umich.edu/modules/meta/2014/core/codebook/h14d_ri.htm)
  - Wave 12: HRS 2014 – SECTION D: COGNITION http://hrsonline.isr.umich.edu/modules/meta/2014/core/qnaire/online/04hr14D.pdf?_ga=2.182864879.836032106.1592309981-645463317.1592309981
  - Wave 13: Cognition Codebook (http://hrsonline.isr.umich.edu/modules/meta/2016/core/codebook/h16d_ri.htm)
  - Wave 13: HRS 2016 – SECTION D: COGNITION http://hrsonline.isr.umich.edu/modules/meta/2016/core/qnaire/online/04hr16D.pdf?_ga=2.75042779.836032106.1592309981-645463317.1592309981

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ HRSW10, HRSW11, HRSW12, HRSW13/ Section D. Cognition

  - Wave 10: https://g2aging.org/printview.php?moduleid=1378
  - Wave 11: https://g2aging.org/printview.php?moduleid=1459
  - Wave 12: https://g2aging.org/printview.php?moduleid=2035
  - Wave 13: https://g2aging.org/printview.php?moduleid=2326&display=flowchart&zoom=

  Harmonised codebook available at Surveys at a Glance/ Harmonised Data / RAND HRS / Section B: Health page

JSTAR

- ***JSTAR Website***: https://www.rieti.go.jp/en/projects/jstar/

  Questionnaires available at: 2011 Survey & 2013 Survey; For each wave, download SCQ/CAPI questionnaires;

  - Wave 3: 3 cities / 2011 Survey 1st wave: "Japanese Study of Aging & Retirement. 2011
  - 1st wave CAPI Questionnaire (Chofu, Hiroshima, and Tondabayashi)" Research Institute of Economy, Trade and Industry. The University of Tokyo and Hitotsubashi University.
  - (https://www.rieti.go.jp/en/projects/jstar/data/questionnaire_2011_3cities_en.pdf)
  - Wave 3: 2 cities / 2011 Survey 2nd wave: "Japanese Study of Aging & Retirement. 2011. 2nd & 3rd waves CAPI Questionnaire (Adachi, Kanazawa, Shirakawa, Sendai, Takikawa, Tosu, and Naha)". Research Institute of Economy, Trade and Industry. The University of Tokyo and Hitotsubashi University. (https://www.rieti.go.jp/en/projects/jstar/data/questionnaire_2011_7cities_en.pdf)
  - Wave 3: 5 cities / 2011 Survey 3rd wave: "Japanese Study of Aging & Retirement. 2011. 2nd & 3rd waves CAPI Questionnaire (Adachi, Kanazawa, Shirakawa, Sendai, Takikawa, Tosu, and Naha)". Research Institute of Economy, Trade and Industry. The University of Tokyo and Hitotsubashi University. (https://www.rieti.go.jp/en/projects/jstar/data/questionnaire_2011_7cities_en.pdf)
  - Wave 4: 10 cities / 2013 Survey : "Japanese Study of Aging & Retirement. CAPI Questionnaire 2nd wave (Chofu, Hiroshima, and Tondabayashi), 3rd wave (Tosu, and Naha) & 4th wave (Adachi, Kanazawa, Shirakawa, Sendai & Takikawa,)". Research Institute of Economy, Trade and Industry. The University of Tokyo and Hitotsubashi University. March 1, 2018. (https://www.rieti.go.jp/en/projects/jstar/data/questionnaire_2013_en.pdf)

  Codebooks available at https://www.rieti.go.jp/en/projects/jstar/

  - Wave 3: 3 cities/ 2011 Codebook 1st wave
  - Wave 3: 7 cities / 2011 Codebook 2nd wave & 3rd wave
  - Wave 4: 10 cities / 2013 Codebook

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ JSTARW3 (3 & 7 cities), JSTARW4/ Section B. Memory, Cognitive ability and hypothetical questions / F. Grip Strength & Cognition modulejust

  - Wave 3: 3 cities (B. Memory, Cognitive ability and hypothetical questions) (https://g2aging.org/printview.php?moduleid=1768&display=flowchart&zoom=)
  - Wave 3: 7 cities (B. Memory, Cognitive ability and hypothetical questions & F. Grip Strength & Cognition module) (https://g2aging.org/printview.php?moduleid=1782&display=flowchart&zoom=)
  - Wave 4: B. Memory, Cognitive ability and hypothetical questions (https://g2aging.org/?section=module&moduleid=2587&display=flowchart)

- Wave 4: F. Grip Strength & Cognition module (https://g2aging.org/?section=module&moduleid=2580&display=flowchart)

Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised JSTAR codebook: https://g2aging.org/?section=downloads

Beaumaster, S., et al. "Harmonised ELSA Documentation, Version F.2." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2019).

