The Mexican Health and Aging Study:
Cognitive Functioning Measures
Version 2

By

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I. Introduction

This document describes the cognitive functioning measures section of the Mexican Health and Aging Study (MHAS/ENASEM), presenting information about the different measures administered in 2001, 2003 and 2012.

The MHAS 2001 baseline survey is a nationally representative survey of individuals born in 1951 or earlier, that is, the population aged 50 or older as of the year 2001. The MHAS was designed to examine the aging process and evaluate the impact of disease on health, function, and mortality of adults over the age of 50 that resided in Mexico in 2001, as well as their spouse or partner, in both urban and rural areas. Three waves of data have been collected so far: baseline in 2001 and follow-ups in 2003 and 2012. A fourth wave will be collected in 2015.

The sample for the MHAS baseline was selected from residents of both rural and urban areas, from the National Employment Survey (Encuesta Nacional de Empleo, ENE), carried out by the INEGI (Instituto Nacional de Estadística y Geografía) in Mexico. Households with at least one resident age 50 or older were eligible to be part of the MHAS baseline sample. If more than one person was age-eligible in the selected households, then one person was selected at random for the study. If the selected MHAS person was married or in a civil union, with the spouse residing in the same household, then the spouse or partner was also recruited to be part of the MHAS regardless of his/her age.

In 2012, the sample was refreshed by adding a representative sample of the population from the 1952-1961 birth cohorts, as well as their spouses/partners regardless of age (MHAS, 2013).

II. Overview

Cognitive function was assessed in the Mexican Health and Aging Study (MHAS/ENASEM), using the screening portion of the Cross-Cultural Cognitive Examination (CCCE) for direct interviews and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) for proxy interviews (Glosser, et al., 1993; Jorm, 1994).

The CCCE was developed as a brief and sensitive tool for the diagnosis of dementia in the community. It consists of an initial screening portion designed to be administered in the field by individuals without medical training. The second portion of the CCCE was designed to increase the specificity of the tool and was designed to be administered by trained medical personnel. This second portion was not included in the MHAS study. All tasks included in the CCCE are accepted as indicators of cognitive function and the effect of literacy and level of education is supposed to be negligible (Glosser G, 1993).

The IQCODE was developed to measure cognitive decline when the subject is unable to complete a direct interview. This is a widely used screening test, in particular in populations with low levels of education (Jorm, 1994; Jorm, 2004)

III. Direct Interviews

A. Overview

In 2001, five tasks measuring four cognitive domains were included in the cognitive assessment portion. The tasks included are:

- Verbal learning: measured by asking respondents to listen to a list of eight words and repeat them. Three consecutive trials are administered and the number of recalled words is recorded.
- Visuospatial (visuoconstructional): measured by presenting two geometrical figures and asking respondents to copy the figures within 90 seconds.
- Visuospatial memory: measured by asking respondents to remember the figures they copied and to draw them on a blank piece of paper; three minutes are allowed to complete this task.
- Verbal learning: measured by asking respondents to listen to a list of eight words and to repeat them. Three consecutive trials are administered and the number of recalled words in each trial is recorded
- Verbal recall: measured by asking respondents to repeat as many of the words they remember from the list provided in verbal learning task; verbal recall was administered after the visual scanning task to allow a time delay
- Visual scanning: measured by asking respondents to circle all figures that are identical to a specific stimulus shown previously within an array of different stimuli. Respondents are given 60 seconds for this task.

In 2003, an additional task was included to measure orientation. This task was measured by asking respondents to indicate the day, month and year of the interview.

In 2012, two more tasks were included:

- Semantic Verbal Fluency: measured by asking respondents to list all the animals they can think of in the next 60 seconds.
- Numeracy: measured by asking respondents to count backwards from 20 to 0 as fast as possible. Respondents were given 60 seconds (max) to complete this task.

B. General Instructions

Unlike the other sections, the cognitive assessment portion of the study focuses on the subject's performance, rather than questions. Some of these activities show the cognitive ability of the individual, while others require greater mental ability in order to be completed.

