The Mexican Health and Aging Study:
Cognitive Function Measures
Scoring and Classification Across Waves
2001-2015
Version 2

Prepared By

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I. Introduction

The Mexican Health and Aging Study (MHAS or ENASEM in Spanish) is a national longitudinal study of adults over the age of 50 with a broad socioeconomic perspective, with five waves completed between 2001 and 2018. The study protocols and survey instruments are highly comparable to the U.S. Health and Retirement Study (HRS). 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 is 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.

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.

The sample is distributed in all 32 states of Mexico and has representation at the national and rural/urban areas. The baseline survey was completed with high response rates (91.8%) in 2001 with a follow-up survey in 2003 (93.3% follow-up response rate). Starting in 2003, the follow-up survey protocol included an instrument for a next-of-kin interview on deceased subjects. In 2012, a follow-up visit was planned to include all the age-eligible subjects from the 2001 and 2003 surveys and a new sample of individuals from the 1952-1962 birth cohorts as well as their spouses/partners regardless of age (MHAS, 2013). The 2012 survey response rate was 88.1% (including the follow-up sample). Another follow-up survey was successfully fielded in 2015, three years after the third wave, with high response and follow-up rates (88.3%). A fifth wave of data was also collected in 2018. Similar to the MHAS 2012 protocol, in 2018 a new cohort was added of representative adults born between 1963-1968. The 2018 survey response rate was 84.7%.

The study aims for direct interviews with the target older adults in their private residence, but proxy interviews (by an adequate informant) are allowed when the target person is unable to complete the interview for health reasons, or for temporary absence beyond the period of the survey fieldwork. A relatively small portion of the interviews are proxy (6.7% in 2001, 8.6% in 2003, 8.1% in 2012, 6.3% in 2015, and 7.8% in 2018). The MHAS survey content includes self-reported health conditions in several dimensions (self-reported global health, chronic conditions, physical function, depressive symptoms, use

of health care services, income, pensions, assets, work, and others). Of relevance to the current document is that the MHAS includes a series of tasks to evaluate cognitive performance for direct interviews and another battery for proxy interviews.

Researchers have published more than 30 manuscripts using the cognitive function variables available in the MHAS; covering topics such as demographics and socioeconomic factors (in particular the relationship with education), health status including hypertension, diabetes, body mass index, health behaviors (alcohol and tobacco consumption) among other associated factors. These publications have used different methodologies to classify cognitive impairment. In particular, we want to mention one of this manuscript published by (Mejia-Arango, Wong and Michaels-Obregon 2015). In this manuscript, Mejia et al. published the first version of normative standards for each task in the modified Cross-Cultural Cognitive Examination (CCCE) to facilitate the construction of cognitive function variables using the MHAS data.

To expand this work on cognitive function, the MHAS established a group of experts lead by Dr. Rebeca Wong (from the University of Texas Medical Branch) and Dr. Silvia Mejia-Arango (from the Colegio de la Frontera Norte, Mexico) with the main purpose of presenting a conceptual framework for the analysis of cognitive aging in the MHAS and determine the different cognitive status categories in the study participants. More details about this work can be found in the manuscript “Effect of Demographic and Health Dynamics on Cognitive Status in Mexico between 2001 and 2015: Evidence from the Mexican Health and Aging Study” (Mejia-Arango et al. 2021).

The main goals of the current MHAS document are:

- To describe application and scoring of the different cognitive function tasks included in the study and comparability across the four waves (2001, 2002, 2012 and 2015).
- To provide the normative standards and z-scores for each task as well as the composite score.
- To describe the process to classify the subject cognitive status in three categories: normal, cognitive impairment no-dementia (CIND) and dementia, for both types of interview – Direct and Proxy.
- To distribute the STATA program codes used for the following constructed variables:
    - individual task score, corresponding z-scores and classification as normal or impaired (see Table 4 for all variables names).
    - composite score for direct interviews and corresponding z-scores (see Table 4 for all variables names).
    - score for proxy interviews and classification as normal or impaired (see Table 6 for all variables names).

- classification of subjects as normal, CIND, dementia (`cognitive_status_xx` and `cognitive_status_v01_xx`).

This descriptive document accompanies the databases that contain these constructed variables for the MHAS users.

Note: The 2018 wave of data collection is not included in the current version of this document (Version 1, April 2020). This MHAS study document replaces "*The Mexican Health and Aging Study: Cognitive Functioning Measures, Version 2" (MHAS 2014);* a study document created to describe the cognitive functioning measures included in the MHAS, presenting information about the different measures administered across waves from 2001 to 2015. This new version of the descriptive document reflects changes ONLY to variable labels included in the final data files and the ADDITION of summary score variables comparable across waves.

II. Overview of Cognitive Function Measures

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 surveys by individuals without medical training. The second portion of the CCCE was designed to increase the specificity of the tool and 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 intended to be negligible (Glosser et al. 1993).

The IQCODE is a brief screening instrument designed to assess cognitive change in older populations based on informant reports. This is a widely used screening test, in particular in populations with low levels of education (Jorm 1994; Jorm 2004).

Measuring cognitive function has been part of the MHAS since the baseline in 2001. Cognitive function has been assessed in the MHAS using the screening portion of the Cross-Cultural Cognitive Examination (CCCE) for direct interviews (Glosser et al. 1993). The CCCE has been modified over the MHAS waves to include a more comprehensive cognitive evaluation. The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) was used for proxy interviews (Glosser et al. 1993; Jorm 1994). It is essential for the study to maintain comparability across waves to facilitate any cross-waves comparison as well to provide the means to analyze cognitive function trajectories. The majority of the battery has been preserved across waves. However, a few changes were introduced to include new tasks (i.e. Backwards

Counting in 2012), and to measure new cognitive abilities previously not included in the battery. For example, items were added to capture Orientation in 2003 (see Table 1 below).

III. Cognitive Function Tasks in MHAS Direct Interviews

A. Overview

In 2001, five tasks were included in the MHAS. In 2003, an additional task was included to measure orientation (marked in green in the list below). In 2012, semantic verbal fluency and backward counting tasks were added (marked in purple in the list below). In 2015, an additional task – serial 7 – was added (marked in red in the list below).

The different tasks to measure cognitive function are briefly described below,.

1. Constructional Praxis (visuo-constructional): measured by presenting two geometrical figures and asking respondents to copy the figures. Respondents were given 90 seconds to complete both figures.
2. Verbal Fluency: measured by asking respondents to list all the animals they can think of in the next 60 seconds.
3. Serial 7s: measured by asking the respondent to sequentially subtract 7 starting from 100, until they complete five successive subtractions.
4. 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.
5. 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.
6. Backward Counting: measured by asking respondents to count backwards from 20 to 0 as fast as possible. Respondents are given 60 seconds (max) to complete this task.
7. Constructional Praxis Recall: measured by asking respondents to remember the figures they copied and to draw them from memory on a blank piece of paper; three minutes are allowed to complete this task.
8. Delayed Verbal recall: measured by asking respondents to repeat as many of the words they remember from the list provided in the verbal learning task; verbal recall was administered after the visual scanning task to allow a time delay.
9. Day, Month and Year: This task asks respondents to indicate the day, month and year of the interview.

As mentioned before, the main part of the cognitive function battery in the MHAS has remained the same across waves. However, as new tasks have been included in the battery, the order of the questions and variable names in the data file have also changed. Table 1 below includes all tasks and listed in the order they were administered in each wave of the study.

Table 1. Cognitive Measures Variable Names in the MHAS 2001-2015, by Task

Task	Variable Name				Order in the Questionnaire			
	2001	2003	2012	2015	2001	2003	2012	2015
Constructional Praxis	e8_e9_01	e6_e7_03	e8_12	e8_15	1	1	2	2
Verbal Learning	**List A**: e11_1i_01 e11_2i_01 e11_3i_01	**List A**: e9_a1_9_03 e9_a2_9_03 e9_a3_9_03	**List A**: e7a_1_12 e7a_2_12 e7a_3_12	**List A**: e7a_1_15 e7a_2_15 e7a_3_15	2	2	1	1
	List B: e11_4i_01 e11_5i_01 e11_6i_01	**List B**: e9_b1_9_03 e9_b2_9_03 e9_b3_9_03	**List B**: e7b_1_12 e7b_2_12 e7b_3_12	**List B**: e7b_1_15 e7b_2_15 e7b_3_15				
Visual Scanning	e12_01	e10_03	e10_12	e10_15	3	3	4	4
Constructional Praxis Recall	e13_01	e11_03	e13_12	e13_15	4	4	7	7
Delayed Verbal Recall	**List A**: e14_1i_01	**List A**: e12a_9_03	**List A**: e14a_12	**List A**: e14a_15	5	5	8	8
	List B: e14_2i_01	**List B**: e12b_9_03	**List B**: e14b_12	**List B**: e14b_15				
Orientation		**Day** e13a_03 **Month** e13b_03 **Year** e13c_03	**Day** e11a_12 **Month** e11b_12 **Year** e11c_12	**Day** e11a_15 **Month** e11b_15 **Year** e11c_15		6	5	5
Verbal Fluency			e9b_12	e9b_15			3	3
Backward Counting (time)			**Trial 1** e12a_12 **Trial 2** e12b_12 **Time** e12c_12	**Trial 1** e12a_15 **Trial 2** e12b_15 **Time** e12c_15			6	6
Serial 7s				e15a_15 e15b_15 e15c_15 e15d_15 e15e_15				9

B. General Instructions for Administering the Cognitive Function Assessment

Unlike the other sections of the survey, the cognitive assessment portion focuses on the subject's performance, rather than questions. Tasks are designed so that there is no need for specialized personnel for their application. However, the interviewers receive special training with input from a 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. During training sessions, interviewers learned how to administer the tasks and how to record answers or scores. For a selected number of tasks, such as the constructional praxis exercise, the results were later scored by trained personnel. For more details on the interviewer specific instructions, please refer to the interviewer manual available in the study website www.MHASweb.org (or here using the links for 2001, 2003 in English and 2001, 2003, 2012, and 2015).

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 participant's ability.

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.

C. Instructions and Scoring

1. Application and Scoring Instructions

Throughout the study waves, new measures have been included to the baseline questionnaire, always ensuring the comparability across waves. As previously mentioned, four new tasks were included to measure orientation, verbal fluency, backward counting, and serial 7 between 2003 and 2015.

Between 2001 and 2003, the instructions and scoring of the original tasks were preserved. However, in 2012 some adjustments were made to the constructional praxis (and constructional praxis recall) task and scoring. The changes to the constructional praxis and constructional praxis recall tasks include: 1) keeping only one figure in each exercise – the flag –, 2) and a new scoring that allowed comparing the results between waves.

Table 2 describes the application instructions and the scoring criteria for each task, by domain. In this table we describe the differences in the constructional praxis and constructional praxis recall tasks.

Table 2. Application and Scoring Instructions by Domain and Task

Task	Application Instructions	Time	Scoring Instructions		Possible Score and Missing Value Codes	
Constructional Praxis	Show the page to the respondent so that it is positioned vertically and INSTRUCT: " Draw this figure in the space below. Try to draw the figure exactly how it appears. I am going to time you. I will indicate to you when you can start and when you can stop."	90 sec.	2001 and 2003: Two figures (flag and triangle) Each drawn figure is scored as correct (1) or incorrect (0). Then the scores for both figures are added up.	2012 and 2015: One figure (flag) Each element of the flag (A) **Small triangle** (closed), (B) **Big triangle**, and (C) **Small square** (closed) is scored as follows: (1) if present or (0) if not present; and (1) if in the correct position or (0) in the incorrect position. The score for each element is then added up.	0-2 (2001 and 2003) Refused=80 Couldn't do it due to vision problems=88	0-6 (2012 and 2015) Refused=8 Didn't do it=9
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.	-	Each word remembered correctly gets one point. Count the number of words marked for each attempt. Add the words remembered correctly in each attempt and divide by 3.		0-8 each attempt Refused=9	
	1st ATTEMPT. Clearly read the words, one every two seconds, do not repeat words after reading the list. Circle the words the respondent says. 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."					
	2nd and 3rd ATTEMPT. After the respondent has stopped responding [the previous attempt], wait for 15 second and read the list for Trial 2. Follow the same procedure as Attempt #1. Circle the words the respondent says. 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".					
Visual Scanning	Show the visual scanning test page to the respondent, so it is positioned horizontally, in order to have the little point on top of the page. Show the page with the designed object, and INSTRUCT THE RESPONDENT: "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."	60 sec.	Count the number of objects 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.		0-60 Couldn't do it due to vision problems=80 Refused=88	
	Begin to count the time when the respondent circles the first object, and give the respondent 60 seconds to complete the task.					

Constructional Praxis Recall	Show the next blank page to the respondent, so that it is positioned vertically and INSTRUCT: "Please remember the figure that you drew before. Draw it again on this paper."	90 sec.	Same instructions as in the "Constructional Praxis" task	0-2 (2001 and 2003) Refused=80 Couldn't do it due to vision problems=88	0-6 (2012 and 2015) Refused=8 Didn't do it=9
Delayed 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 respondent 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	0-8 Refused=9	
Orientation	READ: " Can you please tell me today's date?"	-	Each of the following items is scored as follows: 0 if incorrect or 1 if correct: Day of the Month; Month of the Year; and Year	0-1 for each item and 0-3 for the total score	
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 sec.	When the respondent says the first word, start the timer and write down all the names of animals even if the respondent repeats them. Two scores are computed: a) the total number of different animals considering only once each animal that has been repeated b) the number of animals repeated.	Number of different animals: 0~60 Number of repeated animals: 0~60 Refused=88	
Backwards Counting	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 respondent 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 respondent 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 respondent wants to start again.	60 sec.	1st ATTEMPT. Mark "correct" if the respondent does not have any mistake when counting from 20 to 11 or from 19 to 10. 2nd ATTEMPT. Mark "incorrect" if the respondent 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 is incorrect.	0-5 1st ATTEMPT Wants to start again= 3 Refused = 8 2nd ATTEMPT Refused = 8	
Serial 7	Allow the respondent to subtract 7 each time. Stop the task after 5 subtractions. Allow, the respondent to remember the results from the previous answer for him/herself, even if is not correct. If the respondent says he/she does not understand or does not answer, repeat the same instruction up to 3 times. READ: Now, I'll ask you to try some subtractions". FIRST SUBTRACTION, READ: How much is 100-7? If the respondent adds 7 instead, repeat the question. SECOND-FIFTH SUBTRACTION: As soon as the respondent answers READ: Now keep subtracting 7.	-	All five subtractions are recorded as the respondent completes them. If the respondent makes a mistake in any of them, let him/she make to following subtraction in series from the new result. The numerical answer is then recorded.	Numerical Value=0-999 Refused=888 Doesn't Know=999	

2. Norms and Z-Scores

A previous version of the norms and z-scores was described in the manuscript “Normative and Standardized data for Cognition measures in the MHAS” (Mejia-Arango et al. 2015). The norms are used to classify the subjects into Normal, Mild, or Severe cognitive function for each task. The authors calculated the first normative standardized data (z-scores) by age and education for each task in the cognitive function battery and for total cognition score. The manuscript referred to only three waves of the data. In the current document we provide a revised version of the z-scores for 2001, 2003 and 2012 and we add the 2015 data, in particular the new task added – Serial 7s. Table 3 provides the norms for the z-scores for each task included in the study. Note that the cut-off-points (norms) are the same across waves. However, the tasks ‘constructional praxis’ and constructional recall are an exception. We provide a different set of norms for 2012 and 2015, because the tasks were scored differently in these two waves (See Table 2).

Table 3. Norms and Z-Scores for each Task, by Age Group and Education Level

		ORIENTATION (Score 0-3)			VISUAL SCANNING (Score 0-60)			VERBAL LEARNING (Score 0-8)			DELAYED VERBAL RECALL (Score 0-8)			CONSTRUCTIONAL PRAXIS						CONSTRUCTIONAL PRAXIS RECALL						VERBAL FLUENCY (Score 0~50)			BACKWARD COUNTING (Time 3-60)*			SERIAL 7 (Score 0-5)		
														2001 & 2003 (Score 0-2)			2012-2015 (Score 0-6)			2001 & 2003 (Score 0-2)			2012-2015 (Score 0-6)											
Z-Score		Education (years)																															
		0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+	0	1 to 6	7+
Age <69 years old																																		
Normal	3.0				46 - 60	59 - 60	-	8	8																		28 - 50	27 - 50	31				5		
	2.0				40 - 45	48 - 58	-	7	7	8	8	8														23 - 27	23 - 26	27				4		
	1.5				36 - 39	43 - 47	56 - 60	6		7	7	7	8													20 - 22	21 - 22	25 - 26	3 - 4	3 - 4		3	5	
	1.0	3			28 - 35	35 - 42	47 - 55	5	6		6	6	7											6	6		17 - 19	18 - 20	22 - 24	5 - 9	5 - 6	3 - 5	2	4	5
	0.0	2	3	3	14 - 27	20 - 34	33 - 46	4	5	5 - 6	3 - 5	4 - 5	5 - 6	2	2	2	5 - 6	6	6	2	2	2	4 - 5	4 - 5	5 - 6	11 - 16	13 - 17	16 - 21	10 - 21	7 - 14	6 - 9	1	2 - 3	3 - 4
	-1.0		2		7 - 13	12 - 19	25 - 32	3	4		2	3	4				4	5		1			3			8 - 10	10 - 12	13 - 15	22 - 26	15 - 18	10 - 11	0	1	2
Mild	-1.5	1		2	3 - 6	7 - 11	19 - 24	2	3	4	1	2	3	1			3				1		2	3	4	6 - 7	8 - 9	10 - 12	27 - 31	19 - 20	12 - 13		0	1
Severe	-2.0		1		0 - 2	0 - 6	7 - 18		2	3	0	0 - 1	2				2	4	5		1		1	2	3	3 - 5	5 - 7	6 - 9	32 - 35	21 - 25	14 - 17			0
	-3.0	0	0	0			0 - 6	0 - 1	0 - 1	0 - 2			0 - 1	0	0 - 1	0 - 1	0 - 1	0 - 3	0 - 4	0	0	0	0	0 - 1	0 - 2	0 - 2	0 - 4	0 - 5	36 - 60	26 - 60	18 - 60			
Age 70-79 years old																																		
Normal	3.0				39 - 60			8	8																	25 - 50	26 - 50	28 , 50				5		
	2.0				32 - 38	50 - 60	58 - 60	7	7	8	8	8														21 - 24	22 - 25	25 , 27				4	5	
	1.5				28 - 31	42 - 49	52 - 57	6	6	7	7	7	8													19 - 20	20 - 21	23 - 24		3		3	4	
	1.0	3			22 - 27	37 - 41	43 - 51	5		6	5 - 6	6	6 - 7							2			6	6	6	16 - 18	17 - 19	20 - 22	3 - 9	4 - 7	3 - 5	2	3	5
	0.0	2	3		10 - 21	30 - 36	28 - 42	4	4 - 5	5	3 - 4	3 - 5	4 - 5	2	2	2	5	6	6	1	2	2	4 - 5	4 - 5	5	11 - 15	12 - 16	15 - 19	10 - 22	8 - 16	6 - 10	1	1 - 2	3 - 4
	-1.0		2	3	4 - 9	16 - 29	18 - 27	3		4	2	2	3	1	1		4	5			1		2 - 3	3	4	8 - 10	9 - 11	12 - 14	23 - 30	17 - 20	11 - 13	0	0	2
Mild	-1.5	1		2	0 - 3	6 - 15	13 - 17		3		1	1	2				3	4				1	1	2	3	5 - 7	7 - 8	10 - 11	31 - 35	21 - 23	14 - 15			1
Severe	-2.0	0	1			3 - 5	2 - 12	2	2	3	0	0	0 - 1				2	3	5	0	0		0	1	2	3 - 4	5 - 6	6 - 9	36 - 40	24 - 30	16 - 19			0
	-3.0		0	0		0 - 2	0 - 1	0 - 1	0 - 1	0 - 2				0	0	0 - 1	0 - 1	0 - 2	0 - 4		0			0	0 - 1	0 - 2	0 - 4	0 - 5	41 - 60	31 - 60	20 - 60			
Age 80 or more years old																																		
Normal	3.0					51 - 60	56 - 60	8	8	8	8															22 - 50	23 - 50	26				3 - 5	5	
	2.0				50 - 60	37 - 50	46 - 55	7	7	7	7	7 - 8														19 - 21	20 - 22	23						
	1.5				30 - 49	33 - 36	43 - 45	6	6	6	6	6	7 - 8														18 - 19	21 - 21	3 - 6	3 - 3		2	4	5
	1.0	3	3		26 - 29	26 - 32	36 - 42	5	5	5	5	5	5 - 6				6	6		2	2	2	5 - 6	5 - 6	6	15 - 18	16 - 17	17 - 20	7 - 10	4 - 7	3 - 6		3	4
	0.0	2	2	3	19 - 25	11 - 25	21 - 35	3 - 4	4	4	2 - 4	2 - 4	3 - 4	2	2	2	4 - 5	5	6	1	1	1	3 - 4	3 - 4	4 - 5	11 - 14	10 - 15	12 - 16	11 - 18	8 - 17	7 - 12	0 - 1	1 - 2	2 - 3
	-1.0	1		2	7 - 18	2 - 10	11 - 20		3	3	1	1	1 - 2	1			3	4	5				2	2	3	8 - 10	8 - 9	9 - 11	19 - 23	18 - 20	13 - 15		0	1
Mild	-1.5		1	1	1 - 6	0 - 1	8 - 10	2	2	2	0	0	0		1		2	3	4	0			1	1	2	6 - 7	6 - 7	7 - 8	24 - 26	21 - 24	16 - 20			0
Severe	-2.0	0			0		3 - 7	1	1	1				0		1	1	2			0	0	0	0	1	5 - 5	4 - 5	3 - 6	27 - 32	25 - 30	21 - 23			
	-3.0		0	0			0 - 2	0	0	0					0	0	0	0 - 1	0 - 3						0	0 - 4	0 - 3	0 - 2	33 - 60	31 - 60	24 - 60			

It is important to mention a few details regarding the calculation of the composite score. For this, we provide in Table 4 the names of the constructed variables in the datafiles, the possible score for each task, and how these variables are added to calculate the total composite score which varies across waves. In addition to the norms and z-scores for each individual task, we also provide the norms and z-scores for the total composite score (all tasks included) for each wave in Table 5.

Table 4. Names of Constructed Variables and Scores by Task, and Total Composite Score for each Wave

Task	Constructed Variables Names				Notes on Calculation	Score			
	2001	2003	2012	2015		2001	2003	2012	2015
Constructional Praxis	construction_01	construction_03	construction_12	construction_15	Total score (see Table 2)	0-2		0-6	
Verbal Fluency			verbal_fluency_12	verbal_fluency_15	Categorical variable: 1=0-8 animals 2=9-18 animals 3=19-24 animals 4=25-60 animals			1-4[a]	
Serial 7s				serial7_15	Total 5 subtractions scores: 0=Incorrect 1=Correct				0-5
Verbal Learning	iwr_01	iwr_03	iwr_12	iwr_15	Average 3 Trials (including both lists)	0-8			
Visual Scanning	visual_scan_01	visual_scan_03	visual_scan_12	visual_scan_15	Total score	0-60			
Backward Counting (time)			bwc_12	bwc_15	Categorical variable (time): 0=Incorrect 1=31-60 sec 2=21-30 sec 3=11-20 sec 4=3-10 sec			0-4[b]	
Constructional Praxis Recall	construction_m_01	construction_m_03	construction_m_12	construction_m_15	Total score (see Table 2)	0-2		0-6	
Delayed Verbal Recall	dwr_01	dwr_03	dwr_12	dwr_15	Total of both lists	0-8			
Orientation		orientation_03	orientation_12	orientation_15	Sum of 3 items 0=Incorrect 1=Correct		0-3		
Total Composite Score	**ccce_01**	**ccce_03**	**ccce_12**	**ccce_15**	**Sum of all tasks** (if all are non-missing)	**0-80**	**0-83**	**0-99**	**0-104**
(Number of tasks missing)	ccce_miss_01	ccce_miss_03	ccce_miss_12	ccce_miss_15	Counts of tasks missing	0-5	0-6	0-8	0-9

Total Composite Score Comparable to 2001		ccce_v01_03	ccce_ v01_12	ccce_ v01_15	**Sum of 5 tasks included since 2001** (if all are non-missing)	**0-80**	**0-80**	**0-80**	**0-80**
(Number of tasks missing)		ccce_miss_v01_03	ccce_miss_v01_12	ccce_miss_v01_15	Counts of tasks missing	0-5	0-5	0-5	0-5
Total Composite Score Comparable to 2012				ccce_v12_15	**Sum of all tasks** (if all are non-missing)			**0-99**	**0-104**
(Number of tasks missing)				ccce_miss_v12_15	Counts of tasks missing			0-8	0-8

Notes: [a] The verbal fluency categorical variable was constructed following previous work by Mejia et al. 2015; [b] The backward counting categorical variable was constructed using in combination the correct/incorrect variable from trial 1 and 2, and the time variable, following previous work by (Mejia-Arango et al. 2015).

Table 5. Composite Score Norms and Z-Scores, by Age Group and Education Level

		2001 (CCCE Score Range 0-80)			2003 (CCCE Score Range 0-83)			2012 (CCCE Score Range 0-99)			2015 (CCCE Score Range 0-104)		
Z-Score		**Education (years)**											
		0	**1 to 6**	**7+**	**0**	**1 to 6**	**7+**	**0**	**1 to 6**	**7+**	**0**	**1 to 6**	**7+**
Age <69 years old													
Normal	3.0	63 - 80	73 - 80		69 - 83	79 - 83		83 - 99	92 - 99		76 - 104	98 - 104	
Normal	2.0	53 - 62	63 - 72	77 - 80	57 - 68	66 - 78	81 - 83	70 - 82	80 - 91	95 - 99	65 - 75	84 - 97	100 - 104
Normal	1.5	48 - 52	58 - 62	72 - 76	51 - 56	60 - 65	75 - 80	64 - 69	74 - 79	89 - 94	60 - 64	76 - 83	93 - 99
Normal	1.0	41 - 47	50 - 57	64 - 71	44 - 50	53 - 59	67 - 74	61 - 63	66 - 73	81 - 88	51 - 59	68 - 75	86 - 92
Normal	0.0	24 - 40	31 - 49	46 - 63	26 - 43	34 - 52	48 - 66	38 - 60	46 - 65	62 - 80	33 - 50	48 - 67	67 - 85
Normal	-1.0	17 - 23	23 - 30	38 - 45	19 - 25	26 - 33	41 - 47	30 - 37	38 - 45	54 - 61	21 - 32	41 - 47	60 - 66
Mild	-1.5	12 - 16	18 - 22	32 - 37	14 - 18	21 - 25	35 - 40	25 - 29	31 - 37	48 - 53	18 - 20	33 - 40	52 - 59
Severe	-2.0	4 - 11	8 - 17	18 - 31	5 - 13	9 - 20	22 - 34	15 - 24	13 - 30	26 - 47	6 - 17	18 - 32	38 - 51
Severe	-3.0	0 - 3	0 - 7	0 - 17	0 - 4	0 - 8	0 - 21	0 - 14	0 - 12	0 - 25	0 - 5	0 - 17	0 - 37
Age 70-79 years old													
Normal	3.0	55 - 80	58 - 80	79 - 80	56 - 83	72 - 83		74 - 99	87 - 99		73 - 104	90 - 104	100 - 104
Normal	2.0	46 - 54	56 - 57	73 - 78	49 - 55	59 - 71	76 - 83	60 - 73	73 - 86	92 - 99	61 - 72	76 - 89	96 - 99
Normal	1.5	41 - 45	51 - 55	67 - 72	44 - 48	53 - 58	70 - 75	55 - 59	67 - 72	84 - 91	53 - 60	69 - 75	88 - 95
Normal	1.0	35 - 40	43 - 50	59 - 66	37 - 43	46 - 52	62 - 69	48 - 54	58 - 66	75 - 83	46 - 52	60 - 68	67 - 87
Normal	0.0	20 - 34	25 - 42	39 - 58	22 - 36	28 - 45	41 - 61	34 - 47	39 - 57	54 - 74	27 - 45	39 - 59	56 - 66
Normal	-1.0	14 - 19	18 - 24	30 - 38	16 - 21	21 - 27	33 - 40	26 - 33	31 - 38	45 - 53	19 - 26	31 - 38	47 - 55
Mild	-1.5	10 - 13	13 - 17	24 - 29	12 - 15	15 - 20	26 - 32	22 - 25	25 - 30	41 - 44	12 - 18	25 - 30	40 - 46
Severe	-2.0	7 - 9	5 - 12	9 - 23	8 - 11	6 - 14	12 - 25	13 - 21	12 - 24	23 - 40	0 - 11	12 - 24	23 - 39
Severe	-3.0	0 - 6	0 - 4	0 - 8	0 - 7	0 - 5	0 - 11	0 - 12	0 - 11	0 - 22		0 - 11	0 - 22
Age 80 or more years old													
Normal	3.0				53 - 83	66 - 83	72 - 83	67 - 99	80 - 99	80 - 99	61 - 104	78 - 104	90 - 104
Normal	2.0	63 - 80	67 - 80	78 - 80	45 - 52	54 - 65	65 - 71	59 - 66	67 - 79	67 - 79	48 - 60	64 - 77	80 - 89
Normal	1.5	47 - 62	51 - 66	60 - 77	41 - 44	48 - 53	57 - 64	54 - 58	60 - 66	60 - 66	43 - 47	58 - 63	76 - 79
Normal	1.0	38 - 46	45 - 50	55 - 59	33 - 40	40 - 47	50 - 56	46 - 53	51 - 59	51 - 59	35 - 42	49 - 57	65 - 75
Normal	0.0	30 - 37	37 - 44	48 - 54	16 - 32	21 - 39	32 - 49	26 - 45	32 - 50	32 - 50	19 - 34	28 - 48	44 - 64
Normal	-1.0	15 - 29	19 - 36	30 - 47	10 - 15	13 - 20	25 - 31	18 - 25	23 - 31	23 - 31	12 - 18	19 - 27	35 - 43
Mild	-1.5	8 - 14	11 - 18	23 - 29	7 - 9	7 - 12	20 - 24	12 - 17	17 - 22	17 - 22	8 - 11	12 - 18	27 - 34
Severe	-2.0	4 - 7	5 - 10	17 - 22	0 - 6	4 - 6	12 - 19	0 - 11	13 - 16	13 - 16	0 - 7	0 - 11	10 - 26
Severe	-3.0	0 - 3	0 - 4	9 - 16		0 - 3	0 - 11		0 - 12	0 - 12			

3. Total Scores and Comparability Across Waves

As described in Table 2, measures have been added gradually to the baseline questionnaire modifying the total score in each MHAS wave. However, it is still possible to create a total score including only the baseline tasks.

Notes, tips and other cautionary steps before creating total scores:

1) Constructional praxis and constructional praxis recall:

Comparable Score Across Waves:

To complete a total score comparable across waves, note that the new scoring for constructional praxis and constructional praxis recall introduced in 2012 allows comparing the results between waves. The following table indicates the equivalence between 2001/2003 and 2012 score for these two tasks.

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

Adjustment to Constructional Praxis Recall:

During the process of classifying cognitive performance, the MHAS group found a disproportionate number of individuals (77.2%) with impairment in visual memory, measured through the recall of a previous figure-copy (`constructional_m_imp_v01`). The majority of these individuals had also failed in the figure-copy task (`constructional_imp_v01`). Other researchers have reported on the issue of interdependence in these scores and suggest that visual memory deficits result from an adequate copy of the figure, but a deficient or absent recall. On the other hand, constructional praxis deficits result in distorted copies and poor drawings at recall (Pelati et al. 2011). Thus, the MHAS group adopted the following convention: classify subjects as impaired in constructional praxis-recall (visual memory) if performance was within the normal range in constructional praxis (figure-copy) and their performance in the recall stage was impaired. Otherwise, subjects were classified as not impaired in constructional praxis.

If users of the MHAS data want to compare across waves, then the recommendation is to use this new constructional praxis recall impairment variable (`constructional_m_c_v01`).

In Appendix I – Construction of Cognition Variables, we included the STATA code to create these variables (see the construction code for `construction_v01_12` and `construction_m_v01_12` in 2012 and `construction_v01_15` and `construction_m_v01_15` in 2015).

Because of this change across waves, the constructional praxis and constructional praxis recall are not comparable over time. The MHAS project adopted the following convention to provide the user with a new constructed variable for constructional praxis recall impairment (in both 2012 and 2015) as follows:

IF Constructional Praxis Impairment (`constructional_imp_v01`)	AND Constructional Praxis Recall Impairment (`constructional_m_imp_v01`)	THEN New Constructional Praxis Recall Impairment (`constructional_m_c_v01`)
0	1	1
0	0	0
1	0	0
1	1	0

2) Serial 7:

Before determining if each numerical answer in e15a to e15e is correct or incorrect, some cases with values 888, 999, 88 and 99 need to be validated to consistently indicate either a "Refusal", "Don't Know", or ".s" if the questions should be skipped. This validation process is included in the STATA program in Appendix I, and it includes the cases we list below:

- **Subjects with `e15a_15`=="99"**
  a. Subjects with `e15b_15`=="999" (n=88): In all these cases `e15a_15` should be "999" and `e15b_15` to `e15e_15` should be recoded as ".s" (skipped).
  b. Subjects with `e15b_15`=="888" (n=79): All these cases should remain UNCHANGED.
  c. Subjects with e15b_15=="99" (n=24): In all these cases `e15a_15` should be "999" and `e15b_15` to `e15e_15` should be recoded as ".s" (skipped).
  d. Subjects with `e15b_15`≠"999", "888", or "99" (n=6): Only subject identified with CUNICAH=9419 & NP=20 should be modified. In this case `e15a_15` should be "888" and `e15b_15` to `e15e_15` should be recoded as ".s" (skipped). In all the other cases DO NOT make changes.