KLoSA

- ***KLoSA Website***: https://survey.keis.or.kr/eng/klosa/klosa01.jsp
  Questionnaires and codebooks available at: the 'Questionnaire' (https://survey.keis.or.kr/eng/klosa/questionnaire/List.jsp) and 'Codebook' (https://survey.keis.or.kr/eng/klosa/codebook/List.jsp); For each wave, download respective waves questionnaires and codebooks;

  - Wave 3: "2010 KLoSA Wave 3 questionnaire";
  - Wave 4: "2012 KLoSA Wave 4 questionnaire";
  - Wave 5: "2014 KLoSA Wave 5 questionnaire";
  - Wave 6: "2016 KLoSA Wave 6 questionnaire";

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ KLoSAW3, KLoSAW4, KLoSAW5, KLoSAW6; section C4. Cognition module

  - Wave 3: (https://g2aging.org/printview.php?moduleid=1582)
  - Wave 4: (https://g2aging.org/printview.php?moduleid=1595)
  - Wave 5: (https://g2aging.org/printview.php?moduleid=2265)
  - Wave 6: (https://g2aging.org/printview.php?moduleid=2482)

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised KLoSA codebook: https://g2aging.org/?section=downloads

  Chien et al. "Harmonised KLoSA Documentation, Version C (2006-2016)" *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA*, USA (2019).

LASI

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ LASIW1; section I_C. Health (HT) Module
  - Wave 1: (https://g2aging.org/printview.php?moduleid=2416)

MHAS

- ***MHAS Website***: http://www.mhasweb.org

  Questionnaires and codebooks available at: the 'Documentation & Questionnaire' page of the MHAS website (http://www.mhasweb.org/DocumentationQuestionnaire.aspx); For each wave, download respective waves questionnaires and codebooks;

  - Wave 3: MHAS Mexican Health and Aging Study (2012). Data Files and Documentation (public use): Mexican Health and Aging study, (Core Questionnaire). (http://mhasweb.org/Resources/DOCUMENTS/2012/Core_Questionnaire_2012.pdf)
  - Wave 4: MHAS Mexican Health and Aging Study (2015). Data Files and Documentation (public use): Mexican Health and Aging study, (Core Questionnaire).
  - (http://mhasweb.org/Resources/DOCUMENTS/2015/Core_Questionnaire_2015.pdf)
  - Wave 5: MHAS Mexican Health and Aging Study (2018). Data Files and Documentation (public use): Mexican Health and Aging study, (Core Questionnaire).
  - (http://mhasweb.org/Resources/DOCUMENTS/2018/Core_Questionnaire_2018.pdf)
  - Wave 3: MHAS Mexican Health and Aging Study (2012). Data Files and Documentation (public use): Mexican Health and Aging study, (Section E. Cognition).
  - (http://mhasweb.org/Resources/DOCUMENTS/2012/Codebook/Section_E_Cognition_2012.pdf)
  - Wave 4: MHAS Mexican Health and Aging Study (2015). Data Files and Documentation (public use): Mexican Health and Aging study, (Section E. Cognition).
  - (http://mhasweb.org/Resources/DOCUMENTS/2015/Codebook/Section_E_Cognition_2015.pdf)
  - Wave 5: MHAS Mexican Health and Aging Study (2018). Data Files and Documentation (public use): Mexican Health and Aging study, (Section E. Cognition).
  - (http://mhasweb.org/Resources/DOCUMENTS/2018/Codebook/Section_E_Cognition_2018.pdf)

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ MHASW3, MHASW4, MHASW5; section E. Cognition (Exercises) module

  - Wave 3: (https://g2aging.org/printview.php?moduleid=1629)
  - Wave 4: (https://g2aging.org/printview.php?moduleid=2281)
  - Wave 5: (https://g2aging.org/printview.php?moduleid=2707)

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised MHAS codebook: https://g2aging.org/?section=downloads

  Michaels-Obregon et al. "Harmonised MHAS Documentation, Version A." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2017).