Tasks are designed so that there is no need for specialized staff for their application. However, the interviewers received special training by our consultant expert in cognition, on how to administer this section. All interviewers were trained to follow the instructions as uniformly as possible to achieve an objective and comparable evaluation. The interviewer learned how to administer the tasks and then how to perform the proper rating.

For the application of the cognition tasks, the interviewer was given the following materials:

1) Pen or pencil.
2) Timer (either on a phone or the mini laptop used during the interview).
3) Reading glasses for individuals who have visual problems, they need glasses to see or read, but do not have them.

Since the objective is to assess the subject's cognitive ability, the interviewer is instructed to not allow other people to help the interviewee. If a family member wants to help, the interviewer should politely ask them to allow the respondent to perform independently the test and should explain that the objective is to measure the interviewee's ability.

C. Instructions and Scoring

1. Application and Scoring Instructions

Order	Domain	Task	Application Instructions	Time	Scoring Instructions	Year		
						2001	2003	2012
1	Verbal Memory	Verbal Learning	In the case of an interviewed couple, ask the month of birth of each of them; apply list "A" to the person born first, and list "B" to the other. In the case of a unique interview, apply list "A" if today is Monday, Wednesday or Friday. Apply list "B" if it's another day. **1st ATTEMPT.** Clearly read the words, one every two seconds, do not repeat words after reading the list. READ: "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." Circle the words the informant says. **2nd ATTEMPT.** After the informant has stopped responding, wait for 15 second and read the list for Trial 2. Follow the same procedure as Trail 1. READ: "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". Circle the words the informant says. **3rd ATTEMPT.** After the informant has stopped responding, wait for 15 second and read the list for Trial 3. Follow the same procedure as Trail 1. READ: "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." Circle the words the informant says.	-	Each word remembered correctly gets one point. Count the number of words marked for each attempt. Add the words remembered correctly in each essay. The total number can range from 0 to 8.	X	X	X

<table>
<tr><th rowspan="2">Order</th><th rowspan="2">Domain</th><th rowspan="2">Task</th><th rowspan="2">Application Instructions</th><th rowspan="2">Time</th><th rowspan="2">Scoring Instructions</th><th colspan="3">Year</th></tr>
<tr><th>2001</th><th>2003</th><th>2012</th></tr>
<tr><td>2</td><td>Visuospatial</td><td>Visuospatial</td><td>Show this sheet to the informant, so that it is positioned vertically, and <u>INSTRUCT</u>: " Draw this picture in the space below. Try to draw the picture in order to make it exactly as mine. I will record the time. I will indicate to you when you can start and when you can stop."</td><td>90 seconds</td><td>2001 and 2003
(Two figures):
Each drawn figure is scored as intact (1) or impeded (0), and scores for both figures are added up. Write the total score. A total grade of 2 means the figure is passed.
Flags: The design contains five elements: (1) upper triangle, (2) upper vertical line, (3) “v” shape towards the right, (4) lower vertical line, and (5) lower square. A figure is scored as impeded if there are major distortions in the shape or orientation of more than one element. Errors in the individual elements’ shape or the whole design are not considered when scoring. The complete rotation of the design is considered acceptable if all five elements are related to each other in the correct way.
2012 (one figure):
For each of the 3 parts of figure assign 0 to 2 point, according to the following table:
<table>
<tr><th>Part of the Figure</th><th>Not Present/ Present</th><th>Incorrect /Correct Position</th></tr>
<tr><td>Small triangle (closed)</td><td>0/1</td><td>0/1</td></tr>
<tr><td>Big triangle (open)</td><td>0/1</td><td>0/1</td></tr>
<tr><td>Small square (closed)</td><td>0/1</td><td>0/1</td></tr>
</table></td><td>X</td><td>X</td><td>X</td></tr>
</table>