- **Subjects with `e15a_15`=="88"**
  a. Subjects with `e15b_15`=="888" (n=17): In all these cases `e15a_15` should be "888" and `e15b_15` to `e15e_15` should be ".s".
  b. Subjects with `e15b_15`=="999" (n=2): All these cases should remain UNCHANGED.

c. Subjects with e15b_15≠“888” or “999” (n=7): All these cases should remain UNCHANGED.

- **Subjects with e15b_15==“99” (AND e15a≠“88” or “99”)**
  a. Subjects with e15c_15==“888” (n=32): All these cases should remain UNCHANGED.
  b. Subjects with e15c_15==“999” (n=31): In all these cases e15b_15 should be “999” and e15c_15 to e15e_15 should be recoded as “.s” (skipped)
  c. Subjects with e15c_15==“88” (n=3): Only subject identified with CUNICAH=14600 & NP=14 should be modified. In this case e15b_15 should be “999” and e15c_15 to e15e_15 should be recoded as “.s” (skipped). In all the other cases DO NOT make changes.
  d. Subjects with e15c_15==“99” (n=11): In all these cases e15b_15 should be “999” and e15c_15 to e15e_15 should be recoded as “.s” (skipped).
- **Subjects with e15b_15==“88” (AND e15a≠“88” or “99”)**
  a. Subjects with e15c_15==“888” (n=22): In all these cases e15b_15 should be “888” and e15c_15 to e15e_15 should be recoded as “.s” (skipped).
  b. Subjects with e15c_15==“999” (n=11): All of these cases should remain UNCHANGED.
  c. Subjects with e15c_15==“88” (n=8): In all these cases e15b_15 should be “888” and e15c_15 to e15e_15 should be recoded as “.s” (skipped).
  d. Subjects with e15c_15==“99” (n=2): In all these cases e15c_15 should be “999” and e15d_15 to e15e_15 should be “.s”.
- **Subjects with e15c_15==“88” (AND e15b≠“88” or “99” AND e15a≠“88” or “99”)**
  a. Subjects with e15d_15==“888” (n=12): In all these cases e15c_15 should be “888” and e15d_15 to e15e_15 should be recoded as “.s” (skipped).
  b. Subjects with e15d_15==“999” (n=5):All these cases should remain UNCHANGED.
  c. Subjects with e15d_15==“88” (n=8): Only subjects identified with CUNICAH=3143 & NP=10, CUNICAH=8548 & NP=10, CUNICAH=13405 & NP=20, CUNICAH=14635 & NP=20, CUNICAH=14758 & NP=10, and CUNICAH=14780 & NP=20 should be modified. In those cases, e15c_15 should be “888” and e15d_15 to e15e_15 should be recoded as “.s” (skipped)In all the other cases DO NOT make changes.
- **Subjects with e15c_15==“99” (AND e15b≠“88” or “99” AND e15a≠“88” or “99”)**
  a. Subjects with e15d_15==“888” (n=23): All these cases should remain UNCHANGED.

b. Subjects with e15d_15=="999" (n=13): In all these cases e15c_15 should be "999" and e15d_15 to e15e_15 should be recoded as ".s" (skipped).
c. Subjects with e15d_15==99 (n=13): In all these cases e15c_15 should be "999" and e15d_15 to e15e_15 should be recoded as ".s" (skipped).

- **Subjects with e15d_15=="88" (AND e15c≠"88" or "99" AND e15b≠"88" or "99" AND e15a≠"88" or "99")**
  a. Subjects with e15e_15=="888" (n=8): In all these cases e15d_15 should be "888" and e15e_15 should be recoded as ".s" (skipped).
  b. Subjects with e15e_15=="999" (n=4): All these cases should remain UNCHANGED.
  c. Subjects with e15e_15=="88" (n=8): In all these cases e15d_15 should be "888" and e15e_15 should be recoded as ".s" (skipped).
- **Subjects with e15d_15=="99" (AND e15c≠88 or 99 AND e15b≠88 or 99 AND e15a≠88 or 99)**
  a. Subjects with e15e_15=="888" (n=13): In all these cases e15d_15 should be "999" and e15e_15 should be recoded as ".s" (skipped).
  b. Subjects with e15e_15=="999" (n=8): In all these cases e15d_15 should be "999" and e15e_15 should be recoded as ".s" (skipped).
  c. Subjects with e15e_15=="88" (n=2): In all these cases e15d_15 should be "999" and e15e_15 should be recoded as ".s" (skipped).
  d. Subjects with e15e_15=="99" (n=18): In all these cases e15d_15 should be "999" and e15e_15 should be recoded as ".s" (skipped).
- **Subjects with e15e_15=="99" or "88" (AND e15c≠"88" or "99" AND e15b≠"88" or "99" AND e15a≠"88" or "99")**

  Only the cases identified in the program in Appendix I are changed. In all those cases, "88" should be replaced by "888" and "99" should be replaced by "999". All the other cases should remain UNCHANGED.
- **Other cases**
  a. In the case identified by CUNICAH=11677 & NP=10, e15b_15 should be "999" and e15c_15 to e15e_15 should be recoded as ".s" (skipped).
  b. In the case identified by CUNICAH=10645 & NP=10, e15a_15 should be "93" (instead of 903).

IV. Proxy Interviews

A. Overview

The proxy interview has the same thematic content as the basic interview, but with fewer questions.

Because the cognitive tasks included in Section E (Cognitive function in direct interview) could not be completed 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 respondent evaluates. The idea is to use the proxy's personal impression to judge the perceived changes of behavior of the target person. The proxy has to rate the subject's cognitive status comparing it with how it was 2 years earlier.

The MHAS uses a short version of the IQCODE (Jorm, 1994), which is a 16-item questionnaire on cognitive decline in the elderly. The questions emphasize 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 target person's cognitive deterioration severity.

The questions consider general aspects: memory evaluation, memory comparison, judgments, organization, and daily activities planning as well as particular aspects referring to memory deterioration such as 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 function measures were included in this section, including global ratings on behavioral problems. These assess the frequency with which the proxy informant 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 the 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 defined as whatever the proxy informant understands.

The interviewer asks the proxy informant to try to remember how the subject was two years before and to compare it with how the subject is like at the time of the interview. The informant is then asked if each

of the symptoms has “improved”, “stayed the same”, or “gotten worse”. If the answer is “improved” or “gotten worse”, then the informant is asked to indicate if the change is “much” or “a bit”.

C. Scoring

Different from the Cognitive function battery used during direct interviews (Section E), the proxy-cognitive section (Section PC) has not changed across waves. The scoring of each item is fairly simple and is described in Table 6.

Table 6. Scores by Item and Total Composite Score

Items	Variable Name [a]			Notes on Calculation [b]	Constructed Variables Names	Score
1) Remembering things about family & friends	pc5	pc6	pc7	Using pc5, pc6 and pc7 to constructed iqcode1 as categorical variable as follows: 1 “Much Improved” (pc6=1) 2 “A bit improved” (pc6=2) 3 “Not much changed” (pc5=2) 4 “A bit worse” (pc7=2) 5 “Much worse” (pc7=1)	iqcode1	1-5 (each item)
2) Remembering things that happened recently	pc8	pc9	pc10		iqcode2	
3) Recalling conversations a few days later	pc11	pc12	pc13		iqcode3	
4) Remembering his/her address & phone number	pc14	pc15	pc16		iqcode4	
5) Remembering what day and month it is	pc17	pc18	pc19		iqcode5	
6) Remembering where things are usually kept	pc20	pc21	pc22		iqcode6	
7) Remembering where to find things which have been put in a different place from usual	pc23	pc24	pc25		iqcode7	
8) Knowing how to work familiar machines around the house	pc26	pc27	pc28		iqcode8	
9) Learning to use a new gadget or machine around the house	pc29	pc30	pc31		iqcode9	
10) Learning new things in general	pc32	pc33	pc34		iqcode10	
11) Following a story in a book or TV	pc35	pc36	pc37		iqcode11	
12) Making decision on everyname_day_12 matters	pc38	pc39	pc40		iqcode12	
13) Handling money for shopping	pc41	pc42	pc43		iqcode13	
14) Handling financial matters	pc44	pc45	pc46		iqcode14	
15) Handling other everyname_day_12 arithmetic problems	pc47	pc48	pc49		iqcode15	
16) Using his/her intelligence to understand what's going on and to reason things through	pc50	pc51	pc52		iqcode16	
Total Composite Score				**Mean of all 16 Items**	**iqcode**	**1-5**

Note: [a] Please note that the variables names have not changed across waves; [b] The notes on calculation use as an example the first item “Remembering things about family & friends”, which uses the variables pc5, pc6 and pc7.

There is a total of 16 items that are used to calculate a composite score as the average score of all these items, and that ranges from 1 to 5. To calculate the score for each item, three variables need to be accounted to determine the presence of each symptom: 1 “Much Improved”, 2” A bit improved”, 3 “Not much changed”, 4 “A bit worse”, 5 “Much worse”. In Table 6, we provide notes on the calculation of the scores using as an example the first item “Remembering things about family & friends” which uses questions pc5, pc6, pc7. The resulting constructed variable is ‘iqcode1’. The same algorithm is applied for the other items.

We adopted a cut-off point 3.4 and above in the IQCODE Composite Score proposed by (Cherbuin and Jorm 2017), for community settings with a sensitivity of 84% and specificity of 80%, to classify subjects as “Normal” (below 3.4) or “Impaired” (3.4 and above).

V. Cognitive Function Classification

A. Overview

As mentioned above, the MHAS convened a group of experts, who followed and adapted the criteria for preclinical and clinical phases of all-cause dementia recommended by the National Institute of Aging and the Alzheimer’s Association.

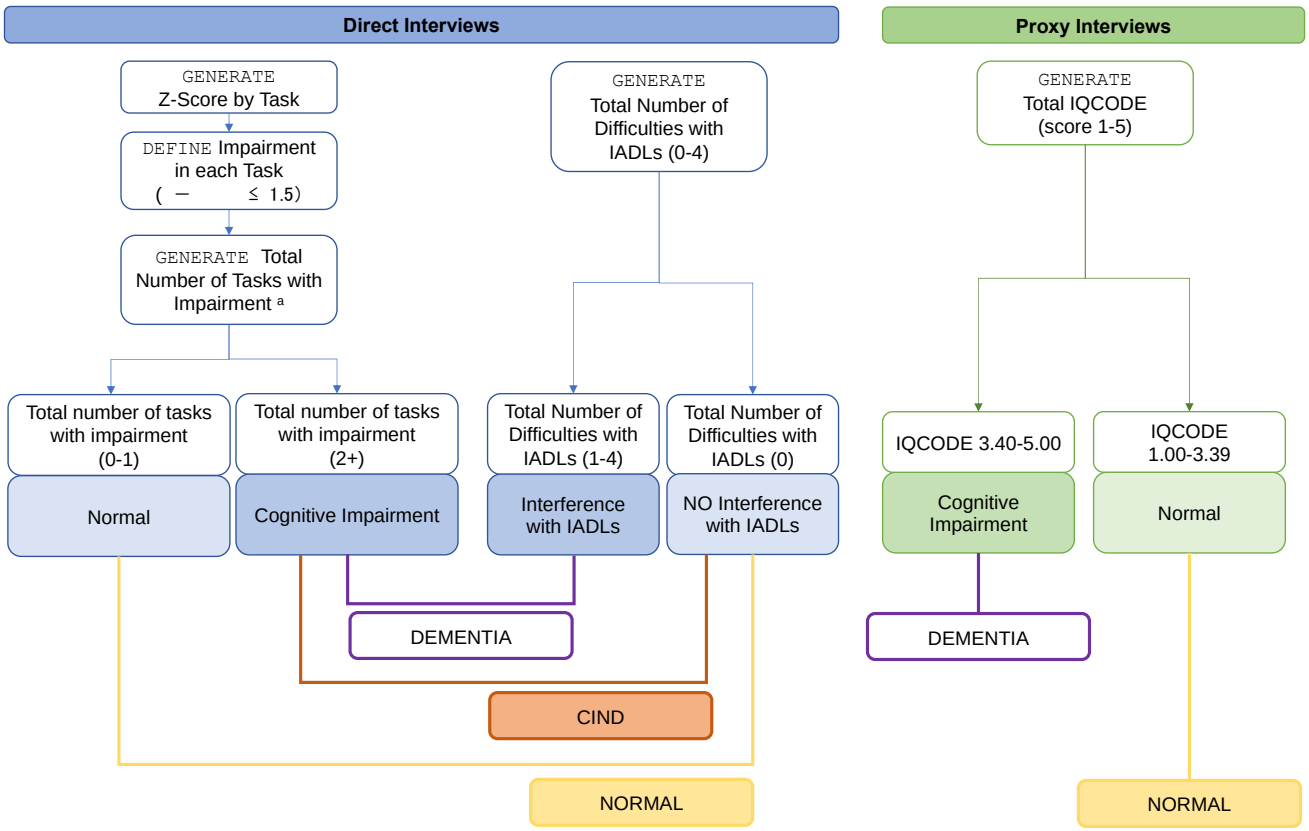
1) Cognitive impairment/Dementia:
    a. For direct interviews:
        i. Impairment in two or more tasks as defined in Table 3, AND
        ii. Limitation with one or more instrumental activities of daily living (from the following: preparing a hot meal, shopping for groceries, taking medications, and managing own money).
    b. Proxy interviews:
        i. A score equal or above 3.4 in the IQCODE
2) Cognitive impairment no-dementia (CIND):
    a. For direct interviews ONLY:
        i. Impairment in two or more tasks, AND
        ii. NO limitation in any instrumental activities of daily living
3) Normal cognitive function with IADLs Limitations:
    a. For direct interviews ONLY
        i. Impairment in 0 or 1 task, AND
        ii. Limitation with one or more instrumental activities of daily living

4) Normal cognitive function AND no IADLs Limitations:
    a. For direct interviews ONLY
        i. Impairment in 0 or 1 task, AND
        ii. NO limitation in any instrumental activities of daily living
    b. Proxy interviews:
        i. A score below 3.4 in the IQCODE

More details about this work can be found in (Mejia-Arango et al. 2020).

B. Classification Flowchart

The framework proposed by the MHAS group established the classification of cognitive function status using the combination of different conditions as mentioned above. The following figure presents a flowchart describing the process we followed to classify the subjects (`cognitive_status_xx`). If MHAS data users want to make comparisons across all waves, we suggest using only the 5 tasks included from 2001 to 2015 (`cognitive_status_v01_xx`). However, it is also possible to use this same framework using all tasks in each wave separately; the STATA code in Appendix II includes both options.



Notes: [a] Only if the respondent completed 2 or more tasks out of 5 tasks included in baseline

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Appendix I. STATA Codes for the Creation of Cognitive Function Variables (Direct and Proxy Interviews)

The following STATA codes can be used to construct the score variable for each task included in the 2001, 2003, 2012, and 2015 waves.

2001

```
*********************************************************
**** MHAS 2001 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*********************************************************

label data "Version 3. December 2021"

**** CREATING VARIABLES BY TASK AND DOMAIN ****

* NOTE: Special missing values were assigned as follows:
* .p indicates proxy interview, .d don't know, .s skip, .r refusal,
and .l physical limitation or visual limitation,


*** VERBAL LEARNING (score 0-8) ***
egen iwr_01=rowmean (e11_1i_01 e11_2i_01 e11_3i_01 e11_4i_01
e11_5i_01 e11_6i_01) if [inrange(e11_1i_01,0,8) |
inrange(e11_2i_01,0,8) | inrange(e11_3i_01,0,8) |
inrange(e11_4i_01,0,8) | inrange(e11_5i_01,0,8) |
inrange(e11_6i_01,0,8)]  & inlist(tipent_01,11,12)
replace iwr_01 = .r if [e10_01==8 & (e11_4i_01==. & e11_5i_01==. &
e11_6i_01==.)] | [[e11_1i_01 == . & e11_2i_01 == . & e11_3i_01 == . &
e10_01==1] | [e11_4i_01 == . & e11_5i_01 == . & e11_6i_01 == . &
e10_01==2] & inlist(tipent_01,11,12)]
replace iwr_01 = .p if inlist(tipent_01,21,22)
replace iwr_01 = .i if inlist(tipent_01,11,12) & [e1_01==. |
e10_01==.]
replace iwr_01 = .s if e1_01==2
label variable iwr_01 "MHAS 2001 Verbal Learning (0-8)"


*** DELAYED VERBAL RECALL (score 0-8) ***
egen dwr_01=rowtotal (e14_1i_01 e14_2i_01)  if
inlist(tipent_01,11,12)
replace dwr_01 = 0 if e14_1i_01 == 9 | e14_2i_01 ==9
replace dwr_01 = .r if [e10_01==8 & e14_2i_01==.] | [[e14_2i_01==. &
e10_01==2] | [e14_1i_01==. & e10_01==1] & inlist(tipent_01,11,12)]
```

```
replace dwr_01 = .p if inlist(tipent_01,21,22)
replace dwr_01 = .i if inlist(tipent_01,11,12) & [e1_01==. |
e10_01==.]
replace dwr_01 = .s if e1_01==2
label variable dwr_01 "MHAS 2001 Delayed Verbal Recall (0-8)"

*** CONSTRUCTIONAL PRAXIS RECALL (score 0-2) ***
gen construction_m_01 = e13_01 if inrange(e13_01,0,2)
replace construction_m_01 = .l if e13_01==88
replace construction_m_01 = .r if e13_01==80
replace construction_m_01 = .p if inlist(tipent_01,21,22)
replace construction_m_01 = .i if inlist(tipent_01,11,12) & e1_01==.
replace construction_m_01 = .s if e1_01==2 | [ (e6_01 == 8 |
inlist(e7_01,1,2,3)) & e13_01==.]
label variable construction_m_01 "MHAS 2001 Constructional Praxis
Recall (0-2)"


*** VISUAL SCANNING (score 0-60) ***
gen visual_scan_01= e12_01 if inrange(e12_01, 0,60)
replace visual_scan_01 = .l if e12_01 == 80
replace visual_scan_01 = .r if e12_01 == 88
replace visual_scan_01 = .p if inlist(tipent_01,21,22)
replace visual_scan_01 = .i if inlist(tipent_01,11,12) & e1_01==.
replace visual_scan_01 = .s if e1_01==2 | [(e6_01 == 8 |
inlist(e7_01,1,2,3)) & e12_01==.]
label variable visual_scan_01 "MHAS 2001 Visual Scanning (0-60)"


*** CONSTRUCTIONAL PRAXIS (score 0-2) ***
gen construction_01= e8_e9_01 if inrange(e8_e9_01,0,2)
replace construction_01 = .l if e8_e9_01==88
replace construction_01 = .r if inlist(e8_e9_01,80,.)
replace construction_01 = .p if inlist(tipent_01,21,22)
replace construction_01 = .i if inlist(tipent_01,11,12) & e1_01==.
replace construction_01 = .s if e1_01==2 | [(e6_01 == 8 |
inlist(e7_01,1,2,3)) & e13_01==.]
label variable construction_01 "MHAS 2001 Constructional Praxis (0-
2)"


*** NUMBER of Tasks missing ***
egen ccce_miss_01=rowmiss(iwr_01 dwr_01 visual_scan_01
construction_01 construction_m_01) if inlist(tipent_01,11,12)
replace ccce_miss_01=.p if inlist(tipent_01,21,22)
label variable ccce_miss_01 "MHAS 2001 Number of CCCE Tasks missing
(0-5)"
```

```
*** TOTAL MHAS 2001 CCCE SCORE (score 0-80) ***
egen ccce_01 = rowtotal(iwr_01 dwr_01 visual_scan_01 construction_01
construction_m_01) if !mi(iwr_01) & !mi(dwr_01) & !mi(visual_scan_01)
& !mi(construction_01) & !mi(construction_m_01)
replace ccce_01 = .d if [iwr_01==.d | dwr_01==.d | visual_scan_01==.d
| construction_01==.d | construction_m_01==.d]
replace ccce_01 = .r if [iwr_01==.r | dwr_01==.r | visual_scan_01==.r
| construction_01==.r | construction_m_01==.r]
replace ccce_01 = .p if inlist(tipent_01,21,22)
replace ccce_01 = .s if e1_01==2 | e6_01 == 8 | inlist(e7_01,1,2,3)
replace ccce_01 = .l if e8_e9_01==88 | e12_01 == 80 | e13_01==88
replace ccce_01 = .i if inlist(tipent_01,11,12) & e1_01==.
label variable ccce_01 "MHAS 2001 CCCE Score (0-80)"



*********************************************************
******* MHAS 2001 IQCODE SHORT -Jorm (SECTION PC) ********
*********************************************************

quietly destring pc1_01-pc63_01, replace

* Remembering things about family & friends
gen iqcode1_01=.
replace iqcode1_01=.r if pc5_01==8 | pc6_01==8 | pc7_01==8
replace iqcode1_01=.d if pc5_01==9 | pc6_01==9 | pc7_01==9
replace iqcode1_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode1_01=3 if pc5_01==2
replace iqcode1_01=pc6_01 if inlist(pc6_01,1,2)
replace iqcode1_01=4 if pc7_01==2
replace iqcode1_01=5 if pc7_01==1

* Remembering things that happened recently
gen iqcode2_01=.
replace iqcode2_01=.r if pc8_01==8 | pc9_01==8 | pc10_01==8
replace iqcode2_01=.d if pc8_01==9 | pc9_01==9 | pc10_01==9
replace iqcode2_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode2_01=3 if pc8_01==2
replace iqcode2_01=pc9_01 if inlist(pc9_01,1,2)
replace iqcode2_01=4 if pc10_01==2
replace iqcode2_01=5 if pc10_01==1

* Recalling conversations a few name_days later
gen iqcode3_01=.
replace iqcode3_01=.r if pc11_01==8 | pc12_01==8 | pc13_01==8
replace iqcode3_01=.d if pc11_01==9 | pc12_01==9 | pc13_01==9
```

```
replace iqcode3_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode3_01=3 if pc11_01==2
replace iqcode3_01=pc12_01 if inlist(pc12_01,1,2)
replace iqcode3_01=4 if pc13_01==2
replace iqcode3_01=5 if pc13_01==1

* Remembering his/her address & phone number
gen iqcode4_01=.
replace iqcode4_01=.r if pc14_01==8 | pc15_01==8 | pc16_01==8
replace iqcode4_01=.d if pc14_01==9 | pc15_01==9 | pc16_01==9
replace iqcode4_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode4_01=3 if pc14_01==2
replace iqcode4_01=pc15_01 if inlist(pc15_01,1,2)
replace iqcode4_01=4 if pc16_01==2
replace iqcode4_01=5 if pc16_01==1

* Remembering what name_day and name_month it is
gen iqcode5_01=.
replace iqcode5_01=.r if pc17_01==8 | pc18_01==8 | pc19_01==8
replace iqcode5_01=.d if pc17_01==9 | pc18_01==9 | pc19_01==9
replace iqcode5_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode5_01=3 if pc17_01==2
replace iqcode5_01=pc18_01 if inlist(pc18_01,1,2)
replace iqcode5_01=4 if pc19_01==2
replace iqcode5_01=5 if pc19_01==1

* Remembering where things are usually kept
gen iqcode6_01=.
replace iqcode6_01=.r if pc20_01==8 | pc21_01==8 | pc22_01==8
replace iqcode6_01=.d if pc20_01==9 | pc21_01==9 | pc22_01==9
replace iqcode6_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode6_01=3 if pc20_01==2
replace iqcode6_01=pc21_01 if inlist(pc21_01,1,2)
replace iqcode6_01=4 if pc22_01==2
replace iqcode6_01=5 if pc22_01==1

* Remembering where to find things which have been put in a different
place from usual
gen iqcode7_01=.
replace iqcode7_01=.r if pc23_01==8 | pc24_01==8 | pc25_01==8
replace iqcode7_01=.d if pc23_01==9 | pc24_01==9 | pc25_01==9
replace iqcode7_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode7_01=3 if pc23_01==2
replace iqcode7_01=pc24_01 if inlist(pc24_01,1,2)
replace iqcode7_01=4 if pc25_01==2
replace iqcode7_01=5 if pc25_01==1
```

```
* Knowing how to work familiar machines around the house
gen iqcode8_01=.
replace iqcode8_01=.r if pc26_01==8 | pc27_01==8 | pc28_01==8
replace iqcode8_01=.d if pc26_01==9 | pc27_01==9 | pc28_01==9
replace iqcode8_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode8_01=3 if pc26_01==2
replace iqcode8_01=pc27_01 if inlist(pc27_01,1,2)
replace iqcode8_01=4 if pc28_01==2
replace iqcode8_01=5 if pc28_01==1

* Learning to use a new gadget or machine around the house
gen iqcode9_01=.
replace iqcode9_01=.r if pc29_01==8 | pc31_01==8 | pc31_01==8
replace iqcode9_01=.d if pc29_01==9 | pc31_01==9 | pc31_01==9
replace iqcode9_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode9_01=3 if pc29_01==2
replace iqcode9_01=pc31_01 if inlist(pc31_01,1,2)
replace iqcode9_01=4 if pc31_01==2
replace iqcode9_01=5 if pc31_01==1

* Learning new things in general
gen iqcode10_01=.
replace iqcode10_01=.r if pc32_01==8 | pc33_01==8 | pc34_01==8
replace iqcode10_01=.d if pc32_01==9 | pc33_01==9 | pc34_01==9
replace iqcode10_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode10_01=3 if pc32_01==2
replace iqcode10_01=pc33_01 if inlist(pc33_01,1,2)
replace iqcode10_01=4 if pc34_01==2
replace iqcode10_01=5 if pc34_01==1

* Following a story in a book or TV
gen iqcode11_01=.
replace iqcode11_01=.r if pc35_01==8 | pc36_01==8 | pc37_01==8
replace iqcode11_01=.d if pc35_01==9 | pc36_01==9 | pc37_01==9
replace iqcode11_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode11_01=3 if pc35_01==2
replace iqcode11_01=pc36_01 if inlist(pc36_01,1,2)
replace iqcode11_01=4 if pc37_01==2
replace iqcode11_01=5 if pc37_01==1

* Making decision on everyname_day matters
gen iqcode12_01=.
replace iqcode12_01=.r if pc38_01==8 | pc39_01==8 | pc40_01==8
replace iqcode12_01=.d if pc38_01==9 | pc39_01==9 | pc40_01==9
replace iqcode12_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode12_01=3 if pc38_01==2
replace iqcode12_01=pc39_01 if inlist(pc39_01,1,2)
```

```
replace iqcode12_01=4 if pc40_01==2
replace iqcode12_01=5 if pc40_01==1

* Handling money for shopping
gen iqcode13_01=.
replace iqcode13_01=.r if pc41_01==8 | pc42_01==8 | pc43_01==8
replace iqcode13_01=.d if pc41_01==9 | pc42_01==9 | pc43_01==9
replace iqcode13_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode13_01=3 if pc41_01==2
replace iqcode13_01=pc42_01 if inlist(pc42_01,1,2)
replace iqcode13_01=4 if pc43_01==2
replace iqcode13_01=5 if pc43_01==1

* Handling financial matters
gen iqcode14_01=.
replace iqcode14_01=.r if pc44_01==8 | pc45_01==8 | pc46_01==8
replace iqcode14_01=.d if pc44_01==9 | pc45_01==9 | pc46_01==9
replace iqcode14_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode14_01=3 if pc44_01==2
replace iqcode14_01=pc45_01 if inlist(pc45_01,1,2)
replace iqcode14_01=4 if pc46_01==2
replace iqcode14_01=5 if pc46_01==1

* Handling other everyname_day arithmetic problems
gen iqcode15_01=.
replace iqcode15_01=.r if pc47_01==8 | pc48_01==8 | pc49_01==8
replace iqcode15_01=.d if pc47_01==9 | pc48_01==9 | pc49_01==9
replace iqcode15_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode15_01=3 if pc47_01==2
replace iqcode15_01=pc48_01 if inlist(pc48_01,1,2)
replace iqcode15_01=4 if pc49_01==2
replace iqcode15_01=5 if pc49_01==1

* Using his/her intelligence to understand what's going on and to
reason things through
gen iqcode16_01=.
replace iqcode16_01=.r if pc50_01==8 | pc51_01==8 | pc52_01==8
replace iqcode16_01=.d if pc50_01==9 | pc51_01==9 | pc52_01==9
replace iqcode16_01=.i if inlist(tipent_01,21,22) & pc1_01==.
replace iqcode16_01=3 if pc50_01==2
replace iqcode16_01=pc51_01 if inlist(pc51_01,1,2)
replace iqcode16_01=4 if pc52_01==2
replace iqcode16_01=5 if pc52_01==1


***  TOTAL IQCODE SCORE (score 1-5) ***
```

```
egen iqcode= rowmean(iqcode1_01 iqcode2_01 iqcode3_01 iqcode4_01
iqcode5_01 iqcode6_01 iqcode7_01 iqcode8_01 iqcode9_01 iqcode10_01
iqcode11_01 iqcode12_01 iqcode13_01 iqcode14_01 iqcode15_01
iqcode16_01) if inlist(tipent_01,21,22)

gen iqcode_01= round(iqcode,0.1)
replace iqcode_01 = .d if [iqcode1_01==.d | iqcode2_01==.d |
iqcode3_01==.d | iqcode4_01==.d | iqcode5_01==.d | iqcode6_01==.d |
iqcode7_01==.d | iqcode8_01==.d | iqcode9_01==.d | iqcode10_01==.d |
iqcode11_01==.d | iqcode12_01==.d | iqcode13_01==.d | iqcode14_01==.d
| iqcode15_01==.d | iqcode16_01==.d]
replace iqcode_01 = .r if [iqcode1_01==.r | iqcode2_01==.r |
iqcode3_01==.r | iqcode4_01==.r | iqcode5_01==.r | iqcode6_01==.r |
iqcode7_01==.r | iqcode8_01==.r | iqcode9_01==.r | iqcode10_01==.r |
iqcode11_01==.r | iqcode12_01==.r | iqcode13_01==.r | iqcode14_01==.r
| iqcode15_01==.r | iqcode16_01==.r]
replace iqcode_01 = .c if inlist(tipent_01,11,12)
replace iqcode_01 = .i if inlist(tipent_01,21,22) & pc1_01==.
label variable iqcode_01 "MHAS 2001 IQCODE Score (1-5)"


*** COGNITIVE IMPAIRMENT - IQCODE (only proxy interviews) ***
gen cog_imp_iqcode_01 = .
replace cog_imp_iqcode_01=0 if inrange(iqcode_01,1,3.4)
replace cog_imp_iqcode_01=1 if inrange(iqcode_01,3.4,5)
replace cog_imp_iqcode_01 = .d if iqcode_01==.d
replace cog_imp_iqcode_01 = .r if iqcode_01==.r
replace cog_imp_iqcode_01 = .c if inlist(tipent_01,11,12)
replace cog_imp_iqcode_01 = .i if inlist(tipent_01,21,22) & pc1_01==.
label variable cog_imp_iqcode_01 "MHAS 2001 IQ CODE Cognitive
Impairment - Normal, Impaired"
label define imp_iqcode 0 "Normal" 1 "Impaired", replace
label values cog_imp_iqcode_01 imp_iqcode

drop iqcode iqcode*_01
```