NICOLA

- ***NICOLA Website***: http://elsi.cpqrr.fiocruz.br/en/
  - Wave 1: NICOLA CAPI questionnaire Wave 1. Version 1.17 (2014)

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ NICOLAW1, NICOLAW2; Module PH. Physical and cognitive health
  - Wave 1: https://g2aging.org/?section=module&moduleid=2352&display=flowchart
  - Wave 2: https://g2aging.org/?section=module&moduleid=2367&display=flowchart

SHARE

- ***SHARE Website***: http://www.share-project.org/home0.html
  Questionnaires and codebooks available at: Data Documentation / Questionnaires page / CAPI main questionnaire

  - Wave 4: http://www.share-project.org/fileadmin/pdf_questionnaire_wave_4/SHARE_generic_wave4_main_questionnaire.pdf
  - Wave 5: http://www.share-project.org/fileadmin/pdf_questionnaire_wave_5/SHARE_paperversion_5_4_10_en_GB.pdf
  - Wave 6: http://www.share-project.org/fileadmin/pdf_questionnaire_wave_6/Generic_main_qnn_6_3_13.pdf
  - Wave 7: http://www.share-project.org/fileadmin/pdf_questionnaire_wave_7/w7_7.4.3.001_paper_questionnaire_main.pdf

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ SHAREW4, SHAREW5, SHAREW6, SHAREW7/ Section PH. Physical & Cognitive Health

  - Wave 4: CF. Cognitive Function Module (https://g2aging.org/printview.php?moduleid=1724)
  - Wave 5: CF. Cognitive Function Module (https://g2aging.org/printview.php?moduleid=1745)
  - Wave 6: CF. Cognitive Function Module (https://g2aging.org/printview.php?moduleid=2235)
  - Wave 7: CF. Cognitive Function Module (https://g2aging.org/printview.php?moduleid=2446)

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised SHARE codebook: https://g2aging.org/?section=downloads

  Chien et al. "Harmonised SHARE Documentation, Version E (2004-2018)." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2019).

TILDA

- ***TILDA Website***: https://tilda.tcd.ie/data/documentation/
  Questionnaires and codebooks available at: the 'data/Documentation page of the TILDA website (https://tilda.tcd.ie/data/documentation/); For each wave, download CAPI main questionnaire and Codebook of additionally derived dataset variables;

  - Wave 1: "The Irish Longitudinal Study on Ageing. 15-04-10 FINAL Main questionnaire. Main Stage ». 2009.
  - Wave 2: "The Irish Longitudinal Study on Ageing. Wave 2. Wave 2 CAPI Questionnaire. 30-10-2013 ». 2013.
  - Wave 3: "The Irish Longitudinal Study on Ageing. Wave 3 CAPI questionnaire »
  - Wave 4: "The Irish Longitudinal Study on Ageing. Wave 4 CAPI questionnaire». Version 4.1.1.8.

- ***Gateway to Global Ageing website:*** https://g2aging.org/?section=surveyOverview

  Codebooks available at: Surveys at a glance/ TILDAW1, TILDAW2, TILDAW3, TILDAW4/ Section PH. Physical & Cognitive Health

  - Wave 1: PH. Physical & Cognitive Health Module (https://g2aging.org/?section=module&moduleid=1319&display=flowchart)
  - Wave 2: PH. Physical & Cognitive Health Module (https://g2aging.org/?section=module&moduleid=1642&display=flowchart)
  - Wave 4: PH. Physical & Cognitive Health Module
  - (https://g2aging.org/?section=module&moduleid=2542&display=flowchart)

  Harmonised codebook available at Downloads Data and Links / Download Harmonised codebook / Harmonised TILDA codebook: https://g2aging.org/?section=downloads

  Scarlett et al. "Harmonised TILDA Documentation, Version B." *Center for Economic and Social Research, USC Dornsife: Santa Monica, CA, USA* (2016).

7. Access to HRS-family studies datasets

In order to access the HRS-family studies datasets, the user must first register at the respective studies' Registration page and obtain a username and password. The username/password combination must then be used to download the data files, which are available at the respective studies' Downloads/ Data pages. The gateway to Global Ageing provides links to registration and data download (also detailed below) at the Downloads page: https://g2aging.org/?section=downloads.