Order	Domain	Task	Application Instructions	Time	Scoring Instructions	Year		
						2001	2003	2012
3	Verbal Fluency	Verbal Fluency	READ: I am going to ask you to name all the animals you can, you have one minute to complete the task.	60 seconds	When the informant says the first word, start the timer and write down all the names of animals even if the informant repeats them. Two scores are valid: a) the total number of different animals considering only once each animal that has been repeated b) the number of repeated animals.			X
4	Visual Scanning	Visual Scanning	Show the visual scanning test page to the informant, so it is positioned horizontally, in order to have the little point on top of the page. Show the page with the designed object E, and INSTRUCT: "Please find all the figures that are identical to this one, in the following page. Find as many figures as you can, and circle around the figure as I am doing it (with a pencil circle an example in the middle of the page). Just circle the figures that are the same as this one. Work as fast as you can, until I tell you to stop." Start to register the time when the informant circles the first figure, and give the respondent 60 seconds to complete the task.	60 seconds	Count the number of objects that the respondent circled correctly (there are a total of 60 objects). Do not count objects that were circled but do not correspond to the object of reference.	X	X	X
5	Orientation	Orientation	READ: " Can you please tell me today's date?"	-	Each of the following items receives a score: • Day of the month • Month of the year • Year		X	X

Order	Domain	Task	Application Instructions Interviewer	Time	Scoring Instructions	Year 2001	2003	2012
6	Numeracy	Numeracy	READ: "In the following exercise, please count backwards from 20 to 0. Do it as fast as possible. I am going to count the time and I will tell you when you can stop." **1st ATTEMPT.** Start the stopwatch when the informant says the first number and stop it when gets to 11, if the first spoken number was 20; or when it gets to 10, if the first spoken number was 19. **2nd ATTEMPT**. Allow the informant to start one more time if he/she stops or makes a mistake and wants to start again. Tell him/her they can try again. Mark "wants to start again" in 1st ATTEMPT if the informant wants to start again.	60 seconds	**1st ATTEMPT.** Mark "correct" if the informant does not have any mistake when counting from 20 to 11 or from 19 to 10. **2nd ATTEMPT.** Mark "incorrect" if the informant makes a mistake and does not want to start again. **TIME.** Note the number of seconds to get to 10 if subject counts from 19 to 10, or to 11 if subject counts from 20 to 11. Note 60 if took the full minute without getting to 10 (if counts from 19 to 10) or to 11 (if counts from 20 to 11) or if the result of both attempts are incorrect.			X
7	Visuospatial Memory	Visuospatial Memory	Show the next blank page to the informant, so that it is positioned vertically and INSTRUCT: "Please remember the figure that you drew before. Draw it again in this paper." Suggest to the informant that he/she can guess or give a partial answer if he/she seems to be unsure. If the informant draws the design from the visual scanning exercise, TELL the informant: "Please draw the other figure that you drew before. Allow just one and a half minutes (90 seconds) to draw the figure."	90 seconds	Score the answers according to the criteria specified for figures in the "Visuospatial" task.	X	X	X
8	Verbal Memory	Verbal Recall	READ: Do you remember the long list of words that I read before? Please tell me all the words you can remember. The order does not matter." Circle the words that the informant says.	-	Each word remembered correctly gets one point. Count the number of words marked for each attempt. Add the words remembered correctly in each trial. The total number can go from 0 to 8.	X	X	X

2. Scoring and Comparability Across Waves

Throughout the study, new measures have been included to the baseline questionnaire, always ensuring the comparability across waves. Since 2003, three new tasks were included to measure orientation, semantic verbal fluency, and numeracy. Between 2001 and 2003, the instructions and scoring of the original tasks were preserved. However, in 2012 some adjustments were made to the scoring of visuospatial and visuospatial memory tasks. The following table includes the individual score for each task and the total score for each wave (for more information on how to construct the total score for each wave see V. STATA Codes).