2003

```
*************************************************************
**** MHAS 2003 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*************************************************************

label data "Version 3. December 2021"

**** CREATING VARIABLES BY TASK AND DOMAIN ****

* NOTE: Special missing values were assigned as follows:
* .p indicates proxy interview, .d don't know, .e error, .s skip, .r
refusal, and .l physical limitation or visual limitation,


*** VERBAL LEARNING (score 0-8) ***
egen iwr_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) if [inrange(e9_a1_9_03,0,8) |
inrange(e9_a2_9_03,0,8) | inrange(e9_a3_9_03,0,8) |
inrange(e9_b1_9_03,0,8) | inrange(e9_b2_9_03,0,8) |
inrange(e9_b3_9_03,0,8)]  & inlist(tipent_03,11,12)
replace iwr_03 = .s if e1_03==2
replace iwr_03 = .r if e8_03==8
replace iwr_03 = .p if inlist(tipent_03,21,22)
replace iwr_03 = .i if inlist(tipent_03,11,12) & [e9_a1_9_03==. &
e9_b1_9_03==.] & iwr_03==.
label variable iwr_03 "MHAS 2003 Verbal Learning (0-8)"


*** DELAYED VERBAL RECALL (score 0-8) ***
egen dwr_03=rowtotal (e12a_9_03 e12b_9_03)  if
inlist(tipent_03,11,12)
replace dwr_03 = 0 if e12a_9_03 == 9 | e12b_9_03 ==9
replace dwr_03 = .s if e1_03==2
replace dwr_03 = .r if e8_03==8
replace dwr_03 = .p if inlist(tipent_03,21,22)
replace dwr_03 = .i if inlist(tipent_03,11,12) & [e12a_9_03==. &
e12b_9_03==.] & dwr_03==.
label variable dwr_03 "MHAS 2003 Delayed Verbal Recall (0-8)"


*** CONSTRUCTIONAL PRAXIS RECALL (score 0-2) ***
gen construction_m_03 = e11_03 if inrange(e11_03,0,2)
replace construction_m_03 = .s if e1_03==2 | e3_03 == 2 | e4_03 == 8
| inlist(e5_03,1,2,3)
replace construction_m_03 = .l if e11_03==88
replace construction_m_03 = .r if e11_03 == 80
```

```
replace construction_m_03 = .p if inlist(tipent_03,21,22)
replace construction_m_03 = .i if inlist(tipent_03,11,12) &
e6_e7_03==. & construction_m_03==.
label variable construction_m_03 "MHAS 2003 Constructional Praxis
Recall (0-6)"


*** ORIENTATION ***
*** Day (score 0-1) ***
gen name_day_03=.
replace name_day_03 = .s if e1_03==2
replace name_day_03 = .r if e13a_03 == 8
replace name_day_03 = .d if e13a_03 == 9
replace name_day_03 = .p if inlist(tipent_03,21,22)
replace name_day_03 = 1 if e13a_03 == 1
replace name_day_03 = 0 if e13a_03 == 2

*** Month (score 0-1) ***
gen name_month_03=.
replace name_month_03 = .s if e1_03==2
replace name_month_03 = .r if e13b_03 == 8
replace name_month_03 = .d if e13b_03 == 9
replace name_month_03 = .p if inlist(tipent_03,21,22)
replace name_month_03 = 1 if e13b_03 == 1
replace name_month_03 = 0 if e13b_03 == 2

*** Year (score 0-1) ***
gen name_year_03=.
replace name_year_03 = .s if e1_03==2
replace name_year_03 = .r if e13c_03 == 8
replace name_year_03 = .d if e13c_03 == 9
replace name_year_03 = .p if inlist(tipent_03,21,22)
replace name_year_03 = 1 if e13c_03 == 1
replace name_year_03 = 0 if e13c_03 == 2

*** Orientation (score 0-3)
egen orientation_03= rowtotal(name_day_03 name_month_03 name_year_03)
if [inlist(name_day_03,0,1) | inlist(name_month_03,0,1) |
inlist(name_year_03,0,1)] & inlist(tipent_03,11,12)
replace orientation_03 = .s if e1_03==2
replace orientation_03 = .r if e13a_03 == 8 | e13b_03 == 8 | e13c_03
== 8
replace orientation_03 = .d if e13a_03 == 9 & e13b_03 == 9 & e13c_03
== 9
replace orientation_03 = .p if inlist(tipent_03,21,22)
replace orientation_03 = .i if inlist(tipent_03,11,12) & e13a_03==. &
orientation_03==.
```

```
label variable orientation_03 "MHAS 2003 Orientation (0-3)"

drop name_day_03 name_month_03 name_year_03


*** VISUAL SCANNING (score 0-60) ***
gen visual_scan_03=e10_03 if inrange(e10_03, 0,60)
replace visual_scan_03 = .s if e1_03==2 | [(e3_03 == 2 | e4_03 == 8 |
inlist(e5_03,1,2,3)) & e10_03==.]
replace visual_scan_03 = .e if e10_03 == 77
replace visual_scan_03 = .l if e10_03 == 80
replace visual_scan_03 = .r if e10_03 == 88
replace visual_scan_03 = .p if inlist(tipent_03,21,22)
replace visual_scan_03 = .i if inlist(tipent_03,11,12) & e10_03==. &
visual_scan_03==.
label variable visual_scan_03 "MHAS 2003 Visual Scanning (0-60)"


*** CONSTRUCTIONAL PRAXIS (score 0-2) ***
gen construction_03= e6_e7_03 if inrange(e6_e7_03,0,2)
replace construction_03 = .s if e1_03==2 | e3_03 == 2 | e4_03 == 8 |
inlist(e5_03,0,1,2,3)
replace construction_03 = .l if e6_e7_03==88
replace construction_03 = .r if e6_e7_03==80
replace construction_03 = .p if inlist(tipent_03,21,22)
replace construction_03 = .i if inlist(tipent_03,11,12) & e6_e7_03==.
& construction_03==.
label variable construction_03 "MHAS 2003 Constructional Praxis (0-
2)"


*** NUMBER of Tasks missing (out of 6 tasks) ***
egen ccce_miss_03=rowmiss(iwr_03 dwr_03 orientation_03 visual_scan_03
construction_03 construction_m_03) if inlist(tipent_03,11,12)
replace ccce_miss_03=.p if inlist(tipent_03,21,22)
label variable ccce_miss_03 "MHAS 2003 Number of CCCE Tasks missing
(0-6)"

*** TOTAL MHAS 2003 CCCE SCORE (score 0-83) ***
egen ccce_03 = rowtotal(iwr_03 dwr_03 orientation_03 visual_scan_03
construction_03 construction_m_03) if !mi(iwr_03) & !mi(dwr_03) &
!mi(visual_scan_03) & !mi(construction_03) & !mi(construction_m_03) &
!mi(orientation_03)
replace ccce_03 = .i if [iwr_03==.i | dwr_03==.i | orientation_03==.i
| visual_scan_03==.i | construction_03==.i | construction_m_03==.i]
replace ccce_03 = .e if [iwr_03==.e | dwr_03==.e | orientation_03==.e
| visual_scan_03==.e | construction_03==.e | construction_m_03==.e]
```

```
replace ccce_03 = .d if [iwr_03==.d | dwr_03==.d | orientation_03==.d
| visual_scan_03==.d | construction_03==.d | construction_m_03==.d]
replace ccce_03 = .r if [iwr_03==.r | dwr_03==.r | orientation_03==.r
| visual_scan_03==.r | construction_03==.r | construction_m_03==.r]
replace ccce_03 = .p if inlist(tipent_03,21,22)
replace ccce_03 = .s if e1_03==2 | e3_03 == 2 | e4_03 == 8 |
inlist(e5_03,1,2,3)
replace ccce_03 = .l if e6_e7_03==88 | e10_03 == 80 | e11_03==88
label variable ccce_03 "MHAS 2003 CCCE Score (0-83)"


*** NUMBER of Tasks missing (out of 5 tasks) ***
egen ccce_miss_v01_03=rowmiss(iwr_03 dwr_03 visual_scan_03
construction_03 construction_m_03) if inlist(tipent_03,11,12)
replace ccce_miss_v01_03=.p if inlist(tipent_03,21,22)
label variable ccce_miss_v01_03 "MHAS 2003 Number of CCCE Tasks
missing - Comparable to 2001 (0-5)"

*** TOTAL MHAS 2003 CCCE SCORE (score 0-80) - With only the 5 items
included since 2001***
egen ccce_v01_03 = rowtotal(iwr_03 dwr_03 visual_scan_03
construction_03 construction_m_03) if !mi(iwr_03) & !mi(dwr_03) &
!mi(visual_scan_03)  & !mi(construction_03) & !mi(construction_m_03)
replace ccce_v01_03 = .i if [iwr_03==.i | dwr_03==.i |
visual_scan_03==.i | construction_03==.i | construction_m_03==.i]
replace ccce_v01_03 = .e if [iwr_03==.e | dwr_03==.e |
visual_scan_03==.e | construction_03==.e | construction_m_03==.e]
replace ccce_v01_03 = .d if [iwr_03==.d | dwr_03==.d |
visual_scan_03==.d | construction_03==.d | construction_m_03==.d]
replace ccce_v01_03 = .r if [iwr_03==.r | dwr_03==.r |
visual_scan_03==.r | construction_03==.r | construction_m_03==.r]
replace ccce_v01_03 = .p if inlist(tipent_03,21,22)
replace ccce_v01_03 = .s if e1_03==2 | e3_03 == 2 | e4_03 == 8 |
inlist(e5_03,1,2,3)
replace ccce_v01_03 = .l if e6_e7_03==88 | e10_03 == 80 | e11_03==88
label variable ccce_v01_03 "MHAS 2003 CCCE Score - Comparable to 2001
(0-80)"

*********************************************************
******* MHAS 2003 IQCODE SHORT -Jorm (SECTION PC) ********
*********************************************************

* Remembering things about family & friends
gen iqcode1_03=.
replace iqcode1_03=.r if pc5_03==8 | pc6_03==8 | pc7_03==8
replace iqcode1_03=.d if pc5_03==9 | pc6_03==9 | pc7_03==9
replace iqcode1_03=3 if pc5_03==2
```

```
replace iqcode1_03=pc6_03 if inlist(pc6_03,1,2)
replace iqcode1_03=4 if pc7_03==2
replace iqcode1_03=5 if pc7_03==1

* Remembering things that happened recently
gen iqcode2_03=.
replace iqcode2_03=.r if pc8_03==8 | pc9_03==8 | pc10_03==8
replace iqcode2_03=.d if pc8_03==9 | pc9_03==9 | pc10_03==9
replace iqcode2_03=3 if pc8_03==2
replace iqcode2_03=pc9_03 if inlist(pc9_03,1,2)
replace iqcode2_03=4 if pc10_03==2
replace iqcode2_03=5 if pc10_03==1

* Recalling conversations a few name_days later
gen iqcode3_03=.
replace iqcode3_03=.r if pc11_03==8 | pc12_03==8 | pc13_03==8
replace iqcode3_03=.d if pc11_03==9 | pc12_03==9 | pc13_03==9
replace iqcode3_03=3 if pc11_03==2
replace iqcode3_03=pc12_03 if inlist(pc12_03,1,2)
replace iqcode3_03=4 if pc13_03==2
replace iqcode3_03=5 if pc13_03==1

* Remembering his/her address & phone number
gen iqcode4_03=.
replace iqcode4_03=.r if pc14_03==8 | pc15_03==8 | pc16_03==8
replace iqcode4_03=.d if pc14_03==9 | pc15_03==9 | pc16_03==9
replace iqcode4_03=3 if pc14_03==2
replace iqcode4_03=pc15_03 if inlist(pc15_03,1,2)
replace iqcode4_03=4 if pc16_03==2
replace iqcode4_03=5 if pc16_03==1

* Remembering what name_day and name_month it is
gen iqcode5_03=.
replace iqcode5_03=.r if pc17_03==8 | pc18_03==8 | pc19_03==8
replace iqcode5_03=.d if pc17_03==9 | pc18_03==9 | pc19_03==9
replace iqcode5_03=3 if pc17_03==2
replace iqcode5_03=pc18_03 if inlist(pc18_03,1,2)
replace iqcode5_03=4 if pc19_03==2
replace iqcode5_03=5 if pc19_03==1

* Remembering where things are usually kept
gen iqcode6_03=.
replace iqcode6_03=.r if pc20_03==8 | pc21_03==8 | pc22_03==8
replace iqcode6_03=.d if pc20_03==9 | pc21_03==9 | pc22_03==9
replace iqcode6_03=3 if pc20_03==2
replace iqcode6_03=pc21_03 if inlist(pc21_03,1,2)
replace iqcode6_03=4 if pc22_03==2
```

```
replace iqcode6_03=5 if pc22_03==1

* Remembering where to find things which have been put in a different
place from usual
gen iqcode7_03=.
replace iqcode7_03=.r if pc23_03==8 | pc24_03==8 | pc25_03==8
replace iqcode7_03=.d if pc23_03==9 | pc24_03==9 | pc25_03==9
replace iqcode7_03=3 if pc23_03==2
replace iqcode7_03=pc24_03 if inlist(pc24_03,1,2)
replace iqcode7_03=4 if pc25_03==2
replace iqcode7_03=5 if pc25_03==1

* Knowing how to work familiar machines around the house
gen iqcode8_03=.
replace iqcode8_03=.r if pc26_03==8 | pc27_03==8 | pc28_03==8
replace iqcode8_03=.d if pc26_03==9 | pc27_03==9 | pc28_03==9
replace iqcode8_03=3 if pc26_03==2
replace iqcode8_03=pc27_03 if inlist(pc27_03,1,2)
replace iqcode8_03=4 if pc28_03==2
replace iqcode8_03=5 if pc28_03==1

* Learning to use a new gadget or machine around the house
gen iqcode9_03=.
replace iqcode9_03=.r if pc29_03==8 | pc31_03==8 | pc31_03==8
replace iqcode9_03=.d if pc29_03==9 | pc31_03==9 | pc31_03==9
replace iqcode9_03=3 if pc29_03==2
replace iqcode9_03=pc31_03 if inlist(pc31_03,1,2)
replace iqcode9_03=4 if pc31_03==2
replace iqcode9_03=5 if pc31_03==1

* Learning new things in general
gen iqcode10_03=.
replace iqcode10_03=.r if pc32_03==8 | pc33_03==8 | pc34_03==8
replace iqcode10_03=.d if pc32_03==9 | pc33_03==9 | pc34_03==9
replace iqcode10_03=3 if pc32_03==2
replace iqcode10_03=pc33_03 if inlist(pc33_03,1,2)
replace iqcode10_03=4 if pc34_03==2
replace iqcode10_03=5 if pc34_03==1

* Following a story in a book or TV
gen iqcode11_03=.
replace iqcode11_03=.r if pc35_03==8 | pc36_03==8 | pc37_03==8
replace iqcode11_03=.d if pc35_03==9 | pc36_03==9 | pc37_03==9
replace iqcode11_03=3 if pc35_03==2
replace iqcode11_03=pc36_03 if inlist(pc36_03,1,2)
replace iqcode11_03=4 if pc37_03==2
replace iqcode11_03=5 if pc37_03==1
```

```
* Making decision on everyname_day matters
gen iqcode12_03=.
replace iqcode12_03=.r if pc38_03==8 | pc39_03==8 | pc40_03==8
replace iqcode12_03=.d if pc38_03==9 | pc39_03==9 | pc40_03==9
replace iqcode12_03=3 if pc38_03==2
replace iqcode12_03=pc39_03 if inlist(pc39_03,1,2)
replace iqcode12_03=4 if pc40_03==2
replace iqcode12_03=5 if pc40_03==1

* Handling money for shopping
gen iqcode13_03=.
replace iqcode13_03=.r if pc41_03==8 | pc42_03==8 | pc43_03==8
replace iqcode13_03=.d if pc41_03==9 | pc42_03==9 | pc43_03==9
replace iqcode13_03=3 if pc41_03==2
replace iqcode13_03=pc42_03 if inlist(pc42_03,1,2)
replace iqcode13_03=4 if pc43_03==2
replace iqcode13_03=5 if pc43_03==1

* Handling financial matters
gen iqcode14_03=.
replace iqcode14_03=.r if pc44_03==8 | pc45_03==8 | pc46_03==8
replace iqcode14_03=.d if pc44_03==9 | pc45_03==9 | pc46_03==9
replace iqcode14_03=3 if pc44_03==2
replace iqcode14_03=pc45_03 if inlist(pc45_03,1,2)
replace iqcode14_03=4 if pc46_03==2
replace iqcode14_03=5 if pc46_03==1

* Handling other everyname_day arithmetic problems
gen iqcode15_03=.
replace iqcode15_03=.r if pc47_03==8 | pc48_03==8 | pc49_03==8
replace iqcode15_03=.d if pc47_03==9 | pc48_03==9 | pc49_03==9
replace iqcode15_03=3 if pc47_03==2
replace iqcode15_03=pc48_03 if inlist(pc48_03,1,2)
replace iqcode15_03=4 if pc49_03==2
replace iqcode15_03=5 if pc49_03==1

* Using his/her intelligence to understand what's going on and to
reason things through
gen iqcode16_03=.
replace iqcode16_03=.r if pc50_03==8 | pc51_03==8 | pc52_03==8
replace iqcode16_03=.d if pc50_03==9 | pc51_03==9 | pc52_03==9
replace iqcode16_03=3 if pc50_03==2
replace iqcode16_03=pc51_03 if inlist(pc51_03,1,2)
replace iqcode16_03=4 if pc52_03==2
replace iqcode16_03=5 if pc52_03==1
```

```
***  TOTAL IQCODE SCORE (score 1-5) ***
egen iqcode= rowmean(iqcode1_03 iqcode2_03 iqcode3_03 iqcode4_03
iqcode5_03 iqcode6_03 iqcode7_03 iqcode8_03 iqcode9_03 iqcode10_03
iqcode11_03 iqcode12_03 iqcode13_03 iqcode14_03 iqcode15_03
iqcode16_03) if inlist(tipent_03,21,22)

gen iqcode_03= round(iqcode,0.1)
replace iqcode_03 = .d if [iqcode1_03==.d | iqcode2_03==.d |
iqcode3_03==.d | iqcode4_03==.d | iqcode5_03==.d | iqcode6_03==.d |
iqcode7_03==.d | iqcode8_03==.d | iqcode9_03==.d | iqcode10_03==.d |
iqcode11_03==.d | iqcode12_03==.d | iqcode13_03==.d | iqcode14_03==.d
| iqcode15_03==.d | iqcode16_03==.d]
replace iqcode_03 = .r if [iqcode1_03==.r | iqcode2_03==.r |
iqcode3_03==.r | iqcode4_03==.r | iqcode5_03==.r | iqcode6_03==.r |
iqcode7_03==.r | iqcode8_03==.r | iqcode9_03==.r | iqcode10_03==.r |
iqcode11_03==.r | iqcode12_03==.r | iqcode13_03==.r | iqcode14_03==.r
| iqcode15_03==.r | iqcode16_03==.r]
replace iqcode_03 = .c if inlist(tipent_03,11,12)
label variable iqcode_03 "MHAS 2003 IQCODE Score (1-5)"


*** COGNITIVE IMPAIRMENT - IQCODE (only proxy interviews) ***
gen cog_imp_iqcode_03 = .
replace cog_imp_iqcode_03=0 if inrange(iqcode_03,1,3.4)
replace cog_imp_iqcode_03=1 if inrange(iqcode_03,3.4,5)
replace cog_imp_iqcode_03 = .d if iqcode_03==.d
replace cog_imp_iqcode_03 = .r if iqcode_03==.r
replace cog_imp_iqcode_03 = .c if inlist(tipent_03,11,12)
replace cog_imp_iqcode_03 = .i if inlist(tipent_03,21,22) & pc1_03==.
label variable cog_imp_iqcode_03 "MHAS 2003 IQ CODE Cognitive
Impairment - Normal, Impaired"
label define imp_iqcode 0 "Normal" 1 "Impaired", replace
label values cog_imp_iqcode_03 imp_iqcode

drop iqcode iqcode*_03
```

2012

```
*************************************************************
**** MHAS 2012 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*************************************************************

label data "Version 2. December 2021"

**** CREATING VARIABLES BY TASK AND DOMAIN ****

* NOTE: Special missing values were assigned as follows:
* .p indicates proxy interview, .d don't know, .s skip, .r refusal,
and .l physical limitation or visual limitation,


*** VERBAL LEARNING (score 0-8) ***
recode e7a_1_12 e7a_2_12 e7a_3_12 e7b_1_12 e7b_2_12 e7b_3_12 (9=0)
egen iwr_12=rowmean (e7a_1_12 e7a_2_12 e7a_3_12 e7b_1_12 e7b_2_12
e7b_3_12) if [inrange(e7a_1_12,0,8) | inrange(e7a_2_12,0,8) |
inrange(e7a_3_12,0,8) | inrange(e7b_1_12,0,8) | inrange(e7b_2_12,0,8)
| inrange(e7b_3_12,0,8)]  & inlist(tipent_12,1,2)
replace iwr_12 = .r if [resul_ec_12 == 3 | e6_12 == 8 ] | [e7a_1_12
== . & e7a_2_12 == . & e7a_3_12 == . & e6_12==1] | [e7b_1_12 == . &
e7b_2_12 == . & e7b_3_12 == . & e6_12==2]
replace iwr_12 = .i if resul_ec_12 == 2 & e6_12 ==.
replace iwr_12 = .p if inlist(tipent_12,3,4)
label variable iwr_12 "MHAS 2012 Verbal Learning (0-8)"


*** DELAYED VERBAL RECALL (score 0-8) ***
egen dwr_12=rowtotal (e14a_12 e14b_12) if inlist(tipent_12,1,2)
replace dwr_12 = 0 if e14a_12 == 9 | e14b_12 ==9
replace dwr_12 = .r if [resul_ec_12 == 3 | e6_12 == 8 ] | [e14a_12 ==
. & e6_12==1] | [e14b_12 == . & e6_12==2]
replace dwr_12 = .i if resul_ec_12 == 2 & e6_12 ==.
replace dwr_12 = .p if inlist(tipent_12,3,4)
label variable dwr_12 "MHAS 2012 Delayed Verbal Recall (0-8)"


*** CONSTRUCTIONAL PRAXIS RECALL ***
*** Delayed recall/copy of figure (score 0-6) ***
gen construction_m_12= e13_12 if inrange(e13_12,0,6)
replace construction_m_12 = .i if resul_ec_12== 2 & e13_12==.
replace construction_m_12 = .s if e3a_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace construction_m_12 = .r if resul_ec_12 == 3
replace construction_m_12 = .r if e13_12 == 8
```

```
replace construction_m_12 = .d if e13_12 == 9
replace construction_m_12 = .p if inlist(tipent_12,3,4)
label variable construction_m_12 "MHAS 2012 Constructional Praxis
Recall (0-6)"

*** Delayed recall/copy of figure comparable to 2012 & 2003 (score 0-
2) ***
gen construction_m_v01_12= 0 if inrange(e13_12,0,2)
replace construction_m_v01_12= 1 if inrange(e13_12,3,4)
replace construction_m_v01_12= 2 if inrange(e13_12,5,6)
replace construction_m_v01_12 = .i if resul_ec_12== 2 & e13_12==.
replace construction_m_v01_12 = .s if e3a_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace construction_m_v01_12 = .r if resul_ec_12 == 3
replace construction_m_v01_12 = .r if e13_12 == 8
replace construction_m_v01_12 = .d if e13_12 == 9
replace construction_m_v01_12 = .p if inlist(tipent_12,3,4)
label variable construction_m_v01_12 "MHAS 2012 Constructional Praxis
Recall v2001-2003 (0-2)"


*** VISUAL SCANNING (score 0-60) ***
gen visual_scan_12=.
replace visual_scan_12 = .i if resul_ec_12== 2 & e10_12==.
replace visual_scan_12 = .s if e3a_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace visual_scan_12 = .l if e10_12 == 80
replace visual_scan_12 = .r if resul_ec_12 == 3 | e10_12 == 88
replace visual_scan_12 = .d if e10_12 == 99
replace visual_scan_12 = .p if inlist(tipent_12,3,4)
replace visual_scan_12 = e10_12 if inrange(e10_12, 0,60)
label variable visual_scan_12 "MHAS 2012 Visual Scanning (0-60)"


*** BACKWARDS COUNTING (score 0-4) ***
** Correct/Incorrect variable. Where 2 points are assigned if the
subject completed correctly the task in the first trial
// and 1 point if the suject completed correclty the task in the
second trial
gen bwc_c_12=.
replace bwc_c_12=0 if e12a_12==2 | e12b_12==2
replace bwc_c_12=0 if [e12a_12==1 | e12b_12==1] &
inlist(e12c_12,0,1,2,61)
replace bwc_c_12=1 if e12b_12==1 & inrange(e12c_12,3,60)
replace bwc_c_12=2 if e12a_12==1 & inrange(e12c_12,3,60)
replace bwc_c_12 = .i if resul_ec_12==2 & [e12a_12==. | e12b_12==.]
replace bwc_c_12 = .r if resul_ec_12==3 | [e12b_12==8]
```

```
replace bwc_c_12 = .d if e12b_12==9 | e12c_12==99
replace bwc_c_12 = .p if inlist(tipent_12,3,4)
label variable bwc_c_12 "MHAS 2012 Backwards Counting
(Correct/Incorrect)"

** Time variable (0-60 sec): we recoded 61 "More than 60 seconds" and
99 "Not specified" as a missing
** Only for those respondents with "correct" answers
gen bwc_time_12=e12c_12 if inlist(bwc_c_12,1,2) &
inrange(e12c_12,3,60)
recode bwc_time_12 (61/99=.)
replace bwc_time_12 = .i if resul_ec_12== 2 & e12c_12==.
replace bwc_time_12 = .n if bwc_c_12==0
replace bwc_time_12 = .r if resul_ec_12==3 | [e12b_12==8]
replace bwc_time_12 = .d if e12b_12==9 | e12c_12==99
replace bwc_time_12 = .p if inlist(tipent_12,3,4)
label variable bwc_time_12 "MHAS 2012 Backwards Counting Time (3-60)"

** Categorical variable (using S. Mejia 2015 SPM) - ONLY TO CONSTRUCT
THE CCCE SCORE
gen bwc_12=.
replace bwc_12=0 if bwc_c_12==0
replace bwc_12=1 if inrange(bwc_time_12,31,60)
replace bwc_12=2 if inrange(bwc_time_12,21,30)
replace bwc_12=3 if inrange(bwc_time_12,11,20)
replace bwc_12=4 if inrange(bwc_time_12,3,10)
replace bwc_12 = .i if resul_ec_12== 2 & bwc_12==.
replace bwc_12 = .p if inlist(tipent_12,3,4)
replace bwc_12 = .r if resul_ec_12==3 | [e12b_12==8]
replace bwc_12 = .d if e12b_12==9  | e12c_12==99
label variable bwc_12 "MHAS 2012 Backwards Counting Cat. (0-4)"


*** ORIENTATION ***
*** Day of the month (score 0-1) ***
gen name_day_12=.
replace name_day_12 = .i if resul_ec_12 == 2 & e11a_12==.
replace name_day_12 = .r if resul_ec_12 == 3 | e11a_12 == 8
replace name_day_12 = .d if e11a_12 == 9
replace name_day_12 = .p if inlist(tipent_12,3,4)
replace name_day_12 = 1 if e11a_12 == 1
replace name_day_12 = 0 if e11a_12 == 2
replace name_day_12 = .i if resul_ec_12== 2 & name_day_12==.

*** Month (score 0-1) ***
gen name_month_12=.
replace name_month_12 = .i if resul_ec_12 == 2 & e11b_12==.
```

```
replace name_month_12 = .r if resul_ec_12 == 3 | e11b_12 == 8
replace name_month_12 = .d if e11b_12 == 9
replace name_month_12 = .p if inlist(tipent_12,3,4)
replace name_month_12 = 1 if e11b_12 == 1
replace name_month_12 = 0 if e11b_12 == 2
replace name_month_12 = .i if resul_ec_12== 2 & name_month_12==.

*** Year (score 0-1) ***
gen name_year_12=.
replace name_year_12 = .i if resul_ec_12 == 2 & e11c_12==.
replace name_year_12 = .r if resul_ec_12 == 3 | e11c_12 == 8
replace name_year_12 = .d if e11c_12 == 9
replace name_year_12 = .p if inlist(tipent_12,3,4)
replace name_year_12 = 1 if e11c_12 == 1
replace name_year_12 = 0 if e11c_12 == 2
replace name_year_12 = .i if resul_ec_12== 2 & name_month_12==.

*** Orientation (score 0-3)
egen orientation_12= rowtotal(name_day_12 name_month_12 name_year_12)
if inlist(tipent_12,1,2)
replace orientation_12 = .r if resul_ec_12 == 3 | e11a_12 == 8 |
e11b_12 == 8 | e11c_12 == 8
replace orientation_12 = .d if e11a_12 == 9 & e11b_12 == 9 & e11c_12
== 9
replace orientation_12 = .p if inlist(tipent_12,3,4)
replace orientation_12 = .i if resul_ec_12== 2 & [e11a_12==. &
e11b_12==. & e11c_12==.]
label variable orientation_12 "MHAS 2012 Orientation (0-3)"

drop name_day_12 name_month_12 name_year_12


*** VERBAL FLUENCY ***
** Number of repeated animals (score 0~50)
gen verbal_fluency_rep_12= e9b_12 if inrange(e9b_12,0,60)
replace verbal_fluency_rep_12 = .r if resul_ec_12 == 3 | e9b_12==99
replace verbal_fluency_rep_12 = .d if e9a_12 == 88 | e9b_12 == 88
replace verbal_fluency_rep_12 = .p if inlist(tipent_12,3,4)
replace verbal_fluency_rep_12 = .i if resul_ec_12== 2 &
verbal_fluency_rep_12==.
label variable verbal_fluency_rep_12 "MHAS 2012 Verbal Fluency:
number of repetitions (0-50)"

** Number of different animals (88 "No response" recorded as a
missing) (score 0~50)
gen verbal_fluency_num_12=e9a_12
replace verbal_fluency_num_12 = .r if resul_ec_12 == 3 | e9a_12==99
```

```
replace verbal_fluency_num_12 = .d if e9a_12 == 88
replace verbal_fluency_num_12 = .p if inlist(tipent_12,3,4)
replace verbal_fluency_num_12 = .i if resul_ec_12== 2 &
verbal_fluency_num_12==.
label variable verbal_fluency_num_12 "MHAS 2012 Verbal Fluency:
number of animals (0-50)"

** Categorical variable (using S. Mejia 2014, Salud Publica de
Mexico) (score 0-4)
gen verbal_fluency_12=.
replace verbal_fluency_12=1 if inrange(verbal_fluency_num_12,0,8)
replace verbal_fluency_12=2 if inrange(verbal_fluency_num_12,9,18)
replace verbal_fluency_12=3 if inrange(verbal_fluency_num_12,19,24)
replace verbal_fluency_12=4 if inrange(verbal_fluency_num_12,25,66)
replace verbal_fluency_12=.r if resul_ec_12 == 3 | e9a_12 == 88
replace verbal_fluency_12=.p if inlist(tipent_12,3,4)
replace verbal_fluency_12=.i if resul_ec_12== 2 &
verbal_fluency_12==.
label variable verbal_fluency_12 "MHAS 2012 Verbal Fluency Cat. (0-
4)"


*** CONSTRUCTIONAL PRAXIS ***
*** Copy one figure (score 0-4) ***
gen construction_12= e8_12 if inrange(e8_12,0,6)
replace construction_12 = .s if e3a_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace construction_12 = .r if resul_ec_12 == 3
replace construction_12 = .r if e8_12 == 8
replace construction_12 = .d if e8_12 == 9
replace construction_12 = .p if inlist(tipent_12,3,4)
replace construction_12 = .i if resul_ec_12== 2 & construction_12==.
label variable construction_12 "MHAS 2012 Constructional Praxis (0-
6)"

*** Copy one figure comparable to 2012 & 2003 (score 0-2) ***
gen construction_v01_12= 0 if inrange(e8_12,0,2)
replace construction_v01_12= 1 if inrange(e8_12,3,4)
replace construction_v01_12= 2 if inrange(e8_12,5,6)
replace construction_v01_12 = .s if e3a_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace construction_v01_12 = .r if resul_ec_12 == 3
replace construction_v01_12 = .r if e8_12 == 8
replace construction_v01_12 = .d if e8_12 == 9
replace construction_v01_12 = .p if inlist(tipent_12,3,4)
replace construction_v01_12 = .i if resul_ec_12== 2 &
construction_v01_12==.
```

```
label variable construction_v01_12 "MHAS 2012 Constructional Praxis
v2001-2003 (0-2)"


*** NUMBER of Tasks missing (out of 8 tasks) ***
egen ccce_miss_12=rowmiss(iwr_12 dwr_12 visual_scan_12 bwc_12
orientation_12 verbal_fluency_12 construction_12 construction_m_12)
if inlist(tipent_12,1,2)
replace ccce_miss_12=.p if inlist(tipent_12,3,4)
label variable ccce_miss_12 "MHAS 2012 Number of CCCE Tasks missing
(0-8)"

*** TOTAL MHAS 2012 CCCE SCORE (score 0-99) - Including all 2012
Items ***
egen ccce_12 = rowtotal(iwr_12 dwr_12 visual_scan_12 bwc_12
orientation_12 verbal_fluency_12 construction_12 construction_m_12)
if !mi(iwr_12) & !mi(dwr_12) & !mi(visual_scan_12) & !mi(bwc_12) &
!mi(orientation_12) & !mi(verbal_fluency_12) & !mi(construction_12) &
!mi(construction_m_12)
replace ccce_12 = .d if [iwr_12==.d | dwr_12==.d | visual_scan_12==.d
| bwc_12==.d | orientation_12==.d | verbal_fluency_12==.d |
construction_12==.d | construction_m_12==.d]
replace ccce_12 = .r if [iwr_12==.r | dwr_12==.r | visual_scan_12==.r
| bwc_12==.r | orientation_12==.r | verbal_fluency_12==.r |
construction_12==.r | construction_m_12==.r]
replace ccce_12 = .p if inlist(tipent_12,3,4)
replace ccce_12 = .r if inlist(resul_ec_12,2,3)
replace ccce_12 = .l if inlist(e3a_12,2) | inlist(e5_12,1,2,3) |
e4_12==8 | e10_12 == 80
label variable ccce_12 "MHAS 2012 CCCE Score (0-99)"


*** NUMBER of Tasks missing (out of 5 tasks) ***
egen ccce_miss_v01_12=rowmiss(iwr_12 dwr_12 visual_scan_12
construction_12 construction_m_12) if inlist(tipent_12,1,2)
replace ccce_miss_v01_12=.p if inlist(tipent_12,3,4)
label variable ccce_miss_v01_12 "MHAS 2012 Number of CCCE Tasks
missing - Comparable to 2001 (0-5)"

*** TOTAL MHAS 2003 CCCE SCORE (score 0-80) - With only the 5 items
included since 2001***
egen ccce_v01_12 = rowtotal(iwr_12 dwr_12 visual_scan_12
construction_12 construction_m_12) if !mi(iwr_12) & !mi(dwr_12) &
!mi(visual_scan_12)  & !mi(construction_12) & !mi(construction_m_12)
replace ccce_v01_12 = .i if [iwr_12==.i | dwr_12==.i |
visual_scan_12==.i | construction_12==.i | construction_m_12==.i]
```

```
replace ccce_v01_12 = .e if [iwr_12==.e | dwr_12==.e |
visual_scan_12==.e | construction_12==.e | construction_m_12==.e]
replace ccce_v01_12 = .d if [iwr_12==.d | dwr_12==.d |
visual_scan_12==.d | construction_12==.d | construction_m_12==.d]
replace ccce_v01_12 = .r if [iwr_12==.r | dwr_12==.r |
visual_scan_12==.r | construction_12==.r | construction_m_12==.r]
replace ccce_v01_12 = .p if inlist(tipent_12,21,22)
replace ccce_v01_12 = .s if e1_12==2 | e3_12 == 2 | e4_12 == 8 |
inlist(e5_12,1,2,3)
replace ccce_v01_12 = .l if e6_e7_12==88 | e10_12 == 80 | e11_12==88
label variable ccce_v01_12 "MHAS 2012 CCCE Score - Comparable to 2001
(0-80)"

*********************************************************
******* MHAS 2012 IQCODE SHORT -Jorm (SECTION PC) ********
*********************************************************

* Remembering things about family & friends
gen iqcode1_12=.
replace iqcode1_12=.r if pc5_12==8 | pc6_12==8 | pc7_12==8
replace iqcode1_12=.d if pc5_12==9 | pc6_12==9 | pc7_12==9
replace iqcode1_12=3 if pc5_12==2
replace iqcode1_12=pc6_12 if inlist(pc6_12,1,2)
replace iqcode1_12=4 if pc7_12==2
replace iqcode1_12=5 if pc7_12==1

* Remembering things that happened recently
gen iqcode2_12=.
replace iqcode2_12=.r if pc8_12==8 | pc9_12==8 | pc10_12==8
replace iqcode2_12=.d if pc8_12==9 | pc9_12==9 | pc10_12==9
replace iqcode2_12=3 if pc8_12==2
replace iqcode2_12=pc9_12 if inlist(pc9_12,1,2)
replace iqcode2_12=4 if pc10_12==2
replace iqcode2_12=5 if pc10_12==1

* Recalling conversations a few days later
gen iqcode3_12=.
replace iqcode3_12=.r if pc11_12==8 | pc12_12==8 | pc13_12==8
replace iqcode3_12=.d if pc11_12==9 | pc12_12==9 | pc13_12==9
replace iqcode3_12=3 if pc11_12==2
replace iqcode3_12=pc12_12 if inlist(pc12_12,1,2)
replace iqcode3_12=4 if pc13_12==2
replace iqcode3_12=5 if pc13_12==1

* Remembering his/her address & phone number
gen iqcode4_12=.
replace iqcode4_12=.r if pc14_12==8 | pc15_12==8 | pc16_12==8
```

```
replace iqcode4_12=.d if pc14_12==9 | pc15_12==9 | pc16_12==9
replace iqcode4_12=3 if pc14_12==2
replace iqcode4_12=pc15_12 if inlist(pc15_12,1,2)
replace iqcode4_12=4 if pc16_12==2
replace iqcode4_12=5 if pc16_12==1

* Remembering what day and month it is
gen iqcode5_12=.
replace iqcode5_12=.r if pc17_12==8 | pc18_12==8 | pc19_12==8
replace iqcode5_12=.d if pc17_12==9 | pc18_12==9 | pc19_12==9
replace iqcode5_12=3 if pc17_12==2
replace iqcode5_12=pc18_12 if inlist(pc18_12,1,2)
replace iqcode5_12=4 if pc19_12==2
replace iqcode5_12=5 if pc19_12==1

* Remembering where things are usually kept
gen iqcode6_12=.
replace iqcode6_12=.r if pc20_12==8 | pc21_12==8 | pc22_12==8
replace iqcode6_12=.d if pc20_12==9 | pc21_12==9 | pc22_12==9
replace iqcode6_12=3 if pc20_12==2
replace iqcode6_12=pc21_12 if inlist(pc21_12,1,2)
replace iqcode6_12=4 if pc22_12==2
replace iqcode6_12=5 if pc22_12==1

* Remembering where to find things which have been put in a different
place from usual
gen iqcode7_12=.
replace iqcode7_12=.r if pc23_12==8 | pc24_12==8 | pc25_12==8
replace iqcode7_12=.d if pc23_12==9 | pc24_12==9 | pc25_12==9
replace iqcode7_12=3 if pc23_12==2
replace iqcode7_12=pc24_12 if inlist(pc24_12,1,2)
replace iqcode7_12=4 if pc25_12==2
replace iqcode7_12=5 if pc25_12==1

* Knowing how to work familiar machines around the house
gen iqcode8_12=.
replace iqcode8_12=.r if pc26_12==8 | pc27_12==8 | pc28_12==8
replace iqcode8_12=.d if pc26_12==9 | pc27_12==9 | pc28_12==9
replace iqcode8_12=3 if pc26_12==2
replace iqcode8_12=pc27_12 if inlist(pc27_12,1,2)
replace iqcode8_12=4 if pc28_12==2
replace iqcode8_12=5 if pc28_12==1

* Learning to use a new gadget or machine around the house
gen iqcode9_12=.
replace iqcode9_12=.r if pc29_12==8 | pc30_12==8 | pc31_12==8
replace iqcode9_12=.d if pc29_12==9 | pc30_12==9 | pc31_12==9
```

```
replace iqcode9_12=3 if pc29_12==2
replace iqcode9_12=pc30_12 if inlist(pc30_12,1,2)
replace iqcode9_12=4 if pc31_12==2
replace iqcode9_12=5 if pc31_12==1

* Learning new things in general
gen iqcode10_12=.
replace iqcode10_12=.r if pc32_12==8 | pc33_12==8 | pc34_12==8
replace iqcode10_12=.d if pc32_12==9 | pc33_12==9 | pc34_12==9
replace iqcode10_12=3 if pc32_12==2
replace iqcode10_12=pc33_12 if inlist(pc33_12,1,2)
replace iqcode10_12=4 if pc34_12==2
replace iqcode10_12=5 if pc34_12==1

* Following a story in a book or TV
gen iqcode11_12=.
replace iqcode11_12=.r if pc35_12==8 | pc36_12==8 | pc37_12==8
replace iqcode11_12=.d if pc35_12==9 | pc36_12==9 | pc37_12==9
replace iqcode11_12=3 if pc35_12==2
replace iqcode11_12=pc36_12 if inlist(pc36_12,1,2)
replace iqcode11_12=4 if pc37_12==2
replace iqcode11_12=5 if pc37_12==1

* Making decision on everyname_day_12 matters
gen iqcode12_12=.
replace iqcode12_12=.r if pc38_12==8 | pc39_12==8 | pc40_12==8
replace iqcode12_12=.d if pc38_12==9 | pc39_12==9 | pc40_12==9
replace iqcode12_12=3 if pc38_12==2
replace iqcode12_12=pc39_12 if inlist(pc39_12,1,2)
replace iqcode12_12=4 if pc40_12==2
replace iqcode12_12=5 if pc40_12==1

* Handling money for shopping
gen iqcode13_12=.
replace iqcode13_12=.r if pc41_12==8 | pc42_12==8 | pc43_12==8
replace iqcode13_12=.d if pc41_12==9 | pc42_12==9 | pc43_12==9
replace iqcode13_12=3 if pc41_12==2
replace iqcode13_12=pc42_12 if inlist(pc42_12,1,2)
replace iqcode13_12=4 if pc43_12==2
replace iqcode13_12=5 if pc43_12==1

* Handling financial matters
gen iqcode14_12=.
replace iqcode14_12=.r if pc44_12==8 | pc45_12==8 | pc46_12==8
replace iqcode14_12=.d if pc44_12==9 | pc45_12==9 | pc46_12==9
replace iqcode14_12=3 if pc44_12==2
replace iqcode14_12=pc45_12 if inlist(pc45_12,1,2)
```

```
replace iqcode14_12=4 if pc46_12==2
replace iqcode14_12=5 if pc46_12==1

* Handling other everyname_day_12 arithmetic problems
gen iqcode15_12=.
replace iqcode15_12=.r if pc47_12==8 | pc48_12==8 | pc49_12==8
replace iqcode15_12=.d if pc47_12==9 | pc48_12==9 | pc49_12==9
replace iqcode15_12=3 if pc47_12==2
replace iqcode15_12=pc48_12 if inlist(pc48_12,1,2)
replace iqcode15_12=4 if pc49_12==2
replace iqcode15_12=5 if pc49_12==1

* Using his/her intelligence to understand what's going on and to
reason things through
gen iqcode16_12=.
replace iqcode16_12=.r if pc50_12==8 | pc51_12==8 | pc52_12==8
replace iqcode16_12=.d if pc50_12==9 | pc51_12==9 | pc52_12==9
replace iqcode16_12=3 if pc50_12==2
replace iqcode16_12=pc51_12 if inlist(pc51_12,1,2)
replace iqcode16_12=4 if pc52_12==2
replace iqcode16_12=5 if pc52_12==1


***  TOTAL IQCODE SCORE (score 1-5) ***
egen iqcode= rowmean(iqcode1_12 iqcode2_12 iqcode3_12 iqcode4_12
iqcode5_12 iqcode6_12 iqcode7_12 iqcode8_12 iqcode9_12 iqcode10_12
iqcode11_12 iqcode12_12 iqcode13_12 iqcode14_12 iqcode15_12
iqcode16_12) if inlist(tipent_12,3,4)

gen iqcode_12= round(iqcode,0.1)
replace iqcode_12 = .d if [iqcode1_12==.d | iqcode2_12==.d |
iqcode3_12==.d | iqcode4_12==.d | iqcode5_12==.d | iqcode6_12==.d |
iqcode7_12==.d | iqcode8_12==.d | iqcode9_12==.d | iqcode10_12==.d |
iqcode11_12==.d | iqcode12_12==.d | iqcode13_12==.d | iqcode14_12==.d
| iqcode15_12==.d | iqcode16_12==.d]
replace iqcode_12 = .r if [iqcode1_12==.r | iqcode2_12==.r |
iqcode3_12==.r | iqcode4_12==.r | iqcode5_12==.r | iqcode6_12==.r |
iqcode7_12==.r | iqcode8_12==.r | iqcode9_12==.r | iqcode10_12==.r |
iqcode11_12==.r | iqcode12_12==.r | iqcode13_12==.r | iqcode14_12==.r
| iqcode15_12==.r | iqcode16_12==.r]
replace iqcode_12 = .c if inlist(tipent_12,1,2)
label variable iqcode_12 "MHAS 2012 IQCODE Score (1-5)"


*** COGNITIVE IMPAIRMENT - IQCODE (only proxy interviews) ***
gen cog_imp_iqcode_12 = .
replace cog_imp_iqcode_12=0 if inrange(iqcode_12,1,3.4)
```

```
replace cog_imp_iqcode_12=1 if inrange(iqcode_12,3.4,5)
replace cog_imp_iqcode_12 = .d if iqcode_12==.d
replace cog_imp_iqcode_12 = .r if iqcode_12==.r
replace cog_imp_iqcode_12 = .c if inlist(tipent_12,1,2)
replace cog_imp_iqcode_12 = .i if inlist(tipent_12,21,22) & pc1_12==.
label variable cog_imp_iqcode_12 "MHAS 2012 IQ CODE Cognitive
Impairment - Normal, Impaired"
label define imp_iqcode 0 "Normal" 1 "Impaired", replace
label values cog_imp_iqcode_12 imp_iqcode

drop iqcode iqcode*_12
```