Links to registration and data download pages per HRS studies:

CHARLS:
Registration: http://charls.pku.edu.cn/users/sign_up/agreement/en.html
Data download: http://charls.pku.edu.cn/pages/data/111/en.html

CRELES:
Registration and data download: http://creles-download.demog.berkeley.edu/CRdata.pl

ELSA:
Registration: https://ukdataservice.ac.uk/get-data/how-to-access.aspx
Data download: https://www.ukdataservice.ac.uk/get-data/how-to-access/downloadorder.aspx

ELSI:
Registration: http://elsi.cpqrr.fiocruz.br/en/register/
Data download: http://elsi.cpqrr.fiocruz.br/en/dataset/

HRS:
Registration: https://hrs.isr.umich.edu/data-products/access-to-public-data?_ga=2.99693020.333305345.1593162469-1123305296.1593162469
Data download: http://hrsonline.isr.umich.edu/index.php?p=avail

JSTAR: https://www.rieti.go.jp/en/projects/jstar/ (see 3.4 Procedures for application and use)

KLoSA:
Registration: https://survey.keis.or.kr/eng/myinfo/login.jsp;
Data download: https://survey.keis.or.kr/eng/klosa/databoard/List.jsp

LASI:

Registration: https://g2aging.org/?section=register;

Data download: https://g2aging.org/?section=page&pageid=26

MHAS:

Registration and data download: http://mhasweb.org/Data.aspx#

NICOLA:

Registration and data download: http://www.qub.ac.uk/sites/NICOLA/InformationforResearchers/

SHARE:

Registration: http://www.share-project.org/data-access/user-registration.html

Data download: https://releases.sharedataportal.eu/users/login

TILDA:

Registration and data download: https://www.ucd.ie/issda/data/tilda/

8. References

1. Zhao, Y., Yisong Hu, James P. Smith, John Strauss, and Gonghuan Yang, Cohort profile: the China health and retirement longitudinal study (CHARLS). International journal of epidemiology, 2014. 43(1): p. 61-68.

2. Rosero Bixby, L., William H. Dow, and Gilbert Brenes Camacho, Costa Rican Longevity and Healthy Aging Study. 2019.

3. Steptoe, A., Elizabeth Breeze, James Banks, and James Nazroo, Cohort profile: the English longitudinal study of ageing. International journal of epidemiology 2013. 42(6): p. 1640-1648.

4. Lima-Costa, M.F., Fabíola Bof de Andrade, Paulo Roberto Borges de Souza, Anita Liberalesso Neri, Yeda Aparecida de Oliveira Duarte, Erico Castro-Costa, and Cesar de Oliveira, The Brazilian longitudinal study of aging (ELSI-BRAZIL): objectives and design. American journal of epidemiology, 2018. 187(7): p. 1345:1353.

5. Sonnega, A., Jessica D. Faul, Mary Beth Ofstedal, Kenneth M. Langa, John WR Phillips, and David R. Weir, Cohort profile: the health and retirement study (HRS). International journal of epidemiology, 2014. 43(2): p. 576-585.

6. Ichimura, H., Hideki Hashimoto, and Satoshi Shimizutani, Japanese study of aging and retirement. RIETIDiscussion Paper Series 2009.

7. Lee, Y., Joung Hwan Back, Jinhee Kim, and Haewon Byeon, Multiple socioeconomic risks and cognitive impairment in older adults. Dementia and geriatric cognitive disorders, 2010. 6: p. 523-529.

8. Wong, R., Alejandra Michaels-Obregon, and Alberto Palloni, Cohort profile: the Mexican health and aging study (MHAS). International journal of epidemiology, 2017. 46(2): p. e2-e2.

9. Neville C.E., C.S.M., Burns F, The Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA). Gu D., Dupre M. (eds) Encyclopedia of Gerontology and Population Aging. Springer, Cham, 2019.

10. Börsch-Supan, A., Martina Brandt, Christian Hunkler, Thorsten Kneip, Julie Korbmacher, Frederic Malter, Barbara Schaan, Stephanie Stuck, and Sabrina Zuber, Data resource profile: the Survey of Health, Ageing and Retirement in Europe (SHARE). International journal of epidemiology, 2013. 42(4): p. 992-1001.

11. Kearney, P.M., Hilary Cronin, Claire O'Regan, Yumiko Kamiya, George M. Savva, Brendan Whelan, and Rose Anne Kenny, Cohort profile: the Irish longitudinal study on ageing. International journal of epidemiology, 2011. 40(4): p. 877-884.

12. Donoghue, O.A., Christine A. McGarrigle, Margaret Foley, Andrew Fagan, James Meaney, and Rose Anne Kenny, Cohort profile update: The Irish longitudinal study on ageing (TILDA). International journal of epidemiology 2018. 47(5): p. 1398-13981.