Domain	Task	Scoring		
		2001	2003	2012
Verbal Memory	Verbal Learning	Zero words=0 From 1 to 8 words=1-8 Refused=9		
Visuospatial	Visuospatial	Zero points = 00 One point = 01 Two points = 02 Refused = 80 Couldn't do it due to vision problems = 88		From 1 to 6 points=1-6 Refused=8
Verbal Fluency	Verbal Fluency**	-	-	**Number of different animals:** No animals = 00 One or more = 01 and up Refused= 88 **Number of repeated animals** (not included in the total score)**:** No animals = 00 One or more = 01 and up Refused= 88
Visual Scanning	Visual Scanning	Zero points = 00 From 1 to 60 points = 01 to 60 Refused = 80 Couldn't do it due to vision problems = 88		
Orientation	Orientation*	-	**Day, Month, Year** (for each item): Correct = 1 Incorrect/DK = 2	

Numeracy	Numeracy**	-	-	**First Attempt** Correct = 1 Incorrect= 2 Want's to start again= 3 Refused = 8 **Second Attempt** Correct = 1 Incorrect= 2 Refused = 8 **Time** (not included in the total score) From 1 to 60 seconds = 01 - 60
Visual Memory	Visual Memory	Zero points = 00 One point = 01 Two points = 02 Refused = 80 Couldn't do it due to vision problems = 88		From 1 to 6 points=1-6 Refused=8
Verbal Memory	Verbal Recall	Zero words=0 From 1 to 8 words=1-8 Refused=9		
Total Score				
Only the baseline tasks		**0-80**	**0-80**	**0-80*** **
All Tasks		**0-80**	**0-81**	**0-122 (aprox)**** **

Note: [a] Included after 2003, [b] Included after 2012, [c] After converting the score using the equivalence between 2001/2003 and 2012, [d] The number of animals in Verbal Fluency can be over 60 (one per second).

The changes to the visuospatial and visuospatial memory tasks include: 1) keeping only one figure in each exercise, 2) and a new scoring that allowed comparing the results between waves. The following table indicates the equivalence between 2001/2003 and 2012 for these two tasks.

Equivalence across waves	
2001-2003 Scores	**2012 Equivalence**
0	0,1, or 2
1	3 or 4
2	5 or 6

IV. Proxy Interviews

A. Overview

The proxy interview has the same thematic content as the basic interview, but with fewer questions. However, due to its nature, Section E is completely different.

Because the cognitive tasks included in Section E could not ne conducted by the proxy respondent, the MHAS uses the proxy-cognitive section (Section PC), which includes a series of questions about the participant's daily, functioning, based on the IQCODE (Jorm, 1994). These questions are based on behavior indicators that the proxy evaluates. The idea is to use the proxy's personal impression to judge the perceived changes of behavior of the person. The proxy has to rate the subject's cognitive status comparing it with how it was 2 years earlier.

The short version of the IQCODE (Jorm, 1994) is a 16-item questionnaire on cognitive decline in the elderly. The questions emphasize on changes through time that are observed in the behavior and functionality of the person; this is because the loss of mental capacity manifests gradually and may vary widely through different activities and behaviors. Some questions, therefore, may sound repetitive, but the several aspects included in the battery provide the researcher with a different indicator of the respondent's cognitive deterioration severity.

The questions included consider general aspects like: memory evaluation, memory comparison, judgments, organization, and daily activities planning as well as particular aspects referring to memory deterioration like: family, recent and past memories, knowledge about addresses, dates, usual and unusual places, and learning how to use domestic devices and new things.

Other cognitive functioning measures were included in this section, including global ratings on behavioral problems. It assesses the frequency with which the proxy rates the presence of different psychiatric symptoms: aggressive and self-harm behavior, sleeping disorders, wandering behavior and paranoid symptoms.

B. General Instructions

The interviewer is trained to ask these series of questions, always remembering that it is expected that the proxy respondent will give their personal opinion. For this reason, the definition of the person's current condition compared to the past, for instance: "much better" or "somewhat better," is given by whatever the proxy understands.

V. STATA Codes

The following STATA codes can be used to construct the variable for each task included in the 2001, 2003, and 2012 waves.