2015

```
*************************************************************
**** MHAS 2015 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*************************************************************

label data "Version 2. December 2021"

**** CREATING VARIABLES BY TASK AND DOMAIN ****

* NOTE: Special missing values were assigned as follows:
* .p indicates proxy interview, .d don't know, .s skip, .r refusal,
and .l physical limitation or visual limitation,


*** VERBAL LEARNING (score 0-8) ***
recode e7a_1_15 e7a_2_15 e7a_3_15 e7b_1_15 e7b_2_15 e7b_3_15 (9=0)
egen iwr_15=rowmean (e7a_1_15 e7a_2_15 e7a_3_15 e7b_1_15 e7b_2_15
e7b_3_15) if [inrange(e7a_1_15,0,8) | inrange(e7a_2_15,0,8) |
inrange(e7a_3_15,0,8) | inrange(e7b_1_15,0,8) | inrange(e7b_2_15,0,8)
| inrange(e7b_3_15,0,8)]  & inlist(tipent_15,1,2)
replace iwr_15 = .r if resul_ec_15 == 3 | e6_15 == 8
replace iwr_15 = .i if e6_15 == .i
replace iwr_15 = .p if inlist(tipent_15,3,4)
label variable iwr_15 "MHAS 2015 Verbal Learning (0-8)"


*** DELAYED VERBAL RECALL (score 0-8) ***
egen dwr_15=rowtotal (e14a_15 e14b_15) if inlist(tipent_15,1,2)
replace dwr_15 = 0 if e14a_15 == 9 | e14b_15 ==9
replace dwr_15 = .r if resul_ec_15 == 3 | e6_15 == 8
replace dwr_15 = .i if e6_15 == .i
replace dwr_15 = .p if inlist(tipent_15,3,4)
label variable dwr_15 "MHAS 2015 Delayed Verbal Recall (0-8)"


*** CONSTRUCTIONAL PRAXIS RECALL ***
*** Delayed recall/copy of figure (score 0-6) ***
gen construction_m_15= e13_15 if inrange(e13_15,0,6)
replace construction_m_15 = .s if [e3a_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)] & e13_15==.s
replace construction_m_15 = .r if resul_ec_15 == 3
replace construction_m_15 = .r if e13_15 == 8
replace construction_m_15 = .d if e13_15 == 9
replace construction_m_15 = .i if e13_15 == .i
replace construction_m_15 = .p if inlist(tipent_15,3,4)
```

```
label variable construction_m_15 "MHAS 2015 Constructional Praxis
Recall (0-6)"

*** Delayed recall/copy of figure comparable to 2015 & 2003 (score 0-
2) ***
gen construction_m_v01_15= 0 if inrange(e13_15,0,2)
replace construction_m_v01_15= 1 if inrange(e13_15,3,4)
replace construction_m_v01_15= 2 if inrange(e13_15,5,6)
replace construction_m_v01_15 = .s if [e3a_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)] & e13_15==.s
replace construction_m_v01_15 = .r if resul_ec_15 == 3
replace construction_m_v01_15 = .r if e13_15 == 8
replace construction_m_v01_15 = .d if e13_15 == 9
replace construction_m_v01_15 = .i if e13_15 == .i
replace construction_m_v01_15 = .p if inlist(tipent_15,3,4)

label variable construction_m_v01_15 "MHAS 2015 Constructional Praxis
Recall v2001-2003 (0-2)"


*** VISUAL SCANNING (score 0-60) ***
gen visual_scan_15=.
replace visual_scan_15 = .s if e3a_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)
replace visual_scan_15 = .l if e10_15 == 80
replace visual_scan_15 = .r if resul_ec_15 == 3 | e10_15 == 88
replace visual_scan_15 = .d if e10_15 == 99
replace visual_scan_15 = .i if e10_15 == .i
replace visual_scan_15 = .p if inlist(tipent_15,3,4)
replace visual_scan_15 = e10_15 if inrange(e10_15, 0,60)
label variable visual_scan_15 "MHAS 2015 Visual Scanning (0-60)"


*** BACKWARDS COUNTING (score 0-4) ***
** Correct/Incorrect variable. Where 2 points are assigned if the
subject completed correctly the task in the first trial
// and 1 point if the suject completed correclty the task in the
second trial
gen bwc_c_15=.
replace bwc_c_15=0 if e12a_15==2 | e12b_15==2
replace bwc_c_15=0 if [e12a_15==1 | e12b_15==1] &
inlist(e12c_15,0,1,2,61,99)
replace bwc_c_15=1 if e12b_15==1 & inrange(e12c_15,3,60)
replace bwc_c_15=2 if e12a_15==1 & inrange(e12c_15,3,60)
replace bwc_c_15 = .i if e12a_15 == .i
replace bwc_c_15 = .r if resul_ec_15==3 | [e12b_15==8]
replace bwc_c_15 = .d if e12b_15==9
```

```
replace bwc_c_15 = .p if inlist(tipent_15,3,4)
label variable bwc_c_15 "MHAS 2015 Backwards Counting
(Correct/Incorrect)"

** Time variable (0-60 sec): we recoded 61 "More than 60 seconds" and
99 "Not specified" as a missing
** Only for those respondents with "correct" answers
gen bwc_time_15=e12c_15 if inlist(bwc_c_15,1,2) &
inrange(e12c_15,3,60)
recode bwc_time_15 (61/99=.)
replace bwc_time_15 = .i if e12a_15 == .i
replace bwc_time_15 = .n if bwc_c_15==0
replace bwc_time_15 = .r if resul_ec_15==3 | [e12b_15==8]
replace bwc_time_15 = .d if e12b_15==9
replace bwc_time_15 = .p if inlist(tipent_15,3,4)
label variable bwc_time_15 "MHAS 2015 Backwards Counting Time (3-60)"

** Categorical variable (using S. Mejia 2015 SPM) - ONLY TO CONSTRUCT
THE CCCE SCORE
gen bwc_15=.
replace bwc_15=0 if bwc_c_15==0
replace bwc_15=1 if inrange(bwc_time_15,31,60)
replace bwc_15=2 if inrange(bwc_time_15,21,30)
replace bwc_15=3 if inrange(bwc_time_15,11,20)
replace bwc_15=4 if inrange(bwc_time_15,3,10)
replace bwc_15 = .r if resul_ec_15==3 | [e12b_15==8]
replace bwc_15 = .d if e12b_15==9
replace bwc_15 = .i if e12a_15 == .i
replace bwc_15 = .p if inlist(tipent_15,3,4)
label variable bwc_15 "MHAS 2015 Backwards Counting Cat. (0-4)"


*** ORIENTATION ***
*** Day of the month (score 0-1) ***
gen name_day_15=.
replace name_day_15 = .r if resul_ec_15 == 3 | e11a_15 == 8
replace name_day_15 = .d if e11a_15 == 9
replace name_day_15 = .i if e11a_15 == .i
replace name_day_15 = .p if inlist(tipent_15,3,4)
replace name_day_15 = 1 if e11a_15 == 1
replace name_day_15 = 0 if e11a_15 == 2

*** Month (score 0-1) ***
gen name_month_15=.
replace name_month_15 = .r if resul_ec_15 == 3 | e11b_15 == 8
replace name_month_15 = .d if e11b_15 == 9
replace name_month_15 = .i if e11b_15 == .i
```

```
replace name_month_15 = .p if inlist(tipent_15,3,4)
replace name_month_15 = 1 if e11b_15 == 1
replace name_month_15 = 0 if e11b_15 == 2

*** Year (score 0-1) ***
gen name_year_15=.
replace name_year_15 = .r if resul_ec_15 == 3 | e11c_15 == 8
replace name_year_15 = .d if e11c_15 == 9
replace name_year_15 = .i if e11c_15 == .i
replace name_year_15 = .p if inlist(tipent_15,3,4)
replace name_year_15 = 1 if e11c_15 == 1
replace name_year_15 = 0 if e11c_15 == 2

*** Orientation (score 0-3)
egen orientation_15= rowtotal(name_day_15 name_month_15 name_year_15)
if inlist(tipent_15,1,2)
replace orientation_15 = .r if resul_ec_15 == 3 | e11a_15 == 8 |
e11b_15 == 8 | e11c_15 == 8
replace orientation_15 = .d if e11a_15 == 9 & e11b_15 == 9 & e11c_15
== 9
replace orientation_15 = .i if [e11a_15 == .i & e11b_15 == .i &
e11c_15 == .i]
replace orientation_15 = .p if inlist(tipent_15,3,4)
label variable orientation_15 "MHAS 2015 Orientation (0-3)"

drop name_day_15 name_month_15 name_year_15


*** VERBAL FLUENCY ***
** Number of repeated animals (score 0~50)
gen verbal_fluency_rep_15= e9b_15 if inrange(e9b_15,0,60)
replace verbal_fluency_rep_15 = .r if resul_ec_15 == 3 | e9b_15==99
replace verbal_fluency_rep_15 = .d if e9a_15 == 88 | e9b_15 == 88
replace verbal_fluency_rep_15 = .i if e9b_15 == .i
replace verbal_fluency_rep_15 = .p if inlist(tipent_15,3,4)
label variable verbal_fluency_rep_15 "MHAS 2015 Verbal Fluency:
number of repetitions (0-50)"

** Number of different animals (88 "No response" recorded as a
missing) (score 0~50)
gen verbal_fluency_num_15=e9a_15
replace verbal_fluency_num_15 = .r if resul_ec_15 == 3 | e9a_15==99
replace verbal_fluency_num_15 = .d if e9a_15 == 88
replace verbal_fluency_num_15 = .i if e9a_15 == .i
replace verbal_fluency_num_15 = .p if inlist(tipent_15,3,4)
label variable verbal_fluency_num_15 "MHAS 2015 Verbal Fluency:
number of animals (0-50)"
```

```
** Categorical variable (using S. Mejia 2014, Salud Publica de
Mexico) (score 0-4)
gen verbal_fluency_15=.
replace verbal_fluency_15=1 if inrange(verbal_fluency_num_15,0,8)
replace verbal_fluency_15=2 if inrange(verbal_fluency_num_15,9,18)
replace verbal_fluency_15=3 if inrange(verbal_fluency_num_15,19,24)
replace verbal_fluency_15=4 if inrange(verbal_fluency_num_15,25,50)
replace verbal_fluency_15=.r if resul_ec_15 == 3 | e9a_15 == 88
replace verbal_fluency_15=.i if e9a_15 == .i
replace verbal_fluency_15=.p if inlist(tipent_15,3,4)
label variable verbal_fluency_15 "MHAS 2015 Verbal Fluency Cat. (0-
4)"


*** SERIAL 7 (score 0-5) ***
* Note: Some cases had 888, 999, 88 and 99 in all or some of the
answers (see companion document MHAS 2015, Notes to Serial 7 Test -
Feb 2018)
*** Clean Variables
gen e15a_clean_15=e15a_15
gen e15b_clean_15=e15b_15
gen e15c_clean_15=e15c_15
gen e15d_clean_15=e15d_15
gen e15e_clean_15=e15e_15

*1)  Subjects with e15a_15==99
*a.  Subjects with e15b_15==999 (n=88)
* In all these cases e15a_15 should be “999” and e15b_15 to e15e_15
should be “.s”
replace e15a_clean_15=999 if e15a_15==99 & e15b_15==999
replace e15b_clean_15=.s if e15a_15==99 & e15b_15==999
replace e15c_clean_15=.s if e15a_15==99 & e15b_15==999
replace e15d_clean_15=.s if e15a_15==99 & e15b_15==999
replace e15e_clean_15=.s if e15a_15==99 & e15b_15==999

*b.  Subjects with e15b_15==888 (n=79)
* All the cases should remain UNCHANGED

*c.  Subjects with e15b_15==99 (n=24)
* In all these cases e15a_15 should be “999” and e15b_15 to e15e_15
should be “.s”
replace e15a_clean_15=999 if e15a_15==99 & e15b_15==99
replace e15b_clean_15=.s if e15a_15==99 & e15b_15==99
replace e15c_clean_15=.s if e15a_15==99 & e15b_15==99
replace e15d_clean_15=.s if e15a_15==99 & e15b_15==99
replace e15e_clean_15=.s if e15a_15==99 & e15b_15==99
```

```
*d.  Subjects with e15b_15≠999, 888, or 99 (n=6)
* Only subject identified with CUNICAH==9419 & NP=20 (highlighted in
the table below) should be modified.
* In this case e15a_15 should be "888" and e15b_15 to e15e_15 should
be ".s".
* In all the other cases DO NOT make changes.
replace e15a_clean_15=888 if cunicah==9419 & np==20
replace e15b_clean_15=.s if cunicah==9419 & np==20
replace e15c_clean_15=.s if cunicah==9419 & np==20
replace e15d_clean_15=.s if cunicah==9419 & np==20
replace e15e_clean_15=.s if cunicah==9419 & np==20

*2)  Subjects with e15a_15==88
*a.  Subjects with e15b_15==888(n=17)
* In all these cases e15a_15 should be "888" and e15b_15 to e15e_15
should be ".s"
replace e15a_clean_15=888 if e15a_15==88 & e15b_15==888
replace e15b_clean_15=.s if e15a_15==88 & e15b_15==888
replace e15c_clean_15=.s if e15a_15==88 & e15b_15==888
replace e15d_clean_15=.s if e15a_15==88 & e15b_15==888
replace e15e_clean_15=.s if e15a_15==88 & e15b_15==888

*b.  Subjects with e15b_15==999 (n=2)
* All these cases should remain UNCHANGED.

*c.  Subjects with e15b_15≠888 or 999 (n=7)
* All these cases should remain UNCHANGED.

*3)  Subjects with e15b_15==99 (AND e15a≠88 or 99)
*a.  Subjects with e15c_15==888(n=32)
* All these cases should remain UNCHANGED.

*b.  Subjects with e15c_15==999(n=31)
* In all these cases e15b_15 should be "999" and e15c_15 to e15e_15
should be ".s"
replace e15b_clean_15=999 if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==999
replace e15c_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==999
replace e15d_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==999
replace e15e_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==999

*c.  Subjects with e15c_15==88(n=3)
```

```
* Only subject identified with CUNICAH==14600 & NP=14 (highlighted in
the table below) should be modified.
* In this case e15b_15 should be “999” and e15c_15 to e15e_15 should
be “.s”
* In all the other cases DO NOT make changes.
replace e15b_clean_15=999 if cunicah==14600 & np==14
replace e15c_clean_15=.s if cunicah==14600 & np==14
replace e15d_clean_15=.s if cunicah==14600 & np==14
replace e15e_clean_15=.s if cunicah==14600 & np==14

*d.  Subjects with e15c_15==99(n=11)
* In all these cases e15b_15 should be “999” and e15c_15 to e15e_15
should be “.s”
replace e15b_clean_15=999 if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==99
replace e15c_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==99
replace e15d_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==99
replace e15e_clean_15=.s if e15b_15==99 & !inlist(e15a_15,88,99) &
e15c_15==99

*4)  Subjects with e15b_15==88 (AND e15a≠88 or 99)(n=43)
*a.  Subjects with e15c_15==888(n=22)
* In all these cases e15b_15 should be “888” and e15c_15 to e15e_15
should be “.s”
replace e15b_clean_15=888 if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==888
replace e15c_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==888
replace e15d_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==888
replace e15e_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==888

*b.  Subjects with e15c_15==999(n=11)
* All of these cases should remain UNCHANGED.

*c.  Subjects with e15c_15==88(n=8)
* In all these cases e15b_15 should be “888” and e15c_15 to e15e_15
should be “.s”
replace e15b_clean_15=888 if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==88
replace e15c_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==88
replace e15d_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==88
```

```
replace e15e_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==88

*d.  Subjects with e15c_15==99(n=2)
* In all these cases e15c_15 should be “999” and e15d_15 to e15e_15
should be “.s”
replace e15c_clean_15=999 if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==99
replace e15d_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==99
replace e15e_clean_15=.s if e15b_15==88 & !inlist(e15a_15,88,99) &
e15c_15==99

*5)  Subjects with e15c_15==88 (AND e15b≠88 or 99 AND e15a≠88 or 99)
*a.  Subjects with e15d_15==888(n=12)
* In all these cases e15c_15 should be “888” and e15d_15 to e15e_15
should be “.s”.
replace e15c_clean_15=888 if e15c_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==888
replace e15d_clean_15=.s if e15c_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==888
replace e15e_clean_15=.s if e15c_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==888

*b.  Subjects with e15d_15==999(n=5)
* All these cases should remain UNCHANGED.

*c.  Subjects with e15d_15==88(n=8)
* Only subjects identified with CUNICAH==3143 & NP=10, CUNICAH==8548
& NP=10, CUNICAH==13405 & NP=20,
* CUNICAH==14635 & NP=20, CUNICAH==14758 & NP=10, and CUNICAH==14780
& NP=20 (highlighted in the table below)
* should be modified. In those cases e15c_15 should be “888” and
e15d_15 to e15e_15 should be “.s”.
* In all the other cases DO NOT make changes.
replace e15c_clean_15=888 if [cunicah==3143 & np==10] |
[cunicah==8548 & np==10] | [cunicah==13405 & np==20] | ///
                              [cunicah==14635 & np==20] |
[cunicah==14758 & np==10] | [cunicah==14780 & np==10]
replace e15d_clean_15=.s if [cunicah==3143 & np==10] | [cunicah==8548
& np==10] | [cunicah==13405 & np==20] | ///
                              [cunicah==14635 & np==20] |
[cunicah==14758 & np==10] | [cunicah==14780 & np==10]
replace e15e_clean_15=.s if [cunicah==3143 & np==10] | [cunicah==8548
& np==10] | [cunicah==13405 & np==20] | ///
                              [cunicah==14635 & np==20] |
[cunicah==14758 & np==10] | [cunicah==14780 & np==10]
```

```
*6)  Subjects with e15c_15==99 (AND e15b≠88 or 99 AND e15a≠88 or 99)
*a.  Subjects with e15d_15==888(n=23)
* All these cases should remain UNCHANGED.

*b.  Subjects with e15d_15==999(n=13)
* In all these cases e15c_15 should be “999” and e15d_15 to e15e_15
should be “.s”.
replace e15c_clean_15=999 if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==999
replace e15d_clean_15=.s if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==999
replace e15e_clean_15=.s if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==999

*c.  Subjects with e15d_15==99(n=13)
* In all these cases e15c_15 should be “999” and e15d_15 to e15e_15
should be “.s”.
replace e15c_clean_15=999 if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==99
replace e15d_clean_15=.s if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==99
replace e15e_clean_15=.s if e15c_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & e15d_15==99

*7)  Subjects with e15d_15==88 (AND e15c≠88 or 99 AND e15b≠88 or 99
AND e15a≠88 or 99)(n=30)
*a.  Subjects with e15e_15==888(n=8)
* In all these cases e15d_15 should be “888” and e15e_15 should be
“.s”.replace e15c_clean_15=999 if e15d_15==88 &
!inlist(e15a_15,88,99) & !inlist(e15b_15,88,99) &
!inlist(e15c_15,88,99) & e15e_15==888
replace e15d_clean_15=888 if e15d_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==888
replace e15e_clean_15=.s if e15d_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==888

*b.  Subjects with e15e_15==999(n=4)
* All these cases should remain UNCHANGED.

*c.  Subjects with e15e_15==88(n=8)
* In all these cases e15d_15 should be “888” and e15e_15 should be
“.s”.
replace e15d_clean_15=888 if e15d_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==88
replace e15e_clean_15=.s if e15d_15==88 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==88
```

```
*8)  Subjects with e15d_15==99 (AND e15c≠88 or 99 AND e15b≠88 or 99
AND e15a≠88 or 99)
*a.  Subjects with e15e_15==888(n=13)
* In all these cases e15d_15 should be “999” and e15e_15 should be
“.s”.
replace e15d_clean_15=999 if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==888
replace e15e_clean_15=.s if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==888

*b.  Subjects with e15e_15==999(n=8)
* In all these cases e15d_15 should be “999” and e15e_15 should be
“.s”.
replace e15d_clean_15=999 if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==999
replace e15e_clean_15=.s if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==999

*c.  Subjects with e15e_15==88(n=2)
* In all these cases e15d_15 should be “999” and e15e_15 should be
“.s”.
replace e15d_clean_15=999 if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==88
replace e15e_clean_15=.s if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==88

*d.  Subjects with e15e_15==99(n=18)
* In all these cases e15d_15 should be “999” and e15e_15 should be
“.s”.
replace e15d_clean_15=999 if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==99
replace e15e_clean_15=.s if e15d_15==99 & !inlist(e15a_15,88,99) &
!inlist(e15b_15,88,99) & !inlist(e15c_15,88,99) & e15e_15==99

*9)  Subjects with e15e_15==99 or 88 (AND e15d≠88 or 99 AND e15c≠88
or 99 AND e15b≠88 or 99 AND e15a≠88 or 99)
* ONLY the cases identified belowed are changed. In all the
highlighted cases, “88” should be replaced by “888” and “99” should
be replaced by “999”.
* All the other cases should remain UNCHANGED.

replace e15e_clean_15=999 if e15e_15==99 & ///
                                  [[cunicah==374 & np==10] |
[cunicah==435 & np==20] | [cunicah==520 & np==20] | ///
                               [cunicah==919 & np==10] | [cunicah==984
& np==10] | [cunicah==1031 & np==20]| ///
```

```
                                    [cunicah==1231 & np==10] |  ///
                                    [cunicah==2792 & np==10] |
[cunicah==3250 & np==20] | [cunicah==3784 & np==10] | ///
                                    [cunicah==3815 & np==20] |
[cunicah==4007 & np==10] | [cunicah==4014 & np==10] | ///
                                  [cunicah==4113 & np==10] |
[cunicah==4396 & np==10] | [cunicah==4922 & np==20] | ///
                                  [cunicah==5172 & np==20] |
[cunicah==5726 & np==10] | [cunicah==6066 & np==20] | ///
                                  [cunicah==6949 & np==20] |
[cunicah==7483 & np==10] | [cunicah==9090 & np==20] | ///
                                    [cunicah==9175 & np==20] |
[cunicah==9321 & np==10] | [cunicah==10287 & np==10] | ///
                                    [cunicah==10440 & np==10] |
[cunicah==11043 & np==20] | [cunicah==11161 & np==20] | ///
                                    [cunicah==11225 & np==20] |
[cunicah==11777 & np==10] | [cunicah==11970 & np==10] | ///
                                    [cunicah==12165 & np==10] |
[cunicah==13121 & np==10] | [cunicah==13596 & np==10]]

replace e15e_clean_15=888 if e15e_15==88 & ///
                                  [[cunicah==1203 & np==10] |
[cunicah==1209 & np==10] | [cunicah==1216 & np==20] | ///
                                    [cunicah==2121 & np==10] |
[cunicah==2769 & np==20] | [cunicah==3038 & np==20] | ///
                                    [cunicah==3163 & np==10] |
[cunicah==4843 & np==10] | [cunicah==5576 & np==10] | ///
                                    [cunicah==6248 & np==20] |
[cunicah==6891 & np==10] | [cunicah==8271 & np==10] | ///
                                    [cunicah==8502 & np==10] |
[cunicah==9799 & np==20] | [cunicah==11699 & np==20] | ///
                                    [cunicah==11946 & np==10] |
[cunicah==12325 & np==10] | [cunicah==13191 & np==20] | ///
                                    [cunicah==13281 & np==10] |
[cunicah==13300 & np==20] | [cunicah==13858 & np==10] | ///
                                  [cunicah==14278 & np==10] |
[cunicah==14489 & np==20] | [cunicah==14541 & np==20] | ///
                                    [cunicah==14777 & np==10] |
[cunicah==15102 & np==20]]

*10) Other cases
* In the case identified by CUNICAH=11677 & NP=10, e15b_15 should be
”999” and e15c_15 to e15e_15 should be “.s”.
* In the case identified by CUNICAH=10645 & NP=10, e15a_15 should be
“93” (instead of 903).
replace e15b_clean_15=999 if [cunicah==11677 & np==10]
replace e15c_clean_15=.s if [cunicah==11677 & np==10]
```

```
replace e15d_clean_15=.s if [cunicah==11677 & np==10]
replace e15e_clean_15=.s if [cunicah==11677 & np==10]

replace e15a_clean_15=93 if [cunicah==10645 & np==10]

** Correct/Incorrect using clean variables (e15*_clean_15)
gen serial7_clean_1=.
replace serial7_clean_1=1 if inlist(e15a_clean_15,93,100)
replace serial7_clean_1=0 if !inlist(e15a_clean_15,93,100,.) |
e15a_clean_15==999
replace serial7_clean_1=.i if e15a_clean_15==.i
replace serial7_clean_1=.p if inlist(tipent_15,3,4)
replace serial7_clean_1=.r if e15a_clean_15==888

gen serial7_clean_2=.
replace serial7_clean_2=1 if e15b_clean_15==e15a_clean_15-7 &
e15b_clean_15!=.
replace serial7_clean_2=0 if !inlist(e15b_clean_15,e15a_clean_15-7,.)
| e15b_clean_15==999
replace serial7_clean_2=.p if inlist(tipent_15,3,4)
replace serial7_clean_2=.i if e15b_clean_15==.i
replace serial7_clean_2=.r if e15b_clean_15==888

gen serial7_clean_3=.
replace serial7_clean_3=1 if e15c_clean_15==e15b_clean_15-7 &
e15c_clean_15!=.
replace serial7_clean_3=0 if !inlist(e15c_clean_15,e15b_clean_15-7,.)
| e15c_clean_15==999
replace serial7_clean_3=.p if inlist(tipent_15,3,4)
replace serial7_clean_3=.i if e15c_clean_15==.i
replace serial7_clean_3=.r if e15c_clean_15==888

gen serial7_clean_4=.
replace serial7_clean_4=1 if e15d_clean_15==e15c_clean_15-7 &
e15d_clean_15!=.
replace serial7_clean_4=0 if !inlist(e15d_clean_15,e15c_clean_15-7,.)
| e15d_clean_15==999
replace serial7_clean_4=.p if inlist(tipent_15,3,4)
replace serial7_clean_4=.i if e15d_clean_15==.i
replace serial7_clean_4=.r if e15d_clean_15==888

gen serial7_clean_5=.
replace serial7_clean_5=1 if e15e_15==e15d_clean_15-7 & e15e_15!=.
replace serial7_clean_5=0 if !inlist(e15e_15,e15d_clean_15-7,.) |
e15e_15==999
replace serial7_clean_5=.p if inlist(tipent_15,3,4)
replace serial7_clean_5=.i if e15e_clean_15==.i
```

```
replace serial7_clean_5=.r if e15e_clean_15==888


** Serial 7 score variable
egen serial7_15 = rowtotal(serial7_clean_1 serial7_clean_2
serial7_clean_3 serial7_clean_4 serial7_clean_5) if
inlist(serial7_clean_1,0,1) | inlist(serial7_clean_2,0,1) |
inlist(serial7_clean_3,0,1) | inlist(serial7_clean_4,0,1) |
inlist(serial7_clean_5,0,1)
replace serial7_15=.r if e15a_clean_15==888
replace serial7_15=.p if inlist(tipent_15,3,4)
replace serial7_15=.i if e15a_clean_15==.i
label variable serial7_15 "MHAS Series of subtractions 7 from 100 (0-
5)"

drop e15*_clean_15 serial7_clean_*
* NOTE: We ONLY exclude 888 from the answers in e15a_clean_15
because:
* 1) after 888 in the first trial the person does not complete the
following trials (.s)
* 2) 999 is considered as a 0 in the score


*** CONSTRUCTIONAL PRAXIS ***
*** Copy one figure (score 0-6) ***
gen construction_15= e8_15 if inrange(e8_15,0,6)
replace construction_15 = .s if [e3a_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)] & e8_15==.s
replace construction_15 = .r if resul_ec_15 == 3
replace construction_15 = .r if e8_15 == 8
replace construction_15 = .d if e8_15 == 9
replace construction_15 = .i if e8_15 == .i
replace construction_15 = .p if inlist(tipent_15,3,4)
label variable construction_15 "MHAS 2015 Constructional Praxis (0-
6)"

*** Copy one figure comparable to 2015 & 2003 (score 0-2) ***
gen construction_v01_15= 0 if inrange(e8_15,0,2)
replace construction_v01_15= 1 if inrange(e8_15,3,4)
replace construction_v01_15= 2 if inrange(e8_15,5,6)
replace construction_v01_15 = .s if [e3a_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)] & e8_15==.s
replace construction_v01_15 = .r if resul_ec_15 == 3
replace construction_v01_15 = .r if e8_15 == 8
replace construction_v01_15 = .d if e8_15 == 9
replace construction_v01_15 = .i if e8_15 == .i
replace construction_v01_15 = .p if inlist(tipent_15,3,4)
```

```
label variable construction_v01_15 "MHAS 2015 Constructional Praxis
v2001-2003 (0-2)"



*** NUMBER of Tasks missing (out of 9 tasks) ***
egen ccce_miss_15=rowmiss(iwr_15 dwr_15 visual_scan_15 bwc_15
orientation_15 verbal_fluency_15 construction_15 construction_m_15
serial7_15) if inlist(tipent_15,1,2)
replace ccce_miss_15=.p if inlist(tipent_15,3,4)
label variable ccce_miss_15 "MHAS 2015 Number of CCCE Tasks missing
(0-9)"


*** TOTAL MHAS 2015 CCCE SCORE (score 0-104) - Including all 2015
Items ***
egen ccce_15 = rowtotal(iwr_15 dwr_15 visual_scan_15 bwc_15
orientation_15 verbal_fluency_15 construction_15 construction_m_15
serial7_15) if !mi(iwr_15) & !mi(dwr_15) & !mi(visual_scan_15) &
!mi(bwc_15) & !mi(orientation_15) & !mi(verbal_fluency_15) &
!mi(construction_15) & !mi(construction_m_15) & !mi(serial7_15)
replace ccce_15 = .i if [iwr_15==.i | dwr_15==.i | visual_scan_15==.i
| bwc_15==.i | orientation_15==.i | verbal_fluency_15==.i |
construction_15==.i | construction_m_15==.i | serial7_15==.i]
replace ccce_15 = .d if [iwr_15==.d | dwr_15==.d | visual_scan_15==.d
| bwc_15==.d | orientation_15==.d | verbal_fluency_15==.d |
construction_15==.d | construction_m_15==.d | serial7_15==.d]
replace ccce_15 = .r if [iwr_15==.r | dwr_15==.r | visual_scan_15==.r
| bwc_15==.r | orientation_15==.r | verbal_fluency_15==.r |
construction_15==.r | construction_m_15==.r | serial7_15==.r]
replace ccce_15 = .r if inlist(resul_ec_15,2,3)
replace ccce_15 = .l if inlist(e3a_15,2) | inlist(e5_15,1,2,3) |
e4_15==8 | e10_15 == 80
replace ccce_15 = .p if inlist(tipent_15,3,4)
label variable ccce_15 "MHAS 2015 CCCE Score (0-104)"


*** NUMBER of Tasks missing (out of 8 tasks) ***
egen ccce_miss_v12_15=rowmiss(iwr_15 dwr_15 visual_scan_15 bwc_15
orientation_15 verbal_fluency_15 construction_15 construction_m_15)
if inlist(tipent_15,1,2)
replace ccce_miss_v12_15=.p if inlist(tipent_15,3,4)
label variable ccce_miss_v12_15 "MHAS 2015 Number of CCCE Tasks
missing - Comparable to 2012 (0-8)"

*** TOTAL MHAS 2015 CCCE SCORE (score 0-99) - With only the items in
2012 ***
```

```
egen ccce_v12_15 = rowtotal(iwr_15 dwr_15 visual_scan_15 bwc_15
orientation_15 verbal_fluency_15 construction_15 construction_m_15)
if !mi(iwr_15) & !mi(dwr_15) & !mi(visual_scan_15) & !mi(bwc_15) &
!mi(orientation_15) & !mi(verbal_fluency_15) & !mi(construction_15) &
!mi(construction_m_15)
replace ccce_v12_15 = .i if [iwr_15==.i | dwr_15==.i |
visual_scan_15==.i | bwc_15==.i | orientation_15==.i |
verbal_fluency_15==.i | construction_15==.i | construction_m_15==.i]
replace ccce_v12_15 = .d if [iwr_15==.d | dwr_15==.d |
visual_scan_15==.d | bwc_15==.d | orientation_15==.d |
verbal_fluency_15==.d | construction_15==.d | construction_m_15==.d]
replace ccce_v12_15 = .r if [iwr_15==.r | dwr_15==.r |
visual_scan_15==.r | bwc_15==.r | orientation_15==.r |
verbal_fluency_15==.r | construction_15==.r | construction_m_15==.r]
replace ccce_v12_15 = .r if inlist(resul_ec_15,2,3)
replace ccce_v12_15 = .l if inlist(e3a_15,2) | inlist(e5_15,1,2,3) |
e4_15==8 | e10_15 == 80
replace ccce_v12_15 = .p if inlist(tipent_15,3,4)
label variable ccce_v12_15 "MHAS 2015 CCCE Score - Comparable to 2012
(0-99)"


*** NUMBER of Tasks missing (out of 5 tasks) ***
egen ccce_miss_v01_15=rowmiss(iwr_15 dwr_15 visual_scan_15
construction_15 construction_m_15) if inlist(tipent_15,11,12)
replace ccce_miss_v01_15=.p if inlist(tipent_15,21,22)
label variable ccce_miss_v01_15 "MHAS 2015 Number of CCCE Tasks
missing - Comparable to 2001 (0-5)"

*** TOTAL MHAS 2003 CCCE SCORE (score 0-80) - With only the 5 items
included since 2001***
egen ccce_v01_15 = rowtotal(iwr_15 dwr_15 visual_scan_15
construction_15 construction_m_15) if !mi(iwr_15) & !mi(dwr_15) &
!mi(visual_scan_15)  & !mi(construction_15) & !mi(construction_m_15)
replace ccce_v01_15 = .i if [iwr_15==.i | dwr_15==.i |
visual_scan_15==.i | construction_15==.i | construction_m_15==.i]
replace ccce_v01_15 = .e if [iwr_15==.e | dwr_15==.e |
visual_scan_15==.e | construction_15==.e | construction_m_15==.e]
replace ccce_v01_15 = .d if [iwr_15==.d | dwr_15==.d |
visual_scan_15==.d | construction_15==.d | construction_m_15==.d]
replace ccce_v01_15 = .r if [iwr_15==.r | dwr_15==.r |
visual_scan_15==.r | construction_15==.r | construction_m_15==.r]
replace ccce_v01_15 = .p if inlist(tipent_15,21,22)
replace ccce_v01_15 = .s if e1_15==2 | e3_15 == 2 | e4_15 == 8 |
inlist(e5_15,1,2,3)
replace ccce_v01_15 = .l if e6_e7_15==88 | e10_15 == 80 | e11_15==88
```

```
label variable ccce_v01_15 "MHAS 2015 CCCE Score - Comparable to 2001
(0-80)"


*********************************************************
******* MHAS 2015 IQCODE SHORT -Jorm (SECTION PC) ********
*********************************************************

* Remembering things about family & friends
gen iqcode1_15=.
replace iqcode1_15=.r if pc5_15==8 | pc6_15==8 | pc7_15==8
replace iqcode1_15=.d if pc5_15==9 | pc6_15==9 | pc7_15==9
replace iqcode1_15=3 if pc5_15==2
replace iqcode1_15=pc6_15 if inlist(pc6_15,1,2)
replace iqcode1_15=4 if pc7_15==2
replace iqcode1_15=5 if pc7_15==1

* Remembering things that happened recently
gen iqcode2_15=.
replace iqcode2_15=.r if pc8_15==8 | pc9_15==8 | pc10_15==8
replace iqcode2_15=.d if pc8_15==9 | pc9_15==9 | pc10_15==9
replace iqcode2_15=3 if pc8_15==2
replace iqcode2_15=pc9_15 if inlist(pc9_15,1,2)
replace iqcode2_15=4 if pc10_15==2
replace iqcode2_15=5 if pc10_15==1

* Recalling conversations a few name_day_15s later
gen iqcode3_15=.
replace iqcode3_15=.r if pc11_15==8 | pc12_15==8 | pc13_15==8
replace iqcode3_15=.d if pc11_15==9 | pc12_15==9 | pc13_15==9
replace iqcode3_15=3 if pc11_15==2
replace iqcode3_15=pc12_15 if inlist(pc12_15,1,2)
replace iqcode3_15=4 if pc13_15==2
replace iqcode3_15=5 if pc13_15==1

* Remembering his/her address & phone number
gen iqcode4_15=.
replace iqcode4_15=.r if pc14_15==8 | pc15_15==8 | pc16_15==8
replace iqcode4_15=.d if pc14_15==9 | pc15_15==9 | pc16_15==9
replace iqcode4_15=3 if pc14_15==2
replace iqcode4_15=pc15_15 if inlist(pc15_15,1,2)
replace iqcode4_15=4 if pc16_15==2
replace iqcode4_15=5 if pc16_15==1

* Remembering what name_day_15 and name_month_15 it is
gen iqcode5_15=.
replace iqcode5_15=.r if pc17_15==8 | pc18_15==8 | pc19_15==8
```

```
replace iqcode5_15=.d if pc17_15==9 | pc18_15==9 | pc19_15==9
replace iqcode5_15=3 if pc17_15==2
replace iqcode5_15=pc18_15 if inlist(pc18_15,1,2)
replace iqcode5_15=4 if pc19_15==2
replace iqcode5_15=5 if pc19_15==1

* Remembering where things are usually kept
gen iqcode6_15=.
replace iqcode6_15=.r if pc20_15==8 | pc21_15==8 | pc22_15==8
replace iqcode6_15=.d if pc20_15==9 | pc21_15==9 | pc22_15==9
replace iqcode6_15=3 if pc20_15==2
replace iqcode6_15=pc21_15 if inlist(pc21_15,1,2)
replace iqcode6_15=4 if pc22_15==2
replace iqcode6_15=5 if pc22_15==1

* Remembering where to find things which have been put in a different
place from usual
gen iqcode7_15=.
replace iqcode7_15=.r if pc23_15==8 | pc24_15==8 | pc25_15==8
replace iqcode7_15=.d if pc23_15==9 | pc24_15==9 | pc25_15==9
replace iqcode7_15=3 if pc23_15==2
replace iqcode7_15=pc24_15 if inlist(pc24_15,1,2)
replace iqcode7_15=4 if pc25_15==2
replace iqcode7_15=5 if pc25_15==1

* Knowing how to work familiar machines around the house
gen iqcode8_15=.
replace iqcode8_15=.r if pc26_15==8 | pc27_15==8 | pc28_15==8
replace iqcode8_15=.d if pc26_15==9 | pc27_15==9 | pc28_15==9
replace iqcode8_15=3 if pc26_15==2
replace iqcode8_15=pc27_15 if inlist(pc27_15,1,2)
replace iqcode8_15=4 if pc28_15==2
replace iqcode8_15=5 if pc28_15==1

* Learning to use a new gadget or machine around the house
gen iqcode9_15=.
replace iqcode9_15=.r if pc29_15==8 | pc30_15==8 | pc31_15==8
replace iqcode9_15=.d if pc29_15==9 | pc30_15==9 | pc31_15==9
replace iqcode9_15=3 if pc29_15==2
replace iqcode9_15=pc30_15 if inlist(pc30_15,1,2)
replace iqcode9_15=4 if pc31_15==2
replace iqcode9_15=5 if pc31_15==1

* Learning new things in general
gen iqcode10_15=.
replace iqcode10_15=.r if pc32_15==8 | pc33_15==8 | pc34_15==8
replace iqcode10_15=.d if pc32_15==9 | pc33_15==9 | pc34_15==9
```

```
replace iqcode10_15=3 if pc32_15==2
replace iqcode10_15=pc33_15 if inlist(pc33_15,1,2)
replace iqcode10_15=4 if pc34_15==2
replace iqcode10_15=5 if pc34_15==1

* Following a story in a book or TV
gen iqcode11_15=.
replace iqcode11_15=.r if pc35_15==8 | pc36_15==8 | pc37_15==8
replace iqcode11_15=.d if pc35_15==9 | pc36_15==9 | pc37_15==9
replace iqcode11_15=3 if pc35_15==2
replace iqcode11_15=pc36_15 if inlist(pc36_15,1,2)
replace iqcode11_15=4 if pc37_15==2
replace iqcode11_15=5 if pc37_15==1

* Making decision on everyname_day_15 matters
gen iqcode12_15=.
replace iqcode12_15=.r if pc38_15==8 | pc39_15==8 | pc40_15==8
replace iqcode12_15=.d if pc38_15==9 | pc39_15==9 | pc40_15==9
replace iqcode12_15=3 if pc38_15==2
replace iqcode12_15=pc39_15 if inlist(pc39_15,1,2)
replace iqcode12_15=4 if pc40_15==2
replace iqcode12_15=5 if pc40_15==1

* Handling money for shopping
gen iqcode13_15=.
replace iqcode13_15=.r if pc41_15==8 | pc42_15==8 | pc43_15==8
replace iqcode13_15=.d if pc41_15==9 | pc42_15==9 | pc43_15==9
replace iqcode13_15=3 if pc41_15==2
replace iqcode13_15=pc42_15 if inlist(pc42_15,1,2)
replace iqcode13_15=4 if pc43_15==2
replace iqcode13_15=5 if pc43_15==1

* Handling financial matters
gen iqcode14_15=.
replace iqcode14_15=.r if pc44_15==8 | pc45_15==8 | pc46_15==8
replace iqcode14_15=.d if pc44_15==9 | pc45_15==9 | pc46_15==9
replace iqcode14_15=3 if pc44_15==2
replace iqcode14_15=pc45_15 if inlist(pc45_15,1,2)
replace iqcode14_15=4 if pc46_15==2
replace iqcode14_15=5 if pc46_15==1

* Handling other everyname_day_15 arithmetic problems
gen iqcode15_15=.
replace iqcode15_15=.r if pc47_15==8 | pc48_15==8 | pc49_15==8
replace iqcode15_15=.d if pc47_15==9 | pc48_15==9 | pc49_15==9
replace iqcode15_15=3 if pc47_15==2
replace iqcode15_15=pc48_15 if inlist(pc48_15,1,2)
```

```
replace iqcode15_15=4 if pc49_15==2
replace iqcode15_15=5 if pc49_15==1

* Using his/her intelligence to understand what's going on and to
reason things through
gen iqcode16_15=.
replace iqcode16_15=.r if pc50_15==8 | pc51_15==8 | pc52_15==8
replace iqcode16_15=.d if pc50_15==9 | pc51_15==9 | pc52_15==9
replace iqcode16_15=3 if pc50_15==2
replace iqcode16_15=pc51_15 if inlist(pc51_15,1,2)
replace iqcode16_15=4 if pc52_15==2
replace iqcode16_15=5 if pc52_15==1


***  TOTAL IQCODE SCORE (score 1-5) ***
egen iqcode= rowmean(iqcode1_15 iqcode2_15 iqcode3_15 iqcode4_15
iqcode5_15 iqcode6_15 iqcode7_15 iqcode8_15 iqcode9_15 iqcode10_15
iqcode11_15 iqcode12_15 iqcode13_15 iqcode14_15 iqcode15_15
iqcode16_15) if inlist(tipent_15,3,4)

gen iqcode_15= round(iqcode,0.1)
replace iqcode_15 = .d if [iqcode1_15==.d | iqcode2_15==.d |
iqcode3_15==.d | iqcode4_15==.d | iqcode5_15==.d | iqcode6_15==.d |
iqcode7_15==.d | iqcode8_15==.d | iqcode9_15==.d | iqcode10_15==.d |
iqcode11_15==.d | iqcode12_15==.d | iqcode13_15==.d | iqcode14_15==.d
| iqcode15_15==.d | iqcode16_15==.d]
replace iqcode_15 = .r if [iqcode1_15==.r | iqcode2_15==.r |
iqcode3_15==.r | iqcode4_15==.r | iqcode5_15==.r | iqcode6_15==.r |
iqcode7_15==.r | iqcode8_15==.r | iqcode9_15==.r | iqcode10_15==.r |
iqcode11_15==.r | iqcode12_15==.r | iqcode13_15==.r | iqcode14_15==.r
| iqcode15_15==.r | iqcode16_15==.r]
replace iqcode_15 = .c if inlist(tipent_15,1,2)
label variable iqcode_15 "MHAS 2015 IQCODE Score (1-5)"


*** COGNITIVE IMPAIRMENT - IQCODE (only proxy interviews) ***
gen cog_imp_iqcode_15 = .
replace cog_imp_iqcode_15=0 if inrange(iqcode_15,1,3.4)
replace cog_imp_iqcode_15=1 if inrange(iqcode_15,3.4,5)
replace cog_imp_iqcode_15 = .d if iqcode_15==.d
replace cog_imp_iqcode_15 = .r if iqcode_15==.r
replace cog_imp_iqcode_15 = .c if inlist(tipent_15,1,2)
replace cog_imp_iqcode_15 = .i if inlist(tipent_15,21,22) & pc1_15==.
label variable cog_imp_iqcode_15 "MHAS 2015 IQ CODE Cognitive
Impairment - Normal, Impaired"
label define imp_iqcode 0 "Normal" 1 "Impaired", replace
label values cog_imp_iqcode_15 imp_iqcode
```

```
drop iqcode iqcode*_15
```