13. Kipps, C.M., and J. R. Hodges, Cognitive assessment for clinicians. Journal of Neurology, Neurosurgery & Psychiatry, 2005. 76: p. i22-30.

14. Strauss, E., Elisabeth MS Sherman, and Otfried Spreen, A compendium of neuropsychological tests: Administration, norms, and commentary. American Chemical Society, 2006.

15. Folstein MF, F.S., McHugh PR, Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Research, 1975. 12(3): p. 189-198.

16. Nasreddine ZS, N.A.P., Valérie Bédirian, Simon Charbonneau, Victor Whitehead, Isabelle Collin, Jeffrey L. Cummings, and Howard Chertkow, The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society, 2005. 53: p. 695-699.

17. Park DC, L.G., Hedden T, Davidson NS, Smith AD, Smith PK, Models of visuospatial and verbal memory across the adult life span. Psychol Aging, 2002. 17(2): p. 299-320.

18. Naveh-Benjamin M, H.Z., Guez J, Bar-On M., Adult age differences in episodic memory: further support for an associative-deficit hypothesis. J Exp Psychol Learn Mem Cogn, 2003. 29(5): p. 826-837.

19. Backman L, S.B., Fratiglioni L, Stability of the preclinical episodic memory deficit in Alzheimer's disease. Brain, 2001. 124: p. 96-102.

20. Brandimonte M, E., GO, McDaniel MA, Prospective memory: Theory and applications. Mahwah, NJ, US: Lawrence Erlbaum Associates, 1996.

21. Roth, M., Huppert, F.A., Mountjoy, C.Q. and Tym, E, CAMDEX-R boxed set: the revised cambridge examination for mental disorders of the elderly. Cambridge University Press., 1998.

22. Mejía S, W.R., Michaels A Normative and standardized data for cognitive measures in the Mexican Health and Aging Study. Salud Pública Mex, 2015. 57: p. s90–s96.

23. Richards, M., Hardy, R., Kuh, D. and Wadsworth, M.E. , Birth weight and cognitive function in the British 1946 birth cohort: longitudinal population based study. British Medical Journal, 2001. 322: p. 199–203.

24. D., W., Manual for the Wechsler Adult Intelligence Scale-Revised. Psychological Corporation; New York, 1981.

25. Robertson IH, M., T., Andrade, J., Baddeley, B.T. and Yiend, J, Oops!': performance correlates of everyday attentional failures in traumatic brain injured and normal subjects. Neuropsychologia, 1997. 35: p. 747-758.

26. D'Elia, L.F., P. Satz, C. L. Uchiyama, and T. White, Colour Trails test. Florida: Psychological Assessment Resources, 1996.

27. AR, Jensen., Clocking the Mind: Mental Chronometry and Individual Differences. London: Elsevier, 2006.

28. Whiteside DM, K.T., Semla M, Luu H, Rice L, Basso MR, et al, Verbal Fluency: Language or Executive Function Measure? Appl Neuropsychol Adult, 2016. 23(1): p. 29-34.

29. Shao Z, J.E., Visser K, Meyer AS, What do verbal fluency tasks measure? Predictors of verbal fluency performance in older adults. Front Psychol, 2014. 5.

30. Manning, R.T., The serial sevens test Archives of internal medicine, 1982. 142(6): p. 1192-1192.

31. Fisher, G.G., J. J. McArdle, R. J. McCammon, A. Sonnega, and D. Weir, New measures of fluid intelligence in the HRS. Ann Arbor, Michegan: Institute for Social Research, University of Michigan, 2013.

32. Brandt J, S.M., Folstein M, The telephone interview for cognitive status. Neuropsychiatry, Neuropsychology and Behavioral Neurology, 1988. 1(2): p. 111–117

33. Wechsler, D., Manual for the Wechsler adult intelligence scale. 1955.

34. Thorn, W., International Adult Literacy and Basic Skills Surveys in the OECD Region. OECD Education Working Papers; OECD Publishing, 2009. 26.

35. Shih, R.A., Jinkook Lee, and Lopamudra Das, Harmonization of Cross-National Studies of Aging to the Health and Retirement Study Cognition. No. WR-861/7. 2012.

36. Kang Y, N.D., Hahn S, A validity study on the Korean Mini-Mental State Examination (K-MMSE) in dementia patients. Journal of the Korean Neurological Association, 1997. 15(2): p. 300-308.