A. 2001

```
# delimit;


*****************************************************************
**;
************* MHAS 2001 - COGNITION - FROM SECTION E
*************;
*****************************************************************
**;


*************************************************************;
**** CLEANING COGNITION VARIABLES & CREATING COMPONENTS****;
*************************************************************;


**** CONSTRUCTION ****;
** score=0/1/2: we recoded 80 "Refused" and 88 "Could not do it
for vision problems" as a missing;
tab  e8_e9_01;
gen construction_01=e8_e9_01;
recode construction_01 (80=.) (88=.);
tab construction_01;
tab construction_01 [fweight=fac_per_01];
sum construction_01;
sum construction_01 [fweight=fac_per_01];



**** VERBAL MEMORY ****;

*** Verbal Learning;
** score= 0-8: average score for each list {e11_1i_01,
e11_2i_01, e11_3i_01} and {e11_4i_01, e11_5i_01, e11_6i_01};

* Creating variable (mean);
egen verbal_learning_01=rowmean (e11_1i_01 e11_2i_01 e11_3i_01
```

```
e11_4i_01 e11_5i_01 e11_6i_01);
sum verbal_learning_01;
sum verbal_learning_01  [fweight=fac_per_01];


*** Verbal Recall;
** score= 0-8: score for each list {e14_1i_01} and {e14_2i_01};

* Creating variable;
egen verbal_recall_01=rowmean (e14_1i_01 e14_2i_01);
sum verbal_recall_01;
sum verbal_recall_01  [fweight=fac_per_01];



*** CONSTRUCTION RECALL ***;
** (score=0/1/2): we recoded 80 "Refused" and 88 "Could not do
it for vision problems" as a missing;
tab e13_01;
gen cons_recall_01=e13_01;
recode cons_recall_01 (80=.) (88=.);
tab cons_recall_01;
tab cons_recall_01 [fweight=fac_per_01];
sum cons_recall_01;
sum cons_recall_01 [fweight=fac_per_01];



*** VISUAL SCANNING ***;
** (score max 60): we recoded 80 "Refused" and 88 "Could not do
it for vision problems" as a missing;
sum e12_01;
gen visual_scanning_01=e12_01;
recode visual_scanning_01 (80=.) (88=.);
sum visual_scanning_01;
sum visual_scanning_01 [fweight=fac_per_01];



****************************************;
**** CREATING TOTAL COGNITION SCORE ****;
****************************************;

** We created a total score variable including ALL components;
* Note:
* 1) If a subject did not complete at least one component (had a
```

```
missing in at least one component) the total score was
considered as a missing;


gen cognition_01= construction_01 + verbal_learning_01 +
verbal_recall_01 + visual_scanning_01 + cons_recall_01;
sum cognition_01;
sum cognition_01 [weight=fac_per_01];
```