Appendix II. STATA Codes for the Creation of Z-Scores and the Classification of Subjects

The following STATA codes can be used to construct the z-scores for each task and total cognition score included in the 2001, 2003, 2012, and 2015 waves. In addition, we provide the code for the cognitive function classification (categories Normal, CIND, Dementia).

2001

```
*********************************************************
**** MHAS 2001 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*********************************************************

label data "Version 3. December 2021"

*** CREATING Z-SCORES & IMPAIREMENT STATUS VARIABLES ***
***          BY TOTAL SCORE, TASK & DOMAIN           ***

*** CCCE Total Score (0-80) ***
** Z-SCORES **
gen ccce_z_score_01=.
replace        ccce_z_score_01=-3.0   if [ [ inrange(ccce_01 ,    0    ,     4
     )     & yrschool==0] |      [ inrange(ccce_01 ,   0    ,     8    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   0    ,     18   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace        ccce_z_score_01=-2.0   if [ [ inrange(ccce_01 ,    4    ,     12
     )     & yrschool==0] |      [ inrange(ccce_01 ,   8    ,     18   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   18   ,     32   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace        ccce_z_score_01=-1.5   if [ [ inrange(ccce_01 ,    12   ,     17
     )     & yrschool==0] |      [ inrange(ccce_01 ,   18   ,     23   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   32   ,     38   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=-1.0  if [ [ inrange(ccce_01 ,    17   ,     24   )
     & yrschool==0] |      [ inrange(ccce_01 ,   23   ,     31   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   38   ,     46   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=0.0         if [ [ inrange(ccce_01 ,    24   ,     41
     )     & yrschool==0] |      [ inrange(ccce_01 ,   31   ,     50   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   46   ,     64   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=1.0         if [ [ inrange(ccce_01 ,    41   ,     48
     )     & yrschool==0] |      [ inrange(ccce_01 ,   50   ,     58   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   64   ,     72   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=1.5         if [ [ inrange(ccce_01 ,    48   ,     53
     )     & yrschool==0] |      [ inrange(ccce_01 ,   58   ,     63   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   72   ,     77   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=2.0         if [ [ inrange(ccce_01 ,    53   ,     63
     )     & yrschool==0] |      [ inrange(ccce_01 ,   63   ,     73   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   77   ,     80   )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace    ccce_z_score_01=3.0         if [ [ inrange(ccce_01 ,    63   ,     80
     )     & yrschool==0] |      [ inrange(ccce_01 ,   73   ,     80   )     &
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```
inrange(yrschool,1,6)]
                                    ]     & inrange(edad_01,18,69)

replace        ccce_z_score_01=-3.0   if [ [ inrange(ccce_01 ,   0    ,    7
     )    & yrschool==0] |      [ inrange(ccce_01 ,   0    ,    5    )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   0    ,    9    )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace        ccce_z_score_01=-2.0   if [ [ inrange(ccce_01 ,   7    ,    10
     )    & yrschool==0] |      [ inrange(ccce_01 ,   5    ,    13   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   9    ,    24   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace        ccce_z_score_01=-1.5   if [ [ inrange(ccce_01 ,   10   ,    14
     )    & yrschool==0] |      [ inrange(ccce_01 ,   13   ,    18   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   24   ,    30   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=-1.0  if [ [ inrange(ccce_01 ,   14   ,    20   )
     & yrschool==0] |      [ inrange(ccce_01 ,   18   ,    25   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   30   ,    39   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=0.0         if [ [ inrange(ccce_01 ,   20   ,    35
     )    & yrschool==0] |      [ inrange(ccce_01 ,   25   ,    43   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   39   ,    59   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=1.0         if [ [ inrange(ccce_01 ,   35   ,    41
     )    & yrschool==0] |      [ inrange(ccce_01 ,   43   ,    51   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   59   ,    67   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=1.5         if [ [ inrange(ccce_01 ,   41   ,    46
     )    & yrschool==0] |      [ inrange(ccce_01 ,   51   ,    56   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   67   ,    73   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=2.0         if [ [ inrange(ccce_01 ,   46   ,    55
     )    & yrschool==0] |      [ inrange(ccce_01 ,   56   ,    58   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   73   ,    79   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)
replace    ccce_z_score_01=3.0         if [ [ inrange(ccce_01 ,   55   ,    80
     )    & yrschool==0] |      [ inrange(ccce_01 ,   58   ,   80     )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   79   ,    80   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,70,79)


replace        ccce_z_score_01=-3.0   if [

                                                    [ inrange(ccce_01 ,   0
     ,    9    )    & inrange(yrschool,7,25)]  ]    & inrange(edad_01,80,129)
replace        ccce_z_score_01=-2.0   if [ [ inrange(ccce_01 ,   0    ,    4
     )    & yrschool==0] |      [ inrange(ccce_01 ,   0    ,    5    )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   9    ,    17   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,80,129)
replace        ccce_z_score_01=-1.5   if [ [ inrange(ccce_01 ,   4    ,    8
     )    & yrschool==0] |      [ inrange(ccce_01 ,   5    ,    11   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   17   ,    23   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,80,129)
replace    ccce_z_score_01=-1.0  if [ [ inrange(ccce_01 ,   8    ,    15   )
     & yrschool==0] |      [ inrange(ccce_01 ,   11   ,    19   )    &
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inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   23    ,     30    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace    ccce_z_score_01=0.0         if [ [ inrange(ccce_01 ,   15    ,     30
     )     & yrschool==0] |      [ inrange(ccce_01 ,   19    ,     37    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   30    ,     48    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace    ccce_z_score_01=1.0         if [ [ inrange(ccce_01 ,   30    ,     38
     )     & yrschool==0] |      [ inrange(ccce_01 ,   37    ,     45    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   48    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace    ccce_z_score_01=1.5         if [ [ inrange(ccce_01 ,   38    ,     47
     )     & yrschool==0] |      [ inrange(ccce_01 ,   45    ,     51    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   55    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace    ccce_z_score_01=2.0         if [ [ inrange(ccce_01 ,   47    ,     63
     )     & yrschool==0] |      [ inrange(ccce_01 ,   51    ,     67    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   60    ,     78    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace    ccce_z_score_01=3.0         if [ [ inrange(ccce_01 ,   63    ,     80
     )     & yrschool==0] |      [ inrange(ccce_01 ,   67    ,     80    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_01 ,   78    ,     80    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)

replace    ccce_z_score_01= ccce_01 if mi(ccce_01) & ccce_z_score_01==.
replace    ccce_z_score_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
ccce_z_score_01==.
replace    ccce_z_score_01= .p if inlist(tipent_01,21,22)
label variable ccce_z_score_01 "MHAS 2001 CCCE Z-Scores"

** Impairment Status  **
gen cognitive_imp_01 = .
label variable cognitive_imp_01 "MHAS 2001 Cognitive Impairment (Total CCCE)"
* edad_01 69< & Years of Education=0
replace cognitive_imp_01=2 if inrange(edad_01,18,69) & yrschool==0 &
inrange(ccce_01,0,12)
replace cognitive_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inrange(ccce_01,12,17)
replace cognitive_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inrange(ccce_01,17,80)
* edad_01 69< & Years of Education 1-6
replace cognitive_imp_01=2  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(ccce_01,0,18)
replace cognitive_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(ccce_01,18,23)
replace cognitive_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(ccce_01,23,80)
* edad_01 69< & Years of Education 7+
replace cognitive_imp_01=2  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(ccce_01,0,32)
replace cognitive_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(ccce_01,32,38)
replace cognitive_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(ccce_01,38,80)

* edad_01 70-79 & Years of Education=0
```

```
replace cognitive_imp_01=2 if inrange(edad_01,70,79) & yrschool==0 &
inrange(ccce_01,0,10)
replace cognitive_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inrange(ccce_01,10,14)
replace cognitive_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inrange(ccce_01,14,80)
* edad_01 70-79 & Years of Education 1-6
replace cognitive_imp_01=2 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(ccce_01,0,13)
replace cognitive_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(ccce_01,13,18)
replace cognitive_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(ccce_01,18,80)
* edad_01 70-79 & Years of Education 7+
replace cognitive_imp_01=2 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(ccce_01,0,24)
replace cognitive_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(ccce_01,24,30)
replace cognitive_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(ccce_01,30,80)

* edad_01 80+ & Years of Education=0
replace cognitive_imp_01=2 if inrange(edad_01,80,120) & yrschool==0 &
inrange(ccce_01,0,4)
replace cognitive_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inrange(ccce_01,4,8)
replace cognitive_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inrange(ccce_01,8,80)
* edad_01 80+ & Years of Education 1-6
replace cognitive_imp_01=2 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(ccce_01,0,5)
replace cognitive_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(ccce_01,5,11)
replace cognitive_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(ccce_01,11,80)
* edad_01 80+ & Years of Education 7+
replace cognitive_imp_01=2 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(ccce_01,0,17)
replace cognitive_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(ccce_01,17,23)
replace cognitive_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(ccce_01,23,80)

replace cognitive_imp_01= ccce_01 if mi(ccce_01) & cognitive_imp_01==.
replace cognitive_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
cognitive_imp_01==.
replace cognitive_imp_01= .p if inlist(tipent_01,21,22)
label define cognitive_imp_01 0 "0.Normal" 1 "1.MCI" 2 "2.Impaired", replace
label values cognitive_imp_01 cognitive_imp_01


*** VERBAL LEARNING ***
** Z-SCORES **
gen iwr_z_01=.
replace iwr_z_01=-3.0 if [[ inrange(iwr_01, 0     ,     2     )     & yrschool==0] |
     [ inrange(iwr_01,     0     ,     2     )     & inrange(yrschool,1,6)] | [
```

```
inrange(iwr_01, 0    ,    3    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,18,69)
replace iwr_z_01=-2.0 if [
                [ inrange(iwr_01,    2    ,    3    )    &
inrange(yrschool,1,6)] |   [ inrange(iwr_01,    3    ,   4 )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,18,69)
replace iwr_z_01=-1.5 if [[ inrange(iwr_01, 2    ,    3    )    & yrschool==0] |
     [ inrange(iwr_01,    3    ,    4    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01, 4    ,    5    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,18,69)
replace iwr_z_01=-1.0 if [[ inrange(iwr_01, 3    ,    4    )    & yrschool==0] |
     [ inrange(iwr_01,    4    ,    5    )    & inrange(yrschool,1,6)]

     ]    & inrange(edad_01,18,69)
replace iwr_z_01= 0.0 if [[ inrange(iwr_01, 4    ,    5    )    & yrschool==0] |
     [ inrange(iwr_01,    5    ,    6    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01, 5    ,    7    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,18,69)
replace iwr_z_01= 1.0 if [[ inrange(iwr_01, 5    ,    6    )    & yrschool==0] |
     [ inrange(iwr_01,    6    ,    7    )    & inrange(yrschool,1,6)]

     ]    & inrange(edad_01,18,69)
replace iwr_z_01= 1.5 if [[ inrange(iwr_01, 6    ,    7    )    & yrschool==0] |

     [ inrange(iwr_01,    7    ,    8    )    & inrange(yrschool,7,25)]  ]
     & inrange(edad_01,18,69)
replace iwr_z_01= 2.0 if [[ inrange(iwr_01, 7    ,    8    )    & yrschool==0] |
     [ inrange(iwr_01,    7    ,    8    )    & inrange(yrschool,1,6)] | [
inlist(iwr_01,  8              )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,18,69)
replace iwr_z_01= 3.0 if [[ inlist(iwr_01,  8              )    & yrschool==0] |
     [ inlist(iwr_01, 8              )    & inrange(yrschool,1,6)]
                                                                        ]
     & inrange(edad_01,18,69)

replace iwr_z_01=-3.0 if [[ inrange(iwr_01, 0    ,    2    )    & yrschool==0] |
     [ inrange(iwr_01,    0    ,    2    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01, 0    ,    3    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,70,79)
replace iwr_z_01=-2.0 if [[ inrange(iwr_01, 2    ,    3    )    & yrschool==0] |
     [ inrange(iwr_01,    2    ,    3    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01, 3    ,    4    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,70,79)
replace iwr_z_01=-1.5 if [
                [ inrange(iwr_01,    3    ,    4    )    &
inrange(yrschool,1,6)]
                                ]    & inrange(edad_01,70,79)
replace iwr_z_01=-1.0 if [[ inrange(iwr_01, 3    ,    4    )    & yrschool==0] |

     [ inrange(iwr_01,    4    ,    5    )    & inrange(yrschool,7,25)]  ]
     & inrange(edad_01,70,79)
replace iwr_z_01= 0.0 if [[ inrange(iwr_01, 4    ,    5    )    & yrschool==0] |
     [ inrange(iwr_01,    4    ,    6    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01, 5    ,    6    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,70,79)
```

```
replace iwr_z_01= 1.0 if [[ inrange(iwr_01, 5    ,    6    )    & yrschool==0] |

     [ inrange(iwr_01,    6    ,    7    )    & inrange(yrschool,7,25)]  ]
     & inrange(edad_01,70,79)
replace iwr_z_01= 1.5 if [[ inrange(iwr_01, 6    ,    7    )    & yrschool==0] |
     [ inrange(iwr_01,    6    ,    7    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  7    ,    8    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,70,79)
replace iwr_z_01= 2.0 if [[ inrange(iwr_01, 7    ,    8    )    & yrschool==0] |
     [ inrange(iwr_01,    7    ,    8    )    & inrange(yrschool,1,6)] | [
inlist(iwr_01,  8              )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,70,79)
replace iwr_z_01= 3.0 if [[ inlist(iwr_01,  8              )    & yrschool==0] |
     [ inlist(iwr_01, 8              )    & inrange(yrschool,1,6)]
                                                                    ]
     & inrange(edad_01,70,79)

replace iwr_z_01=-3.0 if [[ inrange(iwr_01, 0    ,    1    )    & yrschool==0] |
     [ inrange(iwr_01,    0    ,    1    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  0    ,    1    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01=-2.0 if [[ inrange(iwr_01, 1    ,    2    )    & yrschool==0] |
     [ inrange(iwr_01,    1    ,    2    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  1    ,    2    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01=-1.5 if [[ inrange(iwr_01, 2    ,    3    )    & yrschool==0] |
     [ inrange(iwr_01,    2    ,    3    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  2    ,    3    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01=-1.0 if [
               [ inrange(iwr_01,    3    ,    4    )    &
inrange(yrschool,1,6)] |   [ inrange(iwr_01,    3    ,    4    )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_01,80,129)
replace iwr_z_01= 0.0 if [[ inrange(iwr_01, 3    ,    5    )    & yrschool==0] |
     [ inrange(iwr_01,    4    ,    5    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  4    ,    5    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01= 1.0 if [[ inrange(iwr_01, 5    ,    6    )    & yrschool==0] |
     [ inrange(iwr_01,    5    ,    6    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  5    ,    6    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01= 1.5 if [[ inrange(iwr_01, 6    ,    7    )    & yrschool==0] |
     [ inrange(iwr_01,    6    ,    7    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  6    ,    7    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01= 2.0 if [[ inrange(iwr_01, 7    ,    8    )    & yrschool==0] |
     [ inrange(iwr_01,    7    ,    8    )    & inrange(yrschool,1,6)] | [
inrange(iwr_01,  7    ,    8    )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)
replace iwr_z_01= 3.0 if [[ inlist(iwr_01,  8              )    & yrschool==0] |
     [ inlist(iwr_01, 8              )    & inrange(yrschool,1,6)] | [
inlist(iwr_01,  8              )    & inrange(yrschool,7,25)]  ]    &
inrange(edad_01,80,129)

replace iwr_z_01= iwr_01 if mi(iwr_01) & iwr_z_01==.
replace iwr_z_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] & iwr_z_01==.
```

```
replace iwr_z_01= .p if inlist(tipent_01,21,22)
label variable iwr_z_01 "MHAS 2001 Verbal Learning - Z-Scores"

** Impairment Status **
gen iwr_imp_01 = .
label variable iwr_imp_01 "MHAS 2001 Verbal Learning - Normal/Impaired"
* edad_01 69< & Years of Education=0
replace iwr_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inrange(iwr_01,0,3)
replace iwr_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inrange(iwr_01,3,8)
* edad_01 69< & Years of Education 1-6
replace iwr_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(iwr_01,0,4)
replace iwr_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(iwr_01,4,8)
* edad_01 69< & Years of Education 7+
replace iwr_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(iwr_01,0,5)
replace iwr_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(iwr_01,5,8)

* edad_01 70-79 & Years of Education=0
replace iwr_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inrange(iwr_01,0,3)
replace iwr_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inrange(iwr_01,3,8)
* edad_01 70-79 & Years of Education 1-6
replace iwr_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(iwr_01,0,4)
replace iwr_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(iwr_01,4,8)
* edad_01 70-79 & Years of Education 7+
replace iwr_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(iwr_01,0,4)
replace iwr_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(iwr_01,4,8)

* edad_01 80+ & Years of Education=0
replace iwr_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inrange(iwr_01,0,3)
replace iwr_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inrange(iwr_01,3,8)
* edad_01 80+ & Years of Education 1-6
replace iwr_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(iwr_01,0,3)
replace iwr_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(iwr_01,3,8)
* edad_01 80+ & Years of Education 7+
replace iwr_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(iwr_01,0,3)
replace iwr_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(iwr_01,3,8)

replace iwr_imp_01= iwr_01 if mi(iwr_01) & iwr_imp_01==.
```

```
replace iwr_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
iwr_imp_01==.
replace iwr_imp_01= .p if inlist(tipent_01,21,22)
label define cognitive_01 0 "0.Normal" 1 "1.Impaired", replace
label values iwr_imp_01 cognitive_01


*** DELAYED VERBAL RECALL ***
** Z-SCORES **
gen dwr_z_01=.
replace dwr_z_01= 2.0 if [[ inlist(dwr_01,  8               )     & yrschool==0] |
     [ inlist(dwr_01, 8               )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(edad_01,18,69)
replace dwr_z_01= 1.5 if [[ inlist(dwr_01,  7               )     & yrschool==0] |
     [ inlist(dwr_01, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   8              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01= 1.0 if [[ inlist(dwr_01,  6               )     & yrschool==0] |
     [ inlist(dwr_01, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   7              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01= 0.0 if [[ inrange(dwr_01, 3    ,     5    )     & yrschool==0] |
     [ inlist(dwr_01, 4    ,     5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   5    ,     6    )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01=-1.0 if [[ inlist(dwr_01,  2               )     & yrschool==0] |
     [ inlist(dwr_01, 3               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   4              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01=-1.5 if [[ inlist(dwr_01,  1               )     & yrschool==0] |
     [ inlist(dwr_01, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   3              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01=-2.0 if [[ inlist(dwr_01,  0               )     & yrschool==0] |
     [ inlist(dwr_01, 0    ,     1    )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   2              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)
replace dwr_z_01=-3.0 if [

                     [ inlist(dwr_01, 0    ,     1    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)

replace dwr_z_01= 2.0 if [[ inlist(dwr_01,  8               )     & yrschool==0] |
     [ inlist(dwr_01, 8               )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(edad_01,70,79)
replace dwr_z_01= 1.5 if [[ inlist(dwr_01,  7               )     & yrschool==0] |
     [ inlist(dwr_01, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   8              )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
replace dwr_z_01= 1.0 if [[ inlist(dwr_01,  5    ,     6    )     & yrschool==0] |
     [ inlist(dwr_01, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   6    ,     7    )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
```

```
replace dwr_z_01= 0.0 if [[ inlist(dwr_01,  3     ,     4     )     & yrschool==0] |
     [ inrange(dwr_01,     3     ,     5     )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
replace dwr_z_01=-1.0 if [[ inlist(dwr_01,  2                 )     & yrschool==0] |
     [ inlist(dwr_01, 2                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   3                 )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
replace dwr_z_01=-1.5 if [[ inlist(dwr_01,  1                 )     & yrschool==0] |
     [ inlist(dwr_01, 1                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   2                 )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
replace dwr_z_01=-2.0 if [[ inlist(dwr_01,  0                 )     & yrschool==0] |
     [ inlist(dwr_01, 0                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)

replace dwr_z_01= 3.0 if [[ inlist(dwr_01,  8                 )     & yrschool==0]


                ]     & inrange(edad_01,80,129)
replace dwr_z_01= 2.0 if [[ inlist(dwr_01,  7                 )     & yrschool==0] |
     [ inlist(dwr_01, 7     ,     8     )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(edad_01,80,129)
replace dwr_z_01= 1.5 if [[ inlist(dwr_01,  6                 )     & yrschool==0] |
     [ inlist(dwr_01, 6                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)
replace dwr_z_01= 1.0 if [[ inlist(dwr_01,  5                 )     & yrschool==0] |
     [ inlist(dwr_01, 5                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)
replace dwr_z_01= 0.0 if [[ inrange(dwr_01, 2     ,     4     )     & yrschool==0] |
     [ inrange(dwr_01,     2     ,     4     )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)
replace dwr_z_01=-1.0 if [[ inlist(dwr_01,  1                 )     & yrschool==0] |
     [ inlist(dwr_01, 1                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)
replace dwr_z_01=-1.5 if [[ inlist(dwr_01,  0                 )     & yrschool==0] |
     [ inlist(dwr_01, 0                 )     & inrange(yrschool,1,6)] | [
inlist(dwr_01,   0                 )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)

replace dwr_z_01= dwr_01 if mi(dwr_01) & dwr_z_01==.
replace dwr_z_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] & dwr_z_01==.
replace dwr_z_01= .p if inlist(tipent_01,21,22)
label variable dwr_z_01 "MHAS 2001 Delayed Verbal Recall - Z-Scores"

** Impairment Status **
gen dwr_imp_01 = .
label variable dwr_imp_01 "MHAS 2001 Delayed Verbal Recall - Normal/Impaired"
* edad_01 69< & Years of Education=0
```

```
replace dwr_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inrange(dwr_01,0,2)
replace dwr_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inrange(dwr_01,2,8)
* edad_01 69< & Years of Education 1-6
replace dwr_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(dwr_01,0,3)
replace dwr_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(dwr_01,3,8)
* edad_01 69< & Years of Education 7+
replace dwr_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(dwr_01,0,4)
replace dwr_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,7,25) &
inrange(dwr_01,4,8)

* edad_01 70-79 & Years of Education=0
replace dwr_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inrange(dwr_01,0,2)
replace dwr_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inrange(dwr_01,2,8)
* edad_01 70-79 & Years of Education 1-6
replace dwr_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(dwr_01,0,2)
replace dwr_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(dwr_01,2,8)
* edad_01 70-79 & Years of Education 7+
replace dwr_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(dwr_01,0,3)
replace dwr_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(dwr_01,3,8)

* edad_01 80+ & Years of Education=0
replace dwr_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inrange(dwr_01,0,1)
replace dwr_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inrange(dwr_01,1,8)
* edad_01 80+ & Years of Education 1-6
replace dwr_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(dwr_01,0,1)
replace dwr_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(dwr_01,1,8)
* edad_01 80+ & Years of Education 7+
replace dwr_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(dwr_01,0,1)
replace dwr_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,7,25) &
inrange(dwr_01,1,8)

replace dwr_imp_01= dwr_01 if mi(dwr_01) & dwr_imp_01==.
replace dwr_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
dwr_imp_01==.
replace dwr_imp_01= .p if inlist(tipent_01,21,22)
label values dwr_imp_01 cognitive_01


*** CONSTRUCTIONAL PRAXIS RECALL ***
** Z-SCORES **
```

```
gen construction_m_z_01=.
replace construction_m_z_01= 0.0 if [[ inlist(construction_m_01,  2
     )     & yrschool==0] | [ inlist(construction_m_01,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_01,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace construction_m_z_01=-1.0 if [[ inlist(construction_m_01,  1
     )     & yrschool==0]

                                                                      ]     &
inrange(edad_01,18,69)
replace construction_m_z_01=-1.5 if [
                                       [ inlist(construction_m_01,1
     )     & inrange(yrschool,1,6)]
                                                          ]     &
inrange(edad_01,18,69)
replace construction_m_z_01=-2.0 if [

                                                          [ inlist(construction_m_01,
     1               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)

replace construction_m_z_01=-3.0 if [[ inlist(construction_m_01,  0
     )     & yrschool==0] | [ inlist(construction_m_01,0               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_01,0               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)

replace construction_m_z_01= 1.0 if [[ inlist(construction_m_01,  2
     )     & yrschool==0]

                                                                      ]     &
inrange(edad_01,70,79)
replace construction_m_z_01= 0.0 if [[ inlist(construction_m_01,  1
     )     & yrschool==0] | [ inlist(construction_m_01,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_01,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace construction_m_z_01=-1.0 if [
                                       [ inlist(construction_m_01,1
     )     & inrange(yrschool,1,6)]
                                                          ]     &
inrange(edad_01,70,79)
replace construction_m_z_01=-1.5 if [

                                                          [ inlist(construction_m_01,
     1               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
replace construction_m_z_01=-2.0 if [[ inlist(construction_m_01,  0
     )     & yrschool==0] | [ inlist(construction_m_01,0               )     &
inrange(yrschool,1,6)]
                                              ]     & inrange(edad_01,70,79)
replace construction_m_z_01=-3.0 if [

                                                          [ inlist(construction_m_01,
     0               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,70,79)
```

```
replace construction_m_z_01= 1.0 if [[ inlist(construction_m_01,  2
     )     & yrschool==0] |[ inlist(construction_m_01,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_01,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace construction_m_z_01= 0.0 if [[ inlist(construction_m_01,  1
     )     & yrschool==0] |[ inlist(construction_m_01,1               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_01,1               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace construction_m_z_01=-1.5 if [[ inlist(construction_m_01,  0
     )     & yrschool==0]

                                                                      ]     &
inrange(edad_01,80,129)
replace construction_m_z_01=-2.0 if [
                                       [ inlist(construction_m_01,0
     )     & inrange(yrschool,1,6)] |  [ inlist(construction_m_01,0
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,80,129)

replace construction_m_z_01= construction_m_01 if mi(construction_m_01) &
construction_m_z_01==.
replace construction_m_z_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
construction_m_z_01==.
replace construction_m_z_01= .p if inlist(tipent_01,21,22)
label variable construction_m_z_01 "MHAS 2001 Constructional Praxis Recall - Z-
Scores"

** Impairment Status **
gen construction_m_imp_01 = .
label variable construction_m_imp_01 "MHAS 2001 Constructional Praxis Recall -
Normal/Impaired"

* edad_01 69< & Years of Education=0
replace construction_m_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inlist(construction_m_01,0)
replace construction_m_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inlist(construction_m_01,1,2)
* edad_01 69< & Years of Education 1-6
replace construction_m_imp_01=1  if inrange(edad_01,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_01,0,1)
replace construction_m_imp_01=0  if inrange(edad_01,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_01,2)
* edad_01 69< & Years of Education 7+
replace construction_m_imp_01=1  if inrange(edad_01,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_01,0,1)
replace construction_m_imp_01=0  if inrange(edad_01,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_01,2)

* edad_01 70-79 & Years of Education=0
replace construction_m_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inlist(construction_m_01,0)
replace construction_m_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inlist(construction_m_01,1,2)
* edad_01 70-79 & Years of Education 1-6
replace construction_m_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6)
& inlist(construction_m_01,0)
```

```
replace construction_m_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6)
& inlist(construction_m_01,1,2)
* edad_01 70-79 & Years of Education 7+
replace construction_m_imp_01=1 if inrange(edad_01,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_01,0,1)
replace construction_m_imp_01=0 if inrange(edad_01,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_01,2)

* edad_01 80+ & Years of Education=0
replace construction_m_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inlist(construction_m_01,0)
replace construction_m_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inlist(construction_m_01,1,2)
* edad_01 80+ & Years of Education 1-6
replace construction_m_imp_01=1 if inrange(edad_01,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_01,0)
replace construction_m_imp_01=0 if inrange(edad_01,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_01,1,2)
* edad_01 80+ & Years of Education 7+
replace construction_m_imp_01=1 if inrange(edad_01,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_01,0)
replace construction_m_imp_01=0 if inrange(edad_01,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_01,1,2)

replace construction_m_imp_01= construction_m_01 if mi(construction_m_01) &
construction_m_imp_01==.
replace construction_m_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
construction_m_imp_01==.
replace construction_m_imp_01= .p if inlist(tipent_01,21,22)
label values construction_m_imp_01 cognitive_01


*** VISUAL SCANNING ***
** Z-SCORES **
gen visual_scan_z_01=.
replace visual_scan_z_01= 3.0    if [[ inrange(visual_scan_01,    46    ,     60
     )     & yrschool==0] | [ inrange(visual_scan_01,   59    ,     60    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(edad_01,18,69)
replace visual_scan_z_01= 2.0    if [[ inrange(visual_scan_01,    40    ,     45
     )     & yrschool==0] | [ inrange(visual_scan_01,   48    ,     58    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(edad_01,18,69)
replace visual_scan_z_01= 1.5    if [[ inrange(visual_scan_01,    36    ,     39
     )     & yrschool==0] | [ inrange(visual_scan_01,   43    ,     47    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   56    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace visual_scan_z_01= 1.0    if [[ inrange(visual_scan_01,    28    ,     35
     )     & yrschool==0] | [ inrange(visual_scan_01,   35    ,     42    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   47    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace visual_scan_z_01= 0.0    if [[ inrange(visual_scan_01,    14    ,     27
     )     & yrschool==0] | [ inrange(visual_scan_01,   20    ,     34    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   33    ,     46    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
```

```
replace visual_scan_z_01=-1.0    if [[ inrange(visual_scan_01,    7    ,     13
     )     & yrschool==0] |[ inrange(visual_scan_01,   12    ,     19    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   25    ,     32    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace visual_scan_z_01=-1.5    if [[ inrange(visual_scan_01,    3    ,     6
     )     & yrschool==0] |[ inrange(visual_scan_01,   7     ,     11    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   19    ,     24    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace visual_scan_z_01=-2.0    if [[ inrange(visual_scan_01,    0    ,     2
     )     & yrschool==0] |[ inrange(visual_scan_01,   0     ,     6     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   7     ,     18    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace visual_scan_z_01=-3.0    if [

                                                    [ inrange(visual_scan_01,
     0    ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,18,69)

replace visual_scan_z_01= 3.0    if [[ inrange(visual_scan_01,    39    ,     60
     )     & yrschool==0]

                                                                ]     &
inrange(edad_01,70,79)
replace visual_scan_z_01= 2.0    if [[ inrange(visual_scan_01,    32    ,     38
     )     & yrschool==0] |[ inrange(visual_scan_01,   50    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   58    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01= 1.5    if [[ inrange(visual_scan_01,    28    ,     31
     )     & yrschool==0] |[ inrange(visual_scan_01,   42    ,     49    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   52    ,     57    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01= 1.0    if [[ inrange(visual_scan_01,    22    ,     27
     )     & yrschool==0] |[ inrange(visual_scan_01,   37    ,     41    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   43    ,     51    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01= 0.0    if [[ inrange(visual_scan_01,    10    ,     21
     )     & yrschool==0] |[ inrange(visual_scan_01,   30    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   28    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01=-1.0    if [[ inrange(visual_scan_01,    4    ,     9
     )     & yrschool==0] |[ inrange(visual_scan_01,   16    ,     29    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   18    ,     27    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01=-1.5    if [[ inrange(visual_scan_01,    0    ,     3
     )     & yrschool==0] |[ inrange(visual_scan_01,   6     ,     15    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   13    ,     17    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace visual_scan_z_01=-2.0    if [
                                    [ inrange(visual_scan_01,   3     ,     5
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_01,   2     ,     12
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,70,79)
replace visual_scan_z_01=-3.0    if [
                                    [ inrange(visual_scan_01,   0     ,     2
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_01,   0     ,     1
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,70,79)
```

```
replace visual_scan_z_01= 3.0    if [
                                        [ inrange(visual_scan_01,   51    ,     60
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_01,   56    ,     60
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,80,129)
replace visual_scan_z_01= 2.0    if [[ inrange(visual_scan_01,    50    ,     60
     )     & yrschool==0] |[ inrange(visual_scan_01,   37    ,     50    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   46    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01= 1.5    if [[ inrange(visual_scan_01,    30    ,     49
     )     & yrschool==0] |[ inrange(visual_scan_01,   33    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   43    ,     45    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01= 1.0    if [[ inrange(visual_scan_01,    26    ,     29
     )     & yrschool==0] |[ inrange(visual_scan_01,   26    ,     32    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   36    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01= 0.0    if [[ inrange(visual_scan_01,    19    ,     25
     )     & yrschool==0] |[ inrange(visual_scan_01,   11    ,     25    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   21    ,     35    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01=-1.0    if [[ inrange(visual_scan_01,    7     ,     18
     )     & yrschool==0] |[ inrange(visual_scan_01,   2     ,     10    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   11    ,     20    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01=-1.5    if [[ inrange(visual_scan_01,    1     ,     6
     )     & yrschool==0] |[ inrange(visual_scan_01,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_01,   8     ,     10    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace visual_scan_z_01=-2.0    if [[ inlist(visual_scan_01,                 0
     )     & yrschool==0] |
                                      [ inrange(visual_scan_01,   3     ,
     7     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,80,129)
replace visual_scan_z_01=-3.0    if [

                                                    [ inrange(visual_scan_01,
     0     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_01,80,129)

replace visual_scan_z_01= visual_scan_01 if mi(visual_scan_01) &
visual_scan_z_01==.
replace visual_scan_z_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
visual_scan_z_01==.
replace visual_scan_z_01= .p if inlist(tipent_01,21,22)
label variable visual_scan_z_01 "MHAS 2001 Visual Scanning - Z-Scores"

** Impairment Status **
gen visual_scan_imp_01 = .
label variable visual_scan_imp_01 "MHAS 2001 Visual Scanning - Normal/Impaired"

* edad_01 69< & Years of Education=0
replace visual_scan_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inrange(visual_scan_01,0,7)
replace visual_scan_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inrange(visual_scan_01,7,60)
* edad_01 69< & Years of Education 1-6
```

```
replace visual_scan_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_01,0,12)
replace visual_scan_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_01,12,60)
* edad_01 69< & Years of Education 7+
replace visual_scan_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,7,25)
& inrange(visual_scan_01,0,25)
replace visual_scan_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,7,25)
& inrange(visual_scan_01,25,60)

* edad_01 70-79 & Years of Education=0
replace visual_scan_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inrange(visual_scan_01,0,4)
replace visual_scan_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inrange(visual_scan_01,4,60)
* edad_01 70-79 & Years of Education 1-6
replace visual_scan_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_01,0,6)
replace visual_scan_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_01,6,60)
* edad_01 70-79 & Years of Education 7+
replace visual_scan_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_01,0,18)
replace visual_scan_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_01,18,60)

* edad_01 80+ & Years of Education=0
replace visual_scan_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inrange(visual_scan_01,0,1)
replace visual_scan_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inrange(visual_scan_01,1,60)
* edad_01 80+ & Years of Education 1-6
replace visual_scan_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_01,0,2)
replace visual_scan_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_01,2,60)
* edad_01 80+ & Years of Education 7+
replace visual_scan_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,7,25)
& inrange(visual_scan_01,0,12)
replace visual_scan_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,7,25)
& inrange(visual_scan_01,12,60)

replace visual_scan_imp_01= visual_scan_01 if mi(visual_scan_01) &
visual_scan_imp_01==.
replace visual_scan_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
visual_scan_imp_01==.
replace visual_scan_imp_01= .p if inlist(tipent_01,21,22)
label values visual_scan_imp_01 cognitive_01


*** CONSTRUCTIONAL PRAXIS ***
** Z-SCORES **
gen construction_z_01=.
replace construction_z_01= 0.0   if [[ inlist(construction_01,    2
     )     & yrschool==0] | [ inlist(construction_01,   2               )     &
```

```
inrange(yrschool,1,6)] |    [ inlist(construction_01,   2                )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)
replace construction_z_01=-1.5   if [[ inlist(construction_01,    1
     )     & yrschool==0]


                                                                    ]     &
inrange(edad_01,18,69)
replace construction_z_01=-3.0   if [[ inlist(construction_01,    0
     )     & yrschool==0] |[ inlist(construction_01,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_01,   0     ,     1     )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,18,69)

replace construction_z_01= 0.0   if [[ inlist(construction_01,    2
     )     & yrschool==0] |[ inlist(construction_01,   2                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_01,   2                )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)
replace construction_z_01=-1.0   if [[ inlist(construction_01,    1
     )     & yrschool==0] |[ inlist(construction_01,   1                )     &
inrange(yrschool,1,6)]
                                              ]     & inrange(edad_01,70,79)
replace construction_z_01=-3.0   if [[ inlist(construction_01,    0
     )     & yrschool==0] |[ inlist(construction_01,   0                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_01,   0     ,     1     )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,70,79)

replace construction_z_01= 0.0   if [[ inlist(construction_01,    2
     )     & yrschool==0] |[ inlist(construction_01,   2                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_01,   2                )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_01,80,129)
replace construction_z_01=-1.0   if [[ inlist(construction_01,    1
     )     & yrschool==0]


                                                                    ]     &
inrange(edad_01,80,129)
replace construction_z_01=-1.5   if [
                                        [ inlist(construction_01,   1
     )     & inrange(yrschool,1,6)]
                                                          ] & inrange(edad_01,80,129)
replace construction_z_01=-2.0   if [[ inlist(construction_01,    0
     )     & yrschool==0] |
                                                    [ inlist(construction_01,   1
          )     & inrange(yrschool,7,25)] ] & inrange(edad_01,80,129)
replace construction_z_01=-3.0   if [
                                        [ inlist(construction_01,   0
     )     & inrange(yrschool,1,6)] |  [ inlist(construction_01,   0
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_01,80,129)

replace construction_z_01= construction_01 if mi(construction_01) &
construction_z_01==.
replace construction_z_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
construction_z_01==.
replace construction_z_01= .p if inlist(tipent_01,21,22)
label variable construction_z_01 "MHAS 2001 Constructional Praxis - Z-Scores"

** Impairment Status **
gen construction_imp_01 = .
```

```
label variable construction_imp_01 "MHAS 2001 Constructional Praxis -
Normal/Impaired"

* edad_01 69< & Years of Education=0
replace construction_imp_01=1 if inrange(edad_01,18,69) & yrschool==0 &
inlist(construction_01,0,1)
replace construction_imp_01=0 if inrange(edad_01,18,69) & yrschool==0 &
inlist(construction_01,2)
* edad_01 69< & Years of Education 1-6
replace construction_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,1,6)
& inlist(construction_01,0,1)
replace construction_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,1,6)
& inlist(construction_01,2)
* edad_01 69< & Years of Education 7+
replace construction_imp_01=1  if inrange(edad_01,18,69) & inrange(yrschool,7,25)
& inlist(construction_01,0,1)
replace construction_imp_01=0  if inrange(edad_01,18,69) & inrange(yrschool,7,25)
& inlist(construction_01,2)

* edad_01 70-79 & Years of Education=0
replace construction_imp_01=1 if inrange(edad_01,70,79) & yrschool==0 &
inlist(construction_01,0)
replace construction_imp_01=0 if inrange(edad_01,70,79) & yrschool==0 &
inlist(construction_01,1,2)
* edad_01 70-79 & Years of Education 1-6
replace construction_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inlist(construction_01,0)
replace construction_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,1,6) &
inlist(construction_01,1,2)
* edad_01 70-79 & Years of Education 7+
replace construction_imp_01=1 if inrange(edad_01,70,79) & inrange(yrschool,7,25)
& inlist(construction_01,0,1)
replace construction_imp_01=0 if inrange(edad_01,70,79) & inrange(yrschool,7,25)
& inlist(construction_01,2)

* edad_01 80+ & Years of Education=0
replace construction_imp_01=1 if inrange(edad_01,80,120) & yrschool==0 &
inlist(construction_01,0)
replace construction_imp_01=0 if inrange(edad_01,80,120) & yrschool==0 &
inlist(construction_01,1,2)
* edad_01 80+ & Years of Education 1-6
replace construction_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,1,6)
& inlist(construction_01,0,1)
replace construction_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,1,6)
& inlist(construction_01,2)
* edad_01 80+ & Years of Education 7+
replace construction_imp_01=1 if inrange(edad_01,80,120) & inrange(yrschool,7,25)
& inlist(construction_01,0,1)
replace construction_imp_01=0 if inrange(edad_01,80,120) & inrange(yrschool,7,25)
& inlist(construction_01,2)

replace construction_imp_01= construction_01 if mi(construction_01) &
construction_imp_01==.
replace construction_imp_01= .m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
construction_imp_01==.
replace construction_imp_01= .p if inlist(tipent_01,21,22)
```

```
label values construction_imp_01 cognitive_01


***  TOTAL NUMBER OF TASKS COMPLETED (max. 5) ***
egen numb_tasks_miss_01= rowmiss(iwr_01 dwr_01 construction_m_01 visual_scan_01
construction_01) if inlist(tipent_01,11,12) & !mi(edad_01)

gen numb_tasks_comp_01= 5-numb_tasks_miss_01 if inlist(tipent_01,11,12) &
!mi(edad_01)
replace numb_tasks_comp_01= .p if inlist(tipent_01,21,22)
label variable numb_tasks_comp_01 "MHAS 2001 Number of Tasks Completed (0-5)"

drop numb_tasks_miss_01

***  TOTAL NUMBER OF TASKS WITH IMPAIRMENT IF COMPLETED 2 OR MORE TASKS(max. 5)
***
egen numb_tasks_imp_01= rowtotal(iwr_imp_01 dwr_imp_01 construction_m_imp_01
visual_scan_imp_01 construction_imp_01) ///
      if inrange(numb_tasks_comp_01,2,5)
replace numb_tasks_imp_01= .i if inrange(numb_tasks_comp_01,0,1)
replace numb_tasks_imp_01= .m if edad_01==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_01= .s if [iwr_imp_01==.s & dwr_imp_01==.s &
construction_m_imp_01==.s & ///
visual_scan_imp_01==.s & construction_imp_01==.s] & mi(numb_tasks_imp_01)
replace numb_tasks_imp_01= .p if inlist(tipent_01,21,22)
label variable numb_tasks_imp_01 "MHAS 2001 Number of Tasks with Impairment if
completed 2+ (0-5)"

gen two_more_tasks_imp_01=.
replace two_more_tasks_imp_01=0 if inrange(numb_tasks_imp_01,0,1)
replace two_more_tasks_imp_01=1 if inrange(numb_tasks_imp_01,2,5)
replace two_more_tasks_imp_01= .i if inrange(numb_tasks_comp_01,0,1)
replace two_more_tasks_imp_01= .m if edad_01==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_01= .s if [iwr_imp_01==.s & dwr_imp_01==.s &
construction_m_imp_01==.s & ///
visual_scan_imp_01==.s & construction_imp_01==.s] & mi(two_more_tasks_imp_01)
replace two_more_tasks_imp_01= .p if inlist(tipent_01,21,22)
label variable two_more_tasks_imp_01 "MHAS 2001 Dummy of 2+ Tasks with Impairment
if completed 2+ (0-1)"


*********************************************************************
********* MHAS 2001 INSTRUMENTAL ACTIVITIES OF DAILY LIVING *********
*********************************************************************

*** IADL ***
** Managing money **
gen iadl_money_01 =.
replace iadl_money_01 = .m if inlist(tipent_01,11,12,21,22) & h29_1_01 == .
replace iadl_money_01 = .d if h29_1_01 == 9
replace iadl_money_01 = .r if h29_1_01 == 8
replace iadl_money_01 = .p if inlist(tipent_01,21,22)
replace iadl_money_01 = .x if h29_1_01 == 7 & inlist(h29_2_01,8,9)
replace iadl_money_01 = 0 if h29_1_01 == 2 | (h29_1_01 == 7 & h29_2_01 == 2)
replace iadl_money_01 = 1 if inlist(h29_1_01,1,6) | (h29_1_01 == 7 & h29_2_01 ==
1)
```

```
label variable iadl_money_01 "IADLs: Difficulty Managing Money 2001"

** Taking medicines **
gen iadl_medicines_01 =.
replace iadl_medicines_01 = .m if inlist(tipent_01,11,12,21,22) & h28_1_01 == .
replace iadl_medicines_01 = .d if h28_1_01 == 9
replace iadl_medicines_01 = .r if h28_1_01 == 8
replace iadl_medicines_01 = .p if inlist(tipent_01,21,22)
replace iadl_medicines_01 = .x if h28_1_01 == 7 & inlist(h28_2_01,8,9)
replace iadl_medicines_01 = 0 if h28_1_01 == 2 | (h28_1_01 == 7 & h28_2_01 == 2)
replace iadl_medicines_01 = 1 if inlist(h28_1_01,1,6) | (h28_1_01 == 7 & h28_2_01
== 1)
label variable iadl_medicines_01 "IADLs: Difficulty Taking Medicines 2001"

** Shopping for groceries **
gen iadl_shopping_01 =.
replace iadl_shopping_01 = .m if inlist(tipent_01,11,12,21,22) & h27_1_01 == .
replace iadl_shopping_01 = .d if h27_1_01 == 9
replace iadl_shopping_01 = .r if h27_1_01 == 8
replace iadl_shopping_01 = .p if inlist(tipent_01,21,22)
replace iadl_shopping_01 = .x if h27_1_01 == 7 & inlist(h27_2_01,8,9)
replace iadl_shopping_01 = 0 if h27_1_01 == 2 | (h27_1_01 == 7 & h27_2_01 == 2)
replace iadl_shopping_01 = 1 if inlist(h27_1_01,1,6) | (h27_1_01 == 7 & h27_2_01
== 1)
label variable iadl_shopping_01 "IADLs: Difficulty Shopping for Groceries 2001"

** Cooking a hot meal **
gen iadl_cooking_01 =.
replace iadl_cooking_01 = .m if inlist(tipent_01,11,12,21,22) & h26_1_01 == .
replace iadl_cooking_01 = .d if h26_1_01 == 9
replace iadl_cooking_01 = .r if h26_1_01 == 8
replace iadl_cooking_01 = .p if inlist(tipent_01,21,22)
replace iadl_cooking_01 = .x if h26_1_01 == 7 & inlist(h26_2_01,8,9)
replace iadl_cooking_01 = 0 if h26_1_01 == 2 | (h26_1_01 == 7 & h26_2_01 == 2)
replace iadl_cooking_01 = 1 if h26_1_01 == 1 | h26_1_01 == 6 | (h26_1_01 == 7 &
h26_2_01 == 1)
label variable iadl_cooking_01 "IADLs: Difficulty Cooking a Meal 2001"
label values iadl_cooking_01 adls

** Number of Limitations with IADLs (0-4) **
egen iadls_01 = rowtotal(iadl_money_01 iadl_medicines_01 iadl_shopping_01
iadl_cooking_01) if inlist(tipent_01,11,12)
replace iadls_01 = .m if inlist(tipent_01,11,12,21,22)  & h26_1_01 == . &
h27_1_01 == . & h28_1_01 == . & h29_1_01 == . & iadls_01==.
replace iadls_01 = .d if iadl_money_01 == .d & iadl_medicines_01 == .d &
iadl_shopping_01 == .d & iadl_cooking_01 == .d
replace iadls_01 = .r if iadl_money_01 == .r & iadl_medicines_01 == .r &
iadl_shopping_01 == .r & iadl_cooking_01 == .r
replace iadls_01 = .x if iadl_money_01 == .x & iadl_medicines_01 == .x &
iadl_shopping_01 == .x & iadl_cooking_01 == .x
replace iadls_01 = .p if inlist(tipent_01,21,22)
label variable iadls_01 "Number of Limitations with IADLs 2001 (0-4)"



*********************************************************
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********* MHAS 2001 COGNITIVE STATUS ASSESSMENT  *********
*********************************************************

* COGNITIVE STATUS CLASIFICATION: 1) CIND: impairment in 2+ cognitive tasks and
NO IADLs difficulties
                                /// 2) Dementia: 2a) Proxy subjects who had a score
equal or above 3.4 in the IQCODE
                                        ///              2b) Direct interview
subjects impaired in 2+ cognitive tasks and
                                        ///                  had difficulty in one
or more IADLs
                                         /// 3) Normal with IADLS:
                                         ///              3a) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who had difficulty in one or more IADLs
                                         /// 4) Normal NO IADLS:
                                         ///              4a) Proxy respondents
with a score below 3.4 in the IQCODE
                                         ///              4b) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who did not have difficulty with IADLs

** Cognitive Status Classification using 5 tasks (if 2 or more completed) **
gen cognitive_status_01=.
replace cognitive_status_01= 3 if cog_imp_iqcode_01==1 |
[inrange(numb_tasks_imp_01,2,5) & inrange(iadls_01,1,4)]
replace cognitive_status_01= 2 if inrange(numb_tasks_imp_01,2,5) & iadls_01==0
replace cognitive_status_01= 1 if inrange(numb_tasks_imp_01,0,1) &
inrange(iadls_01,1,4)
replace cognitive_status_01= 0 if cog_imp_iqcode_01==0 |
[inrange(numb_tasks_imp_01,0,1) & iadls_01==0]
replace cognitive_status_01=.i if inrange(numb_tasks_comp_01,0,1) |
cog_imp_iqcode_01==.i
replace cognitive_status_01=.m if [edad_01==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_01==.
replace cognitive_status_01=.m if iadls_01==.m & cognitive_status_01==.
replace cognitive_status_01=.d if iadls_01==.d & cognitive_status_01==.
replace cognitive_status_01=.r if iadls_01==.r & cognitive_status_01==.
replace cognitive_status_01=.x if iadls_01==.x & cognitive_status_01==.
replace cognitive_status_01=.d if cog_imp_iqcode_01==.d & cognitive_status_01==.
replace cognitive_status_01=.r if cog_imp_iqcode_01==.r & cognitive_status_01==.
replace cognitive_status_01=.m if cog_imp_iqcode_01==.m & cognitive_status_01==.
replace cognitive_status_01=.s if numb_tasks_imp_01==.s
label variable cognitive_status_01 "MHAS 2001 Cognitive Status"
label define cognitive_status_01 0 "0.Normal" 1 "1.Normal with Instrumental
Impairment" 2 "2.CIND" 3 "3.Dementia", replace
label values cognitive_status_01 cognitive_status_01
```