B. 2003

```
# delimit;


*************************************************************;
**** CLEANING COGNITION VARIABLES & CREATING COMPONENTS****;
*************************************************************;


**** CONSTRUCTION ****;
** score=0/1/2: we recoded 80 "Refused" and 88 "Could not do it
for vision problems" as a missing;
tab   e6_e7_03;
gen construction_03= e6_e7_03;
recode construction_03 (80=.) (88=.);
tab construction_03;
tab construction_03 [fweight=factori_03];
sum construction_03;
sum construction_03 [fweight=factori_03];



**** VERBAL MEMORY ****;

*** Verbal Learning;
** score= 0-8: average score for each list {e9_a1_9_03,
e9_a2_9_03, e9_a3_9_03} and {e9_b1_9_03, e9_b2_9_03,
e9_b3_9_03};

* Creating variable (mean);
egen verbal_learning_03=rowmean (e9_a1_9_03 e9_a2_9_03
e9_a3_9_03 e9_b1_9_03 e9_b2_9_03 e9_b3_9_03);
sum verbal_learning_03;
sum verbal_learning_03  [fweight=factori_03];


*** Verbal Recall;
** score= 0-8: score for each list {e12a_9_03} and {e12b_9_03};

* Creating variable;
egen verbal_recall_03=rowmean (e12a_9_03 e12b_9_03);
sum verbal_recall_03;
sum verbal_recall_03  [fweight=factori_03];
```

```
*** CONSTRUCTION RECALL ***;
** (score=0/1/2): we recoded 80 "Refused" and 88 "Could not do
it for vision problems" as a missing;
tab e11_03;
gen cons_recall_03=e11_03;
recode cons_recall_03 (80=.) (88=.);
tab cons_recall_03;
tab cons_recall_03 [fweight=factori_03];
sum cons_recall_03;
sum cons_recall_03 [fweight=factori_03];


*** VISUAL SCANNING ***;
** (score max 60): we recoded 80 "Refused" and 88 "Could not do
it for vision problems" as a missing;
sum e10_03;
gen visual_scanning_03=e10_03;
recode visual_scanning_03 (80=.) (88=.) (77=.);
sum visual_scanning_03;
sum visual_scanning_03 [fweight=factori_03];



*** ORIENTATION ***;
** Score (score=0 "Incorrect", 1 "Correct"), we recoded e11a_12,
e11b_12, and e11c_12 to change "Incorrect" = 0 and 9 "Not
specified" as a missing;
tab  e13a_03;
tab  e13b_03;
tab  e13c_03;
recode e13a_03 e13b_03 e13c_03 (2=0);

gen orientation_day_03=e13a_03;
tab orientation_day_03;
tab orientation_day_03 [fweight=factori_03];


gen orientation_month_03=e13b_03;
tab orientation_month_03;
tab orientation_month_03 [fweight=factori_03];


gen orientation_year_03=e13c_03;
tab orientation_year_03;
tab orientation_year_03 [fweight=factori_03];
```

```
* Creating Orientation variable, "Correct" if the subject
anwered correct the three components (day, month, and year) and
"Incorrect" if the subject;
* answered incorrectly at least one of the components;
gen orientation_03=.;
replace orientation_03=1 if orientation_day_03==1 &
orientation_month_03==1 & orientation_day_03==1;
replace orientation_03=0 if orientation_day_03==0 |
orientation_month_03==0 | orientation_day_03==0;
tab orientation_03;
tab orientation_03 [fweight=factori_03];




****************************************;
**** CREATING TOTAL COGNITION SCORE ****;
****************************************;

** We created a total score variable including ALL components;
* Note:
* 1) If a subject did not complete at least one component (had a
missing in at least one component) the total score was
considered as a missing;

gen cognition_03= construction_03 + verbal_learning_03 +
verbal_recall_03 + visual_scanning_03 + cons_recall_03 +
orientation_03;
sum cognition_03;
sum cognition_03 [fweight=factori_03];

#delimit;
** We ALSO created a total score variable including only
components included in 2001 (score max=80);
* Note:
* 1) If a subject did not complete at least one component (had a
missing in at least one component) the total score was
considered as a missing;

gen cognition_comp_03= construction_03 + verbal_learning_03 +
verbal_recall_03 + visual_scanning_03 + cons_recall_03;
sum cognition_comp_03;
sum cognition_comp_03 [fweight=factori_03];
```