2003

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*************************************************************
**** MHAS 2003 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*************************************************************

label data "Version 3. December 2021"

*** CREATING Z-SCORES & IMPAIREMENT STATUS VARIABLES ***
***          BY TOTAL SCORE, TASK & DOMAIN           ***

*** CCCE Total Score (0-83) ***
** Z-SCORES **
gen ccce_z_score_03=.
replace        ccce_z_score_03=-3.0   if [ [ inrange(ccce_03 ,   0    ,    5
     )    & yrschool==0] |      [ inrange(ccce_03 ,   0    ,    9    )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   0    ,    22   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace        ccce_z_score_03=-2.0   if [ [ inrange(ccce_03 ,   5    ,    14
     )    & yrschool==0] |      [ inrange(ccce_03 ,   9    ,    21   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   22   ,    35   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace        ccce_z_score_03=-1.5   if [ [ inrange(ccce_03 ,   14   ,    19
     )    & yrschool==0] |      [ inrange(ccce_03 ,   21   ,    26   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   35   ,    41   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=-1.0  if [ [ inrange(ccce_03 ,   19   ,    26   )
     & yrschool==0] |      [ inrange(ccce_03 ,   26   ,    34   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   41   ,    48   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=0.0        if [ [ inrange(ccce_03 ,   26   ,    44
     )    & yrschool==0] |      [ inrange(ccce_03 ,   34   ,    53   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   48   ,    67   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=1.0        if [ [ inrange(ccce_03 ,   44   ,    51
     )    & yrschool==0] |      [ inrange(ccce_03 ,   53   ,    60   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   67   ,    75   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=1.5        if [ [ inrange(ccce_03 ,   51   ,    57
     )    & yrschool==0] |      [ inrange(ccce_03 ,   60   ,    66   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   75   ,    81   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=2.0        if [ [ inrange(ccce_03 ,   57   ,    69
     )    & yrschool==0] |      [ inrange(ccce_03 ,   66   ,    79   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   81   ,    83   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,18,69)
replace    ccce_z_score_03=3.0        if [ [ inrange(ccce_03 ,   69   ,    83
     )    & yrschool==0] |      [ inrange(ccce_03 ,   79   ,    83   )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(edad_03,18,69)

replace        ccce_z_score_03=-3.0   if [ [ inrange(ccce_03 ,   0    ,    8
     )    & yrschool==0] |      [ inrange(ccce_03 ,   0    ,    6    )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   0    ,    12   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
```

```
replace        ccce_z_score_03=-2.0   if [ [ inrange(ccce_03 ,   8    ,    12
     )    & yrschool==0] |      [ inrange(ccce_03 ,   6    ,    15   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   12   ,    26   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace        ccce_z_score_03=-1.5   if [ [ inrange(ccce_03 ,   12   ,    16
     )    & yrschool==0] |      [ inrange(ccce_03 ,   15   ,    21   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   26   ,    33   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=-1.0  if [ [ inrange(ccce_03 ,   16   ,    22   )
     & yrschool==0] |      [ inrange(ccce_03 ,   21   ,    28   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   33   ,    41   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=0.0        if [ [ inrange(ccce_03 ,   22   ,    37
     )    & yrschool==0] |      [ inrange(ccce_03 ,   28   ,    46   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   41   ,    62   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=1.0        if [ [ inrange(ccce_03 ,   37   ,    44
     )    & yrschool==0] |      [ inrange(ccce_03 ,   46   ,    53   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   62   ,    70   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=1.5        if [ [ inrange(ccce_03 ,   44   ,    49
     )    & yrschool==0] |      [ inrange(ccce_03 ,   53   ,    59   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   70   ,    76   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=2.0        if [ [ inrange(ccce_03 ,   49   ,    56
     )    & yrschool==0] |      [ inrange(ccce_03 ,   59   ,    72   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   76   ,    83   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,70,79)
replace    ccce_z_score_03=3.0        if [ [ inrange(ccce_03 ,   56   ,    83
     )    & yrschool==0] |      [ inrange(ccce_03 ,   72   ,    83   )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(edad_03,70,79)

replace        ccce_z_score_03=-3.0   if [
                                       [ inrange(ccce_03 ,   0    ,    4
     )    & inrange(yrschool,1,6)] |       [ inrange(ccce_03 ,   0    ,    12
     )    & inrange(yrschool,7,25)]  ]     & inrange(edad_03,80,129)
replace        ccce_z_score_03=-2.0   if [ [ inrange(ccce_03 ,   0    ,    7
     )    & yrschool==0] |      [ inrange(ccce_03 ,   4    ,    7    )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   12   ,    20   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,80,129)
replace        ccce_z_score_03=-1.5   if [ [ inrange(ccce_03 ,   7    ,    10
     )    & yrschool==0] |      [ inrange(ccce_03 ,   7    ,    13   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   20   ,    25   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,80,129)
replace    ccce_z_score_03=-1.0  if [ [ inrange(ccce_03 ,   10   ,    16   )
     & yrschool==0] |      [ inrange(ccce_03 ,   13   ,    21   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   25   ,    32   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,80,129)
replace    ccce_z_score_03=0.0        if [ [ inrange(ccce_03 ,   16   ,    33
     )    & yrschool==0] |      [ inrange(ccce_03 ,   21   ,    40   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   32   ,    50   )    &
inrange(yrschool,7,25)]    ]    & inrange(edad_03,80,129)
replace    ccce_z_score_03=1.0        if [ [ inrange(ccce_03 ,   33   ,    41
     )    & yrschool==0] |      [ inrange(ccce_03 ,   40   ,    48   )    &
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```
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   50    ,     57    )     &
inrange(yrschool,7,25)]    ]     & inrange(edad_03,80,129)
replace    ccce_z_score_03=1.5         if [ [ inrange(ccce_03 ,   41    ,     45
     )     & yrschool==0] |      [ inrange(ccce_03 ,   48    ,     54    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   57    ,     65    )     &
inrange(yrschool,7,25)]    ]     & inrange(edad_03,80,129)
replace    ccce_z_score_03=2.0         if [ [ inrange(ccce_03 ,   45    ,     53
     )     & yrschool==0] |      [ inrange(ccce_03 ,   54    ,     66    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   65    ,     72    )     &
inrange(yrschool,7,25)]    ]     & inrange(edad_03,80,129)
replace    ccce_z_score_03=3.0         if [ [ inrange(ccce_03 ,   53    ,     83
     )     & yrschool==0] |      [ inrange(ccce_03 ,   66    ,     83    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_03 ,   72    ,     83    )     &
inrange(yrschool,7,25)]    ]     & inrange(edad_03,80,129)

replace    ccce_z_score_03= ccce_03 if mi(ccce_03) & ccce_z_score_03==.
replace    ccce_z_score_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
ccce_z_score_03==.
replace    ccce_z_score_03= .p if inlist(tipent_03,21,22)
label variable ccce_z_score_03 "MHAS 2003 CCCE Z-Scores"

** Impairment Status  **
gen cognitive_imp_03 = .
label variable cognitive_imp_03 "MHAS 2003 Cognitive Impairment (Total CCCE)"
* edad_03 69< & Years of Education=0
replace cognitive_imp_03=2 if inrange(edad_03,18,69) & yrschool==0 &
inrange(ccce_03,0,14)
replace cognitive_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inrange(ccce_03,14,19)
replace cognitive_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inrange(ccce_03,19,83)
* edad_03 69< & Years of Education 1-6
replace cognitive_imp_03=2  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(ccce_03,0,21)
replace cognitive_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(ccce_03,21,26)
replace cognitive_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(ccce_03,26,83)
* edad_03 69< & Years of Education 7+
replace cognitive_imp_03=2  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(ccce_03,0,35)
replace cognitive_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(ccce_03,35,41)
replace cognitive_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(ccce_03,41,83)

* edad_03 70-79 & Years of Education=0
replace cognitive_imp_03=2 if inrange(edad_03,70,79) & yrschool==0 &
inrange(ccce_03,0,12)
replace cognitive_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inrange(ccce_03,12,16)
replace cognitive_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inrange(ccce_03,16,83)
* edad_03 70-79 & Years of Education 1-6
replace cognitive_imp_03=2 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(ccce_03,0,15)
```

```
replace cognitive_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(ccce_03,15,21)
replace cognitive_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(ccce_03,21,83)
* edad_03 70-79 & Years of Education 7+
replace cognitive_imp_03=2 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(ccce_03,0,26)
replace cognitive_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(ccce_03,26,33)
replace cognitive_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(ccce_03,33,83)

* edad_03 80+ & Years of Education=0
replace cognitive_imp_03=2 if inrange(edad_03,80,120) & yrschool==0 &
inrange(ccce_03,0,7)
replace cognitive_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inrange(ccce_03,7,10)
replace cognitive_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inrange(ccce_03,10,83)
* edad_03 80+ & Years of Education 1-6
replace cognitive_imp_03=2 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(ccce_03,0,7)
replace cognitive_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(ccce_03,7,13)
replace cognitive_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(ccce_03,13,83)
* edad_03 80+ & Years of Education 7+
replace cognitive_imp_03=2 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(ccce_03,0,20)
replace cognitive_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(ccce_03,20,25)
replace cognitive_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(ccce_03,25,83)

replace cognitive_imp_03= ccce_03 if mi(ccce_03) & cognitive_imp_03==.
replace cognitive_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
cognitive_imp_03==.
replace cognitive_imp_03= .p if inlist(tipent_03,21,22)
label define cognitive_imp_03 0 "0.Normal" 1 "1.MCI" 2 "2.Impaired", replace
label values cognitive_imp_03 cognitive_imp_03


*** VERBAL LEARNING ***
** Z-SCORES **
gen iwr_z_03=.
replace iwr_z_03=-3.0 if [[ inrange(iwr_03, 0     ,     2     )     & yrschool==0] |
      [ inrange(iwr_03,     0     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  0     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace iwr_z_03=-2.0 if [
                [ inrange(iwr_03,     2     ,     3     )     &
inrange(yrschool,1,6)] |    [ inrange(iwr_03,     3     ,    4 )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace iwr_z_03=-1.5 if [[ inrange(iwr_03, 2     ,     3     )     & yrschool==0] |
      [ inrange(iwr_03,     3     ,     4     )     & inrange(yrschool,1,6)] | [
```

```
inrange(iwr_03,  4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace iwr_z_03=-1.0 if [[ inrange(iwr_03, 3     ,     4     )     & yrschool==0] |
     [ inrange(iwr_03,     4     ,     5     )     & inrange(yrschool,1,6)]

     ]     & inrange(edad_03,18,69)
replace iwr_z_03= 0.0 if [[ inrange(iwr_03, 4     ,     5     )     & yrschool==0] |
     [ inrange(iwr_03,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  5     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace iwr_z_03= 1.0 if [[ inrange(iwr_03, 5     ,     6     )     & yrschool==0] |
     [ inrange(iwr_03,     6     ,     7     )     & inrange(yrschool,1,6)]

     ]     & inrange(edad_03,18,69)
replace iwr_z_03= 1.5 if [[ inrange(iwr_03, 6     ,     7     )     & yrschool==0] |

     [ inrange(iwr_03,     7     ,     8     )     & inrange(yrschool,7,25)]   ]
     & inrange(edad_03,18,69)
replace iwr_z_03= 2.0 if [[ inrange(iwr_03, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_03,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_03,   8                )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace iwr_z_03= 3.0 if [[ inlist(iwr_03,  8                 )     & yrschool==0] |
     [ inlist(iwr_03, 8                )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(edad_03,18,69)

replace iwr_z_03=-3.0 if [[ inrange(iwr_03, 0     ,     2     )     & yrschool==0] |
     [ inrange(iwr_03,     0     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  0     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace iwr_z_03=-2.0 if [[ inrange(iwr_03, 2     ,     3     )     & yrschool==0] |
     [ inrange(iwr_03,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace iwr_z_03=-1.5 if [
               [ inrange(iwr_03,     3     ,     4     )     &
inrange(yrschool,1,6)]
                                  ]     & inrange(edad_03,70,79)
replace iwr_z_03=-1.0 if [[ inrange(iwr_03, 3     ,     4     )     & yrschool==0] |

     [ inrange(iwr_03,     4     ,     5     )     & inrange(yrschool,7,25)]   ]
     & inrange(edad_03,70,79)
replace iwr_z_03= 0.0 if [[ inrange(iwr_03, 4     ,     5     )     & yrschool==0] |
     [ inrange(iwr_03,     4     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace iwr_z_03= 1.0 if [[ inrange(iwr_03, 5     ,     6     )     & yrschool==0] |

     [ inrange(iwr_03,     6     ,     7     )     & inrange(yrschool,7,25)]   ]
     & inrange(edad_03,70,79)
replace iwr_z_03= 1.5 if [[ inrange(iwr_03, 6     ,     7     )     & yrschool==0] |
     [ inrange(iwr_03,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
```

```
replace iwr_z_03= 2.0 if [[ inrange(iwr_03, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_03,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_03,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace iwr_z_03= 3.0 if [[ inlist(iwr_03,  8               )     & yrschool==0] |
     [ inlist(iwr_03, 8               )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(edad_03,70,79)

replace iwr_z_03=-3.0 if [[ inrange(iwr_03, 0     ,     1     )     & yrschool==0] |
     [ inrange(iwr_03,     0     ,     1     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03=-2.0 if [[ inrange(iwr_03, 1     ,     2     )     & yrschool==0] |
     [ inrange(iwr_03,     1     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03=-1.5 if [[ inrange(iwr_03, 2     ,     3     )     & yrschool==0] |
     [ inrange(iwr_03,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  2     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03=-1.0 if [
                [ inrange(iwr_03,     3     ,     4     )     &
inrange(yrschool,1,6)] |    [ inrange(iwr_03,     3     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace iwr_z_03= 0.0 if [[ inrange(iwr_03, 3     ,     5     )     & yrschool==0] |
     [ inrange(iwr_03,     4     ,     5     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03= 1.0 if [[ inrange(iwr_03, 5     ,     6     )     & yrschool==0] |
     [ inrange(iwr_03,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03= 1.5 if [[ inrange(iwr_03, 6     ,     7     )     & yrschool==0] |
     [ inrange(iwr_03,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  6     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03= 2.0 if [[ inrange(iwr_03, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_03,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inrange(iwr_03,  7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace iwr_z_03= 3.0 if [[ inlist(iwr_03,  8               )     & yrschool==0] |
     [ inlist(iwr_03, 8               )     & inrange(yrschool,1,6)] | [
inlist(iwr_03,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)

replace iwr_z_03= iwr_03 if mi(iwr_03) & iwr_z_03==.
replace iwr_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] & iwr_z_03==.
replace iwr_z_03= .p if inlist(tipent_03,21,22)
label variable iwr_z_03 "MHAS 2003 Verbal Learning - Z-Scores"

** Impairment Status **
gen iwr_imp_03 = .
label variable iwr_imp_03 "MHAS 2003 Verbal Learning - Normal/Impaired"
* edad_03 69< & Years of Education=0
```

```
replace iwr_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inrange(iwr_03,0,3)
replace iwr_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inrange(iwr_03,3,8)
* edad_03 69< & Years of Education 1-6
replace iwr_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(iwr_03,0,4)
replace iwr_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(iwr_03,4,8)
* edad_03 69< & Years of Education 7+
replace iwr_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(iwr_03,0,5)
replace iwr_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(iwr_03,5,8)

* edad_03 70-79 & Years of Education=0
replace iwr_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inrange(iwr_03,0,3)
replace iwr_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inrange(iwr_03,3,8)
* edad_03 70-79 & Years of Education 1-6
replace iwr_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(iwr_03,0,4)
replace iwr_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(iwr_03,4,8)
* edad_03 70-79 & Years of Education 7+
replace iwr_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(iwr_03,0,4)
replace iwr_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(iwr_03,4,8)

* edad_03 80+ & Years of Education=0
replace iwr_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inrange(iwr_03,0,3)
replace iwr_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inrange(iwr_03,3,8)
* edad_03 80+ & Years of Education 1-6
replace iwr_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(iwr_03,0,3)
replace iwr_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(iwr_03,3,8)
* edad_03 80+ & Years of Education 7+
replace iwr_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(iwr_03,0,3)
replace iwr_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(iwr_03,3,8)

replace iwr_imp_03= iwr_03 if mi(iwr_03) & iwr_imp_03==.
replace iwr_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
iwr_imp_03==.
replace iwr_imp_03= .p if inlist(tipent_03,21,22)
label define cognitive_03 0 "0.Normal" 1 "1.Impaired", replace
label values iwr_imp_03 cognitive_03


*** DELAYED VERBAL RECALL ***
```

```
** Z-SCORES **
gen dwr_z_03=.
replace dwr_z_03= 2.0 if [[ inlist(dwr_03,  8                )     & yrschool==0] |
     [ inlist(dwr_03, 8               )     & inrange(yrschool,1,6)]
                                                                                  ]
     & inrange(edad_03,18,69)
replace dwr_z_03= 1.5 if [[ inlist(dwr_03,  7                )     & yrschool==0] |
     [ inlist(dwr_03, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03= 1.0 if [[ inlist(dwr_03,  6                )     & yrschool==0] |
     [ inlist(dwr_03, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   7               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03= 0.0 if [[ inrange(dwr_03, 3    ,     5    )     & yrschool==0] |
     [ inlist(dwr_03, 4    ,     5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   5    ,     6    )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03=-1.0 if [[ inlist(dwr_03,  2                )     & yrschool==0] |
     [ inlist(dwr_03, 3               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   4               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03=-1.5 if [[ inlist(dwr_03,  1                )     & yrschool==0] |
     [ inlist(dwr_03, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   3               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03=-2.0 if [[ inlist(dwr_03,  0                )     & yrschool==0] |
     [ inlist(dwr_03, 0    ,     1    )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   2               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)
replace dwr_z_03=-3.0 if [

                     [ inlist(dwr_03, 0    ,     1    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)

replace dwr_z_03= 2.0 if [[ inlist(dwr_03,  8                )     & yrschool==0] |
     [ inlist(dwr_03, 8               )     & inrange(yrschool,1,6)]
                                                                                  ]
     & inrange(edad_03,70,79)
replace dwr_z_03= 1.5 if [[ inlist(dwr_03,  7                )     & yrschool==0] |
     [ inlist(dwr_03, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace dwr_z_03= 1.0 if [[ inlist(dwr_03,  5    ,     6    )     & yrschool==0] |
     [ inlist(dwr_03, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   6    ,     7    )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace dwr_z_03= 0.0 if [[ inlist(dwr_03,  3    ,     4    )     & yrschool==0] |
     [ inrange(dwr_03,     3    ,     5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   4    ,     5    )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace dwr_z_03=-1.0 if [[ inlist(dwr_03,  2                )     & yrschool==0] |
     [ inlist(dwr_03, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   3               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
```

```
replace dwr_z_03=-1.5 if [[ inlist(dwr_03,  1               )     & yrschool==0] |
     [ inlist(dwr_03, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   2               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace dwr_z_03=-2.0 if [[ inlist(dwr_03,  0               )     & yrschool==0] |
     [ inlist(dwr_03, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)

replace dwr_z_03= 3.0 if [[ inlist(dwr_03,  8               )     & yrschool==0]


                ]     & inrange(edad_03,80,129)
replace dwr_z_03= 2.0 if [[ inlist(dwr_03,  7               )     & yrschool==0] |
     [ inlist(dwr_03, 7     ,     8     )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(edad_03,80,129)
replace dwr_z_03= 1.5 if [[ inlist(dwr_03,  6               )     & yrschool==0] |
     [ inlist(dwr_03, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace dwr_z_03= 1.0 if [[ inlist(dwr_03,  5               )     & yrschool==0] |
     [ inlist(dwr_03, 5               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace dwr_z_03= 0.0 if [[ inrange(dwr_03, 2     ,     4     )     & yrschool==0] |
     [ inrange(dwr_03,     2     ,     4     )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace dwr_z_03=-1.0 if [[ inlist(dwr_03,  1               )     & yrschool==0] |
     [ inlist(dwr_03, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)
replace dwr_z_03=-1.5 if [[ inlist(dwr_03,  0               )     & yrschool==0] |
     [ inlist(dwr_03, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_03,   0               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)

replace dwr_z_03= dwr_03 if mi(dwr_03) & dwr_z_03==.
replace dwr_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] & dwr_z_03==.
replace dwr_z_03= .p if inlist(tipent_03,21,22)
label variable dwr_z_03 "MHAS 2003 Delayed Verbal Recall - Z-Scores"

** Impairment Status **
gen dwr_imp_03 = .
label variable dwr_imp_03 "MHAS 2003 Delayed Verbal Recall - Normal/Impaired"
* edad_03 69< & Years of Education=0
replace dwr_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inrange(dwr_03,0,2)
replace dwr_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inrange(dwr_03,2,8)
* edad_03 69< & Years of Education 1-6
replace dwr_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(dwr_03,0,3)
replace dwr_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(dwr_03,3,8)
```

```
* edad_03 69< & Years of Education 7+
replace dwr_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(dwr_03,0,4)
replace dwr_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25) &
inrange(dwr_03,4,8)

* edad_03 70-79 & Years of Education=0
replace dwr_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inrange(dwr_03,0,2)
replace dwr_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inrange(dwr_03,2,8)
* edad_03 70-79 & Years of Education 1-6
replace dwr_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(dwr_03,0,2)
replace dwr_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(dwr_03,2,8)
* edad_03 70-79 & Years of Education 7+
replace dwr_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(dwr_03,0,3)
replace dwr_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(dwr_03,3,8)

* edad_03 80+ & Years of Education=0
replace dwr_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inrange(dwr_03,0,1)
replace dwr_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inrange(dwr_03,1,8)
* edad_03 80+ & Years of Education 1-6
replace dwr_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(dwr_03,0,1)
replace dwr_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(dwr_03,1,8)
* edad_03 80+ & Years of Education 7+
replace dwr_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(dwr_03,0,1)
replace dwr_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25) &
inrange(dwr_03,1,8)

replace dwr_imp_03= dwr_03 if mi(dwr_03) & dwr_imp_03==.
replace dwr_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
dwr_imp_03==.
replace dwr_imp_03= .p if inlist(tipent_03,21,22)
label values dwr_imp_03 cognitive_03


*** CONSTRUCTIONAL PRAXIS RECALL ***
** Z-SCORES **
gen construction_m_z_03=.
replace construction_m_z_03= 0.0 if [[ inlist(construction_m_03,  2
     )     & yrschool==0] | [ inlist(construction_m_03,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_03,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace construction_m_z_03=-1.0 if [[ inlist(construction_m_03,  1
     )     & yrschool==0]
```

```
                                                                    ]     &
inrange(edad_03,18,69)
replace construction_m_z_03=-1.5 if [
                                        [ inlist(construction_m_03,1
     )     & inrange(yrschool,1,6)]
                                                                ]     &
inrange(edad_03,18,69)
replace construction_m_z_03=-2.0 if [

                                                                [ inlist(construction_m_03,
     1               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)

replace construction_m_z_03=-3.0 if [[ inlist(construction_m_03,  0
     )     & yrschool==0] | [ inlist(construction_m_03,0               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_03,0               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)

replace construction_m_z_03= 1.0 if [[ inlist(construction_m_03,  2
     )     & yrschool==0]

                                                                    ]     &
inrange(edad_03,70,79)
replace construction_m_z_03= 0.0 if [[ inlist(construction_m_03,  1
     )     & yrschool==0] | [ inlist(construction_m_03,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_03,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace construction_m_z_03=-1.0 if [
                                        [ inlist(construction_m_03,1
     )     & inrange(yrschool,1,6)]
                                                                ]     &
inrange(edad_03,70,79)
replace construction_m_z_03=-1.5 if [

                                                                [ inlist(construction_m_03,
     1               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)
replace construction_m_z_03=-2.0 if [[ inlist(construction_m_03,  0
     )     & yrschool==0] | [ inlist(construction_m_03,0               )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(edad_03,70,79)
replace construction_m_z_03=-3.0 if [

                                                                [ inlist(construction_m_03,
     0               )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,70,79)

replace construction_m_z_03= 1.0 if [[ inlist(construction_m_03,  2
     )     & yrschool==0] | [ inlist(construction_m_03,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_03,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace construction_m_z_03= 0.0 if [[ inlist(construction_m_03,  1
     )     & yrschool==0] | [ inlist(construction_m_03,1               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_03,1               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
```

```
replace construction_m_z_03=-1.5 if [[ inlist(construction_m_03,  0
     )     & yrschool==0]

                                                                    ]     &
inrange(edad_03,80,129)
replace construction_m_z_03=-2.0 if [
                                        [ inlist(construction_m_03,0
     )     & inrange(yrschool,1,6)] |  [ inlist(construction_m_03,0
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)

replace construction_m_z_03= construction_m_03 if mi(construction_m_03) &
construction_m_z_03==.
replace construction_m_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
construction_m_z_03==.
replace construction_m_z_03= .p if inlist(tipent_03,21,22)
label variable construction_m_z_03 "MHAS 2003 Constructional Praxis Recall - Z-
Scores"