C. 2012

```
# delimit;

*************************************************************;
************ MHAS 2012 - COGNITION - FROM SECTION E ***********;
*************************************************************;


*************************************************************;
**** CLEANING COGNITION VARIABLES & CREATING COMPONENTS ****;
*************************************************************;



**** CONSTRUCTION ****;
** score=0-6: we recoded 08 "Refused" and 09 "Did not do it" as
a missing;
tab  e8_12;
gen construction_12=e8_12;
recode construction_12 (08/09=.);
tab construction_12;
tab construction_12 [fweight=factori_12];
sum construction_12;
sum construction_12 [fweight=factori_12];

* The following variable was constructed following the
equivalences between the scores in 2001/2003 and in 2012;
* 2001-2003          2012;
*    0             0,1, or 2;
*    1             3 or 4;
*    2             5 or 6;

gen construction_comp_12=0 if construction_12==0 |
construction_12==1 | construction_12==2;
replace construction_comp_12=1 if construction_12==3 |
construction_12==4;
replace construction_comp_12=2 if construction_12==5 |
construction_12==6;

tab construction_comp_12;
tab construction_comp_12 [fweight=factori_12];
sum construction_comp_12;
sum construction_comp_12 [fweight=factori_12];
```

```
**** VERBAL MEMORY ****;

*** Verbal Learning;
** score= 0-8: average score for each list {e7a_1_12, e7a_2_12,
e7a_3_12} and {e7b_1_12, e7b_2_12, e7b_3_12};

* Cleaning variables: we recoded 9 "Refused" as a missing;
recode e7a_1_12 e7a_2_12 e7a_3_12 e7b_1_12 e7b_2_12 e7b_3_12
(9=.);

* Creating variable (mean);
egen verbal_learning_12=rowmean (e7a_1_12 e7a_2_12 e7a_3_12
e7b_1_12 e7b_2_12 e7b_3_12);
sum verbal_learning_12;
sum verbal_learning_12  [fweight=factori_12];


*** Verbal Recall;
** score= 0-8: score for each list {e14a_12} and {e14b_12};

* Cleaning variables: we recoded 9 "Refused" as a missing;
recode e14a_12 e14b_12 (9=.);

* Creating variable (mean);
egen verbal_recall_12=rowmean (e14a_12 e14b_12);
sum verbal_recall_12;
sum verbal_recall_12  [fweight=factori_12];



*** CONSTRUCTION RECALL ***;
** (score=0-6): we recoded 08 "Refused" and 09 "Did not do it"
as a missing;;
tab  e13_12;
gen cons_recall_12=e13_12;
recode cons_recall_12 (08/09=.);

tab cons_recall_12;
tab cons_recall_12 [fweight=factori_12];
sum cons_recall_12;
sum cons_recall_12 [fweight=factori_12];

* The following variable was constructed following the
equivalences between the scores in 2001/2003 and in 2012;
* 2001-2003         2012;
*    0              0,1, or 2;
*    1              3 or 4;
```

```
*    2              5 or 6;

gen cons_recall_comp_12=0 if cons_recall_12==0 |
cons_recall_12==1 | cons_recall_12==2;
replace cons_recall_comp_12=1 if cons_recall_12==3 |
cons_recall_12==4;
replace cons_recall_comp_12=2 if cons_recall_12==5 |
cons_recall_12==6;

tab cons_recall_comp_12;
tab cons_recall_comp_12 [fweight=factori_12];
sum cons_recall_comp_12;
sum cons_recall_comp_12 [fweight=factori_12];



*** VISUAL SCANNING ***;
** (score max 60): we recoded 80 "Could not because of vision
problems", 88 "Refused", 99 " Not specified" as a missing;
sum e10_12;
gen visual_scanning_12=e10_12;
recode visual_scanning_12 (80=.) (88/99=.);
sum visual_scanning_12;
sum visual_scanning_12 [fweight=factori_12];



*** NUMERACY ***;
** Score (score=0 "Incorrect", 1 "Correct");
tab  e12a_12;
tab  e12b_12;

* We first recoded e12a_12 and e12b_12 to change "Incorrect" =
0;
recode e12a_12 e12b_12 (2=0);

* Cleaning variables: we recoded e12a_12 and e12b_12 as follows;
* 1) If the time reported in e12b_12 was 61 "More than 60
seconds" as 0 "Incorrect";
* 2) If the time reported in e12b_12 was 99 "Not specified" as a
missing;
recode e12a_12 e12b_12 (61=0) (99=.);

* Creating variable;
gen numeracy_12=.;
* 1) First attempt;
replace numeracy_12=0 if e12a_12==0;
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replace numeracy_12=1 if e12a_12==1;
* 2) Second attempt;
replace numeracy_12=0 if e12b_12==0;
replace numeracy_12=1 if e12b_12==1;

tab numeracy_12;
tab numeracy_12 [weight=factori_12];


** Time (0-60 sec): we recoded 61 "More than 60 seconds" and 99
"Not specified" as a missing;
sum e12c_12 if e12c_12!=61 & e12c_12!=99 ;
recode e12c_12 (61/99=.);

gen numeracy_time_12=e12c_12;
sum numeracy_time_12;
sum numeracy_time_12 [fweight=factori_12];



*** VERBAL FLUENCY ***;

** Number of different animals: we recoded 88 "No response" as a
missing;
sum e9a_12 if e9a_12!=88;
gen verbal_fluency_num_12=e9a_12;
recode verbal_fluency_num_12 (88=.);
sum verbal_fluency_num_12;
sum verbal_fluency_num_12 [fweight=factori_12];


** Number of times the respondent repeated an animal: we recoded
99 "Not specified" as a missing;
sum e9b_12 if e9b_12!=99;
gen verbal_fluency_rep_12=e9b_12;
recode verbal_fluency_rep_12 (99=.);
sum verbal_fluency_rep_12;
sum verbal_fluency_rep_12 [fweight=factori_12];



*** ORIENTATION ***;
** Score (score=0 "Incorrect", 1 "Correct"), we recoded e11a_12,
e11b_12, and e11c_12 to change "Incorrect" = 0 and 9 "Not
specified" as a missing;
tab  e11a_12;
tab  e11b_12;
```

```
tab  e11c_12;
recode e11a_12 e11b_12 e11c_12 (2=0) (9=.);

gen orientation_day_12=e11a_12;
tab orientation_day_12;
tab orientation_day_12 [fweight=factori_12];


gen orientation_month_12=e11b_12;
tab orientation_month_12;
tab orientation_month_12 [fweight=factori_12];


gen orientation_year_12=e11c_12;
tab orientation_year_12;
tab orientation_year_12 [fweight=factori_12];


* Creating Orientation variable, "Correct" if the subject
anwered correct the three components (day, month, and year) and
"Incorrect" if the subject;
* answered incorrectly at least one of the components;
gen orientation_12=.;
replace orientation_12=1 if orientation_day_12==1 &
orientation_month_12==1 & orientation_day_12==1;
replace orientation_12=0 if orientation_day_12==0 |
orientation_month_12==0 | orientation_day_12==0;
tab orientation_12;
tab orientation_12 [fweight=factori_12];




****************************************;
**** CREATING TOTAL COGNITION SCORE ****;
****************************************;

** We created a total score variable including ALL components;
* Note:
* 1) We did not include "Number of times a subject repeated an
animal" (verbal_fuelcy_rep_12) and "Time to complete numeracy
excercise" (numeracy_time_12);
* 2) If a subject did not complete at least one component (had a
missing in at least one component) the total score was
considered as a missing;
* 3) For the Construction and Construction recall domains we
considered only the orginal score variables (construction_12 and
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cons_recall_12) with a score 0-6;

gen cognition_12= construction_12 + verbal_learning_12 +
verbal_recall_12 + visual_scanning_12 + cons_recall_12 +
numeracy_12 + verbal_fluency_num_12 + orientation_12;
sum cognition_12;
sum cognition_12 [fweight=factori_12];


** We ALSO created a total score variable including only
components included in 2001, 2003 and 2012 (score max=80);
* Note:
* 1) We did not include "Number of times a subject repeated an
animal" (verbal_fuelcy_rep_12) and "Time to complete numeracy
excercise" (numeracy_time_12);
* 2) If a subject did not complete at least one component (had a
missing in at least one component) the total score was
considered as a missing;
* 3) For the Construction and Construction recall domains we
considered only the orginal score variables we created using
the;
* score equivalences between 2001/2003 and 2012
(construction_comp_12 and cons_comp_recall_12) with a score 0-6;

gen cognition_comp_12= construction_comp_12 + verbal_learning_12
+ verbal_recall_12 + visual_scanning_12 + cons_recall_comp_12;
sum cognition_comp_12;
sum cognition_comp_12 [fweight=factori_12];
```

VI. Bibliography

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