** Impairment Status **
gen construction_m_imp_03 = .
label variable construction_m_imp_03 "MHAS 2003 Constructional Praxis Recall -
Normal/Impaired"

* edad_03 69< & Years of Education=0
replace construction_m_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inlist(construction_m_03,1,2)
* edad_03 69< & Years of Education 1-6
replace construction_m_imp_03=1  if inrange(edad_03,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_03,0,1)
replace construction_m_imp_03=0  if inrange(edad_03,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_03,2)
* edad_03 69< & Years of Education 7+
replace construction_m_imp_03=1  if inrange(edad_03,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_03,0,1)
replace construction_m_imp_03=0  if inrange(edad_03,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_03,2)

* edad_03 70-79 & Years of Education=0
replace construction_m_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inlist(construction_m_03,1,2)
* edad_03 70-79 & Years of Education 1-6
replace construction_m_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6)
& inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6)
& inlist(construction_m_03,1,2)
* edad_03 70-79 & Years of Education 7+
replace construction_m_imp_03=1 if inrange(edad_03,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_03,0,1)
replace construction_m_imp_03=0 if inrange(edad_03,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_03,2)

* edad_03 80+ & Years of Education=0
```

```
replace construction_m_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inlist(construction_m_03,1,2)
* edad_03 80+ & Years of Education 1-6
replace construction_m_imp_03=1 if inrange(edad_03,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_03,1,2)
* edad_03 80+ & Years of Education 7+
replace construction_m_imp_03=1 if inrange(edad_03,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_03,0)
replace construction_m_imp_03=0 if inrange(edad_03,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_03,1,2)

replace construction_m_imp_03= construction_m_03 if mi(construction_m_03) &
construction_m_imp_03==.
replace construction_m_imp_03= .m if edad_03==999 | inlist(yrschool,88,99,.m) &
construction_m_imp_03==.
replace construction_m_imp_03= .p if inlist(tipent_03,21,22)
label values construction_m_imp_03 cognitive_03


*** VISUAL SCANNING ***
** Z-SCORES **
gen visual_scan_z_03=.
replace visual_scan_z_03= 3.0    if [[ inrange(visual_scan_03,    46    ,     60
     )     & yrschool==0] | [ inrange(visual_scan_03,   59    ,     60    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(edad_03,18,69)
replace visual_scan_z_03= 2.0    if [[ inrange(visual_scan_03,    40    ,     45
     )     & yrschool==0] | [ inrange(visual_scan_03,   48    ,     58    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(edad_03,18,69)
replace visual_scan_z_03= 1.5    if [[ inrange(visual_scan_03,    36    ,     39
     )     & yrschool==0] | [ inrange(visual_scan_03,   43    ,     47    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   56    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03= 1.0    if [[ inrange(visual_scan_03,    28    ,     35
     )     & yrschool==0] | [ inrange(visual_scan_03,   35    ,     42    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   47    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03= 0.0    if [[ inrange(visual_scan_03,    14    ,     27
     )     & yrschool==0] | [ inrange(visual_scan_03,   20    ,     34    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   33    ,     46    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03=-1.0    if [[ inrange(visual_scan_03,    7     ,     13
     )     & yrschool==0] | [ inrange(visual_scan_03,   12    ,     19    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   25    ,     32    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03=-1.5    if [[ inrange(visual_scan_03,    3     ,     6
     )     & yrschool==0] | [ inrange(visual_scan_03,   7     ,     11    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   19    ,     24    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03=-2.0    if [[ inrange(visual_scan_03,    0     ,     2
     )     & yrschool==0] | [ inrange(visual_scan_03,   0     ,     6     )     &
```

```
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   7     ,     18    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace visual_scan_z_03=-3.0    if [

                                                          [ inrange(visual_scan_03,
     0     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,18,69)

replace visual_scan_z_03= 3.0    if [[ inrange(visual_scan_03,    39    ,     60
     )     & yrschool==0]

                                                                  ]     &
inrange(edad_03,70,79)
replace visual_scan_z_03= 2.0    if [[ inrange(visual_scan_03,    32    ,     38
     )     & yrschool==0] |[ inrange(visual_scan_03,   50    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   58    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03= 1.5    if [[ inrange(visual_scan_03,    28    ,     31
     )     & yrschool==0] |[ inrange(visual_scan_03,   42    ,     49    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   52    ,     57    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03= 1.0    if [[ inrange(visual_scan_03,    22    ,     27
     )     & yrschool==0] |[ inrange(visual_scan_03,   37    ,     41    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   43    ,     51    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03= 0.0    if [[ inrange(visual_scan_03,    10    ,     21
     )     & yrschool==0] |[ inrange(visual_scan_03,   30    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   28    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03=-1.0    if [[ inrange(visual_scan_03,    4     ,     9
     )     & yrschool==0] |[ inrange(visual_scan_03,   16    ,     29    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   18    ,     27    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03=-1.5    if [[ inrange(visual_scan_03,    0     ,     3
     )     & yrschool==0] |[ inrange(visual_scan_03,   6     ,     15    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   13    ,     17    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace visual_scan_z_03=-2.0    if [
                                      [ inrange(visual_scan_03,   3     ,     5
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_03,   2     ,     12
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,70,79)
replace visual_scan_z_03=-3.0    if [
                                      [ inrange(visual_scan_03,   0     ,     2
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_03,   0     ,     1
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,70,79)

replace visual_scan_z_03= 3.0    if [
                                      [ inrange(visual_scan_03,   51    ,     60
     )     & inrange(yrschool,1,6)] |  [ inrange(visual_scan_03,   56    ,     60
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
replace visual_scan_z_03= 2.0    if [[ inrange(visual_scan_03,    50    ,     60
     )     & yrschool==0] |[ inrange(visual_scan_03,   37    ,     50    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   46    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03= 1.5    if [[ inrange(visual_scan_03,    30    ,     49
     )     & yrschool==0] |[ inrange(visual_scan_03,   33    ,     36    )     &
```

```
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   43    ,     45    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03= 1.0    if [[ inrange(visual_scan_03,    26    ,     29
     )     & yrschool==0] |[ inrange(visual_scan_03,   26    ,     32    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   36    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03= 0.0    if [[ inrange(visual_scan_03,    19    ,     25
     )     & yrschool==0] |[ inrange(visual_scan_03,   11    ,     25    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   21    ,     35    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03=-1.0    if [[ inrange(visual_scan_03,    7     ,     18
     )     & yrschool==0] |[ inrange(visual_scan_03,   2     ,     10    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   11    ,     20    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03=-1.5    if [[ inrange(visual_scan_03,    1     ,     6
     )     & yrschool==0] |[ inrange(visual_scan_03,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_03,   8     ,     10    )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
replace visual_scan_z_03=-2.0    if [[ inlist(visual_scan_03,                0
     )     & yrschool==0] |
                                          [ inrange(visual_scan_03,   3     ,
     7     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
replace visual_scan_z_03=-3.0    if [

                                                    [ inrange(visual_scan_03,
     0     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(edad_03,80,129)

replace visual_scan_z_03= visual_scan_03 if mi(visual_scan_03) &
visual_scan_z_03==.
replace visual_scan_z_03= .e if e10_03 == 77
replace visual_scan_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
visual_scan_z_03==.
replace visual_scan_z_03= .p if inlist(tipent_03,21,22)
label variable visual_scan_z_03 "MHAS 2003 Visual Scanning - Z-Scores"

** Impairment Status **
gen visual_scan_imp_03 = .
label variable visual_scan_imp_03 "MHAS 2003 Visual Scanning - Normal/Impaired"

* edad_03 69< & Years of Education=0
replace visual_scan_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inrange(visual_scan_03,0,7)
replace visual_scan_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inrange(visual_scan_03,7,60)
* edad_03 69< & Years of Education 1-6
replace visual_scan_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_03,0,12)
replace visual_scan_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_03,12,60)
* edad_03 69< & Years of Education 7+
replace visual_scan_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inrange(visual_scan_03,0,25)
replace visual_scan_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inrange(visual_scan_03,25,60)
```

```
* edad_03 70-79 & Years of Education=0
replace visual_scan_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inrange(visual_scan_03,0,4)
replace visual_scan_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inrange(visual_scan_03,4,60)
* edad_03 70-79 & Years of Education 1-6
replace visual_scan_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_03,0,6)
replace visual_scan_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_03,6,60)
* edad_03 70-79 & Years of Education 7+
replace visual_scan_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_03,0,18)
replace visual_scan_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_03,18,60)

* edad_03 80+ & Years of Education=0
replace visual_scan_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inrange(visual_scan_03,0,1)
replace visual_scan_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inrange(visual_scan_03,1,60)
* edad_03 80+ & Years of Education 1-6
replace visual_scan_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_03,0,2)
replace visual_scan_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_03,2,60)
* edad_03 80+ & Years of Education 7+
replace visual_scan_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inrange(visual_scan_03,0,12)
replace visual_scan_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inrange(visual_scan_03,12,60)

replace visual_scan_imp_03= visual_scan_03 if mi(visual_scan_03) &
visual_scan_imp_03==.
replace visual_scan_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
visual_scan_imp_03==.
replace visual_scan_imp_03= .p if inlist(tipent_03,21,22)
label values visual_scan_imp_03 cognitive_03


*** ORIENTATION ***
** Z-SCORES **
gen orientation_z_03=.
replace    orientation_z_03= 1.0      if [[ inlist(orientation_03,     3     )
     & yrschool==0]

                                                          ]   &
inrange(edad_03,18,69)
replace    orientation_z_03= 0.0      if [[ inlist(orientation_03,     2     )
     & yrschool==0] |      [ inlist(orientation_03,    3     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    3                )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,18,69)
replace    orientation_z_03=-1.0      if [
                                      [ inlist(orientation_03,    2     )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(edad_03,18,69)
```

```
replace    orientation_z_03=-1.5      if [[ inlist(orientation_03,     1     )
     & yrschool==0] |
                                      [ inlist(orientation_03,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,18,69)
replace    orientation_z_03=-2.0      if [
                                      [ inlist(orientation_03,    1     )     &
inrange(yrschool,1,6)]
                                                          ]     & inrange(edad_03,18,69)
replace    orientation_z_03=-3.0      if [[ inlist(orientation_03,     0     )
     & yrschool==0] |      [ inlist(orientation_03,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,18,69)

replace    orientation_z_03= 1.0      if [[ inlist(orientation_03,     3     )
     & yrschool==0]

                                                                  ]     &
inrange(edad_03,70,79)
replace    orientation_z_03= 0.0      if [[ inlist(orientation_03,     2     )
     & yrschool==0] |      [ inlist(orientation_03,    3     )     &
inrange(yrschool,1,6)]
                                                          ]     & inrange(edad_03,70,79)
replace    orientation_z_03=-1.0      if [
                                      [ inlist(orientation_03,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,70,79)
replace    orientation_z_03=-1.5      if [[ inlist(orientation_03,     1     )
     & yrschool==0] |
                                      [ inlist(orientation_03,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,70,79)
replace    orientation_z_03=-2.0      if [[ inlist(orientation_03,     0     )
     & yrschool==0] |      [ inlist(orientation_03,    1     )     &
inrange(yrschool,1,6)]
                                                          ]     & inrange(edad_03,70,79)
replace    orientation_z_03=-3.0      if [
                                      [ inlist(orientation_03,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,70,79)

replace    orientation_z_03= 1.0      if [[ inlist(orientation_03,     3     )
     & yrschool==0] |      [ inlist(orientation_03,    3     )     &
inrange(yrschool,1,6)]
                                                          ]     & inrange(edad_03,80,129)
replace    orientation_z_03= 0.0      if [[ inlist(orientation_03,     2     )
     & yrschool==0] |      [ inlist(orientation_03,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
replace    orientation_z_03=-1.0      if [[ inlist(orientation_03,     1     )
     & yrschool==0] |
                                      [ inlist(orientation_03,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
replace    orientation_z_03=-1.5      if [
                                      [ inlist(orientation_03,    1     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    1                 )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
```

```
replace    orientation_z_03=-2.0      if [[ inlist(orientation_03,     0     )
     & yrschool==0]

                                                                ]     &
inrange(edad_03,80,129)
replace    orientation_z_03=-3.0      if [
                                      [ inlist(orientation_03,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_03,    0                )
     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)

replace orientation_z_03= orientation_03 if mi(orientation_03) &
orientation_z_03==.
replace orientation_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
orientation_z_03==.
replace orientation_z_03= .p if inlist(tipent_03,3,4)
label variable orientation_z_03 "MHAS 2003 Orientation - Z-Scores"

** Impairment Status **
gen orientation_imp_03 = .
label variable orientation_imp_03 "MHAS 2003 Orientation - Normal/Impaired"

* edad_03 69< & Years of Education=0
replace orientation_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inrange(orientation_03,0,1)
replace orientation_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inrange(orientation_03,2,3)
* edad_03 69< & Years of Education 1-6
replace orientation_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(orientation_03,0,1)
replace orientation_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6) &
inrange(orientation_03,2,3)
* edad_03 69< & Years of Education 7+
replace orientation_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inrange(orientation_03,0,2)
replace orientation_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inlist(orientation_03,3)

* edad_03 70-79 & Years of Education=0
replace orientation_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inrange(orientation_03,0,1)
replace orientation_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inrange(orientation_03,2,3)
* edad_03 70-79 & Years of Education 1-6
replace orientation_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(orientation_03,0,1)
replace orientation_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inrange(orientation_03,2,3)
* edad_03 70-79 & Years of Education 7+
replace orientation_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inrange(orientation_03,0,2)
replace orientation_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25) &
inlist(orientation_03,3)

* edad_03 80+ & Years of Education=0
replace orientation_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inlist(orientation_03,0)
```

```
replace orientation_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inrange(orientation_03,1,3)
* edad_03 80+ & Years of Education 1-6
replace orientation_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(orientation_03,0,1)
replace orientation_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6) &
inrange(orientation_03,2,3)
* edad_03 80+ & Years of Education 7+
replace orientation_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inrange(orientation_03,0,1)
replace orientation_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inrange(orientation_03,2,3)

replace orientation_imp_03= orientation_03 if mi(orientation_03) &
orientation_imp_03==.
replace orientation_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
orientation_imp_03==.
replace orientation_imp_03= .p if inlist(tipent_03,21,22)
label values orientation_imp_03 cognitive_03


*** CONSTRUCTIONAL PRAXIS ***
** Z-SCORES **
gen construction_z_03=.
replace construction_z_03= 0.0   if [[ inlist(construction_03,    2
     )     & yrschool==0] |[ inlist(construction_03,  2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_03,  2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)
replace construction_z_03=-1.5   if [[ inlist(construction_03,    1
     )     & yrschool==0]

                                                                    ]     &
inrange(edad_03,18,69)
replace construction_z_03=-3.0   if [[ inlist(construction_03,    0
     )     & yrschool==0] |[ inlist(construction_03,  0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_03,  0     ,     1     )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,18,69)

replace construction_z_03= 0.0   if [[ inlist(construction_03,    2
     )     & yrschool==0] |[ inlist(construction_03,  2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_03,  2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)
replace construction_z_03=-1.0   if [[ inlist(construction_03,    1
     )     & yrschool==0] |[ inlist(construction_03,  1               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(edad_03,70,79)
replace construction_z_03=-3.0   if [[ inlist(construction_03,    0
     )     & yrschool==0] |[ inlist(construction_03,  0               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_03,  0     ,     1     )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,70,79)

replace construction_z_03= 0.0   if [[ inlist(construction_03,    2
     )     & yrschool==0] |[ inlist(construction_03,  2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_03,  2               )     &
inrange(yrschool,7,25)]     ]     & inrange(edad_03,80,129)
```

```
replace construction_z_03=-1.0   if [[ inlist(construction_03,    1
     )     & yrschool==0]

                                                                    ]     &
inrange(edad_03,80,129)
replace construction_z_03=-1.5   if [
                                       [ inlist(construction_03,   1
     )     & inrange(yrschool,1,6)]
                                                          ]     &
inrange(edad_03,80,129)
replace construction_z_03=-2.0   if [[ inlist(construction_03,    0
     )     & yrschool==0] |
                                            [ inlist(construction_03,   1
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)
replace construction_z_03=-3.0   if [
                                       [ inlist(construction_03,   0
     )     & inrange(yrschool,1,6)] |  [ inlist(construction_03,   0
     )     & inrange(yrschool,7,25)]   ]     & inrange(edad_03,80,129)

replace construction_z_03= construction_03 if mi(construction_03) &
construction_z_03==.
replace construction_z_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
construction_z_03==.
replace construction_z_03= .p if inlist(tipent_03,21,22)
label variable construction_z_03 "MHAS 2003 Constructional Praxis - Z-Scores"

** Impairment Status **
gen construction_imp_03 = .
label variable construction_imp_03 "MHAS 2003 Constructional Praxis -
Normal/Impaired"

* edad_03 69< & Years of Education=0
replace construction_imp_03=1 if inrange(edad_03,18,69) & yrschool==0 &
inlist(construction_03,0,1)
replace construction_imp_03=0 if inrange(edad_03,18,69) & yrschool==0 &
inlist(construction_03,2)
* edad_03 69< & Years of Education 1-6
replace construction_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,1,6)
& inlist(construction_03,0,1)
replace construction_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,1,6)
& inlist(construction_03,2)
* edad_03 69< & Years of Education 7+
replace construction_imp_03=1  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inlist(construction_03,0,1)
replace construction_imp_03=0  if inrange(edad_03,18,69) & inrange(yrschool,7,25)
& inlist(construction_03,2)

* edad_03 70-79 & Years of Education=0
replace construction_imp_03=1 if inrange(edad_03,70,79) & yrschool==0 &
inlist(construction_03,0)
replace construction_imp_03=0 if inrange(edad_03,70,79) & yrschool==0 &
inlist(construction_03,1,2)
* edad_03 70-79 & Years of Education 1-6
replace construction_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inlist(construction_03,0)
```

```
replace construction_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,1,6) &
inlist(construction_03,1,2)
* edad_03 70-79 & Years of Education 7+
replace construction_imp_03=1 if inrange(edad_03,70,79) & inrange(yrschool,7,25)
& inlist(construction_03,0,1)
replace construction_imp_03=0 if inrange(edad_03,70,79) & inrange(yrschool,7,25)
& inlist(construction_03,2)

* edad_03 80+ & Years of Education=0
replace construction_imp_03=1 if inrange(edad_03,80,120) & yrschool==0 &
inlist(construction_03,0)
replace construction_imp_03=0 if inrange(edad_03,80,120) & yrschool==0 &
inlist(construction_03,1,2)
* edad_03 80+ & Years of Education 1-6
replace construction_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,1,6)
& inlist(construction_03,0,1)
replace construction_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,1,6)
& inlist(construction_03,2)
* edad_03 80+ & Years of Education 7+
replace construction_imp_03=1 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inlist(construction_03,0,1)
replace construction_imp_03=0 if inrange(edad_03,80,120) & inrange(yrschool,7,25)
& inlist(construction_03,2)

replace construction_imp_03= construction_03 if mi(construction_03) &
construction_imp_03==.
replace construction_imp_03= .m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
construction_imp_03==.
replace construction_imp_03= .p if inlist(tipent_03,21,22)
label values construction_imp_03 cognitive_03



***  TOTAL NUMBER OF TASKS COMPLETED (max. 5) ***
egen numb_tasks_miss_03= rowmiss(iwr_03 dwr_03 construction_m_03 visual_scan_03
construction_03) if inlist(tipent_03,11,12)

gen numb_tasks_comp_03= 5-numb_tasks_miss_03 if inlist(tipent_03,11,12)
replace numb_tasks_comp_03= .p if inlist(tipent_03,21,22)
label variable numb_tasks_comp_03 "MHAS 2003 Number of Tasks Completed (0-5)"

drop numb_tasks_miss_03

***  TOTAL NUMER OF TASKS WITH IMPAIRMENT (max. 5 not including orientation) ***
egen numb_tasks_imp_03= rowtotal(iwr_imp_03 dwr_imp_03 construction_m_imp_03
visual_scan_imp_03 construction_imp_03) ///
      if inrange(numb_tasks_comp_03,2,5)
replace numb_tasks_imp_03= .i if inrange(numb_tasks_comp_03,0,1)
replace numb_tasks_imp_03= .m if edad_03==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_03= .s if [iwr_imp_03==.s & dwr_imp_03==.s &
construction_m_imp_03==.s & ///
visual_scan_imp_03==.s & construction_imp_03==.s] & mi(numb_tasks_imp_03)
replace numb_tasks_imp_03= .p if inlist(tipent_03,21,22)
label variable numb_tasks_imp_03 "MHAS 2003 Number of Tasks with Impairment if
completed 2+ (0-5)"
```

```
gen two_more_tasks_imp_03=.
replace two_more_tasks_imp_03=0 if inrange(numb_tasks_imp_03,0,1)
replace two_more_tasks_imp_03=1 if inrange(numb_tasks_imp_03,2,5)
replace two_more_tasks_imp_03= .i if inrange(numb_tasks_comp_03,0,1)
replace two_more_tasks_imp_03= .m if edad_03==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_03= .s if [iwr_imp_03==.s & dwr_imp_03==.s &
construction_m_imp_03==.s & ///
visual_scan_imp_03==.s & construction_imp_03==.s] & mi(two_more_tasks_imp_03)
replace two_more_tasks_imp_03= .p if inlist(tipent_03,21,22)
label variable two_more_tasks_imp_03 "MHAS 2003 Dummy of 2+ Tasks with Impairment
if completed 2+ (0-1)"


*********************************************************************
********* MHAS 2003 INSTRUMENTAL ACTIVITIES OF DAILY LIVING *********
*********************************************************************

*** IADL ***
** Managing money **
gen iadl_money_03 =.
replace iadl_money_03 = 0 if h29a_03 == 2 | (h29a_03 == 7 & h29b_03 == 2)
replace iadl_money_03 = 1 if inlist(h29a_03,1,6) | (h29a_03 == 7 & h29b_03 == 1)
replace iadl_money_03 = .m if inlist(tipent_03,11,12,21,22) & h29a_03 == .
replace iadl_money_03 = .d if h29a_03 == 9
replace iadl_money_03 = .r if h29a_03 == 8
replace iadl_money_03 = .p if inlist(tipent_03,21,22)
replace iadl_money_03 = .x if h29a_03 == 7 & inlist(h29b_03,8,9)
label variable iadl_money_03 "IADLs: Difficulty Managing Money 2003"

** Taking medicines **
gen iadl_medicines_03 =.
replace iadl_medicines_03 = 0 if h28a_03 == 2 | (h28a_03 == 7 & h28b_03 == 2)
replace iadl_medicines_03 = 1 if inlist(h28a_03,1,6) | (h28a_03 == 7 & h28b_03 ==
1)
replace iadl_medicines_03 = .m if inlist(tipent_03,11,12,21,22) & h28a_03 == .
replace iadl_medicines_03 = .d if h28a_03 == 9
replace iadl_medicines_03 = .r if h28a_03 == 8
replace iadl_medicines_03 = .p if inlist(tipent_03,21,22)
replace iadl_medicines_03 = .x if h28a_03 == 7 & inlist(h28b_03,8,9)
label variable iadl_medicines_03 "IADLs: Difficulty Taking Medicines 2003"

** Shopping for groceries **
gen iadl_shopping_03 =.
replace iadl_shopping_03 = 0 if h27a_03 == 2 | (h27a_03 == 7 & h27b_03 == 2)
replace iadl_shopping_03 = 1 if inlist(h27a_03,1,6) | (h27a_03 == 7 & h27b_03 ==
1)
replace iadl_shopping_03 = .m if inlist(tipent_03,11,12,21,22) & h27a_03 == .
replace iadl_shopping_03 = .d if h27a_03 == 9
replace iadl_shopping_03 = .r if h27a_03 == 8
replace iadl_shopping_03 = .p if inlist(tipent_03,21,22)
replace iadl_shopping_03 = .x if h27a_03 == 7 & inlist(h27b_03,8,9)
label variable iadl_shopping_03 "IADLs: Difficulty Shopping for Groceries 2003"

** Cooking a hot meal **
gen iadl_cooking_03 =.
replace iadl_cooking_03 = 0 if h26a_03 == 2 | (h26a_03 == 7 & h26b_03 == 2)
```

```
replace iadl_cooking_03 = 1 if inlist(h26a_03,1,6) | (h26a_03 == 7 & h26b_03 ==
1)
replace iadl_cooking_03 = .m if inlist(tipent_03,11,12,21,22) & h26a_03 == .
replace iadl_cooking_03 = .d if h26a_03 == 9
replace iadl_cooking_03 = .r if h26a_03 == 8
replace iadl_cooking_03 = .p if inlist(tipent_03,21,22)
replace iadl_cooking_03 = .x if h26a_03 == 7 & inlist(h26b_03,8,9)
label variable iadl_cooking_03 "IADLs: Difficulty Cooking a Meal 2003"
label values iadl_cooking_03 adls

** Number of Limitations with IADLs (0-4) **
egen iadls_03 = rowtotal(iadl_money_03 iadl_medicines_03 iadl_shopping_03
iadl_cooking_03) if inlist(tipent_03,11,12)
replace iadls_03 = .m if inlist(tipent_03,11,12,21,22)  & h26a_03 == . & h27a_03
== . & h28a_03 == . & h29a_03 == . & iadls_03==.
replace iadls_03 = .d if iadl_money_03 == .d & iadl_medicines_03 == .d &
iadl_shopping_03 == .d & iadl_cooking_03 == .d
replace iadls_03 = .r if iadl_money_03 == .r & iadl_medicines_03 == .r &
iadl_shopping_03 == .r & iadl_cooking_03 == .r
replace iadls_03 = .x if iadl_money_03 == .x & iadl_medicines_03 == .x &
iadl_shopping_03 == .x & iadl_cooking_03 == .x
replace iadls_03 = .p if inlist(tipent_03,21,22)
label variable iadls_03 "Number of Limitations with IADLs 2003 (0-4)"



*************************************************************
********* MHAS 2003 COGNITIVE STATUS ASSESSMENT  *********
*************************************************************

* COGNITIVE STATUS CLASIFICATION: 1) CIND: impairment in 2+ cognitive tasks and
NO IADLs difficulties
                                /// 2) Dementia: 2a) Proxy subjects who had a score
equal or above 3.4 in the IQCODE
                                        ///              2b) Direct interview
subjects impaired in 2+ cognitive tasks and
                                       ///                  had difficulty in one
or more IADLs
                                        /// 3) Normal with IADLS:
                                        ///              3a) Direct interview
subjects with no impairment
                                        ///                  or with impairment
in only one cognitive task and who had difficulty in one or more IADLs
                                        /// 4) Normal NO IADLS:
                                        ///              4a) Proxy respondents
with a score below 3.4 in the IQCODE
                                        ///              4b) Direct interview
subjects with no impairment
                                        ///                  or with impairment
in only one cognitive task and who did not have difficulty with IADLs

** Cognitive Status Classification using 5 tasks (if 2 or more completed) **
gen cognitive_status_03=.
replace cognitive_status_03= 3 if cog_imp_iqcode_03==1 |
[inrange(numb_tasks_imp_03,2,5) & inrange(iadls_03,1,4)]
replace cognitive_status_03= 2 if inrange(numb_tasks_imp_03,2,5) & iadls_03==0
```

```
replace cognitive_status_03= 1 if inrange(numb_tasks_imp_03,0,1) &
inrange(iadls_03,1,4)
replace cognitive_status_03= 0 if cog_imp_iqcode_03==0 |
[inrange(numb_tasks_imp_03,0,1) & iadls_03==0]
replace cognitive_status_03=.i if inrange(numb_tasks_comp_03,0,1) |
cog_imp_iqcode_03==.i
replace cognitive_status_03=.m if [edad_03==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_03==.
replace cognitive_status_03=.m if iadls_03==.m & cognitive_status_03==.
replace cognitive_status_03=.d if iadls_03==.d & cognitive_status_03==.
replace cognitive_status_03=.r if iadls_03==.r & cognitive_status_03==.
replace cognitive_status_03=.x if iadls_03==.x & cognitive_status_03==.
replace cognitive_status_03=.d if cog_imp_iqcode_03==.d & cognitive_status_03==.
replace cognitive_status_03=.r if cog_imp_iqcode_03==.r & cognitive_status_03==.
replace cognitive_status_03=.m if cog_imp_iqcode_03==.m & cognitive_status_03==.
replace cognitive_status_03=.s if numb_tasks_imp_03==.s
label variable cognitive_status_03 "MHAS 2003 Cognitive Status"
label define cognitive_status_03 0 "0.Normal" 1 "1.Normal with Instrumental
Impairment" 2 "2.CIND" 3 "3.Dementia", replace
label values cognitive_status_03 cognitive_status_03
```

2012

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*********************************************************
**** MHAS 2012 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*********************************************************

label data "Version 2. December 2021"

*** CREATING Z-SCORES & IMPAIREMENT STATUS VARIABLES ***
***          BY TOTAL SCORE, TASK & DOMAIN           ***

*** CCCE Total Score (0-99) ***
** Z-SCORES **
gen ccce_z_score_12=.
replace        ccce_z_score_12=-3.0   if [ [ inrange(ccce_12 ,   0    ,    15
     )    & yrschool==0] |      [ inrange(ccce_12 ,   0    ,    13   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   0    ,    26   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace        ccce_z_score_12=-2.0   if [ [ inrange(ccce_12 ,   15   ,    25
     )    & yrschool==0] |      [ inrange(ccce_12 ,   13   ,    31   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   26   ,    48   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace        ccce_z_score_12=-1.5   if [ [ inrange(ccce_12 ,   25   ,    30
     )    & yrschool==0] |      [ inrange(ccce_12 ,   31   ,    38   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   48   ,    54   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=-1.0  if [ [ inrange(ccce_12 ,   30   ,    38   )
     & yrschool==0] |      [ inrange(ccce_12 ,   38   ,    46   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   54   ,    62   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=0.0        if [ [ inrange(ccce_12 ,   38   ,    61
     )    & yrschool==0] |      [ inrange(ccce_12 ,   46   ,    66   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   62   ,    81   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=1.0        if [ [ inrange(ccce_12 ,   61   ,    64
     )    & yrschool==0] |      [ inrange(ccce_12 ,   66   ,    74   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   81   ,    89   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=1.5        if [ [ inrange(ccce_12 ,   64   ,    70
     )    & yrschool==0] |      [ inrange(ccce_12 ,   74   ,    80   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   89   ,    95   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=2.0        if [ [ inrange(ccce_12 ,   70   ,    83
     )    & yrschool==0] |      [ inrange(ccce_12 ,   80   ,    92   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   95   ,    99   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace    ccce_z_score_12=3.0        if [ [ inrange(ccce_12 ,   83   ,    99
     )    & yrschool==0] |      [ inrange(ccce_12 ,   92   ,    99   )    &
inrange(yrschool,1,6)]
                                   ]    & inrange(age_12,21,69)

replace        ccce_z_score_12=-3.0   if [ [ inrange(ccce_12 ,   0    ,    13
     )    & yrschool==0] |      [ inrange(ccce_12 ,   0    ,    12   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   0    ,    23   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
```

```
replace        ccce_z_score_12=-2.0   if [ [ inrange(ccce_12 ,   13   ,    22
     )    & yrschool==0] |      [ inrange(ccce_12 ,   12   ,    25   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   23   ,    41   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace        ccce_z_score_12=-1.5   if [ [ inrange(ccce_12 ,   22   ,    26
     )    & yrschool==0] |      [ inrange(ccce_12 ,   25   ,    31   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   41   ,    45   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=-1.0  if [ [ inrange(ccce_12 ,   26   ,    34   )
     & yrschool==0] |      [ inrange(ccce_12 ,   31   ,    39   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   45   ,    54   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=0.0        if [ [ inrange(ccce_12 ,   34   ,    48
     )    & yrschool==0] |      [ inrange(ccce_12 ,   39   ,    58   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   54   ,    75   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=1.0        if [ [ inrange(ccce_12 ,   48   ,    55
     )    & yrschool==0] |      [ inrange(ccce_12 ,   58   ,    67   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   75   ,    84   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=1.5        if [ [ inrange(ccce_12 ,   55   ,    60
     )    & yrschool==0] |      [ inrange(ccce_12 ,   67   ,    73   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   84   ,    92   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=2.0        if [ [ inrange(ccce_12 ,   60   ,    74
     )    & yrschool==0] |      [ inrange(ccce_12 ,   73   ,    87   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   92   ,    99   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,70,79)
replace    ccce_z_score_12=3.0        if [ [ inrange(ccce_12 ,   74   ,    99
     )    & yrschool==0] |      [ inrange(ccce_12 ,   87   ,    99   )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(age_12,70,79)

replace        ccce_z_score_12=-3.0   if [
                                       [ inrange(ccce_12 ,   0    ,    13
     )    & inrange(yrschool,1,6)] |       [ inrange(ccce_12 ,   0    ,    13
     )    & inrange(yrschool,7,25)]  ]     & inrange(age_12,80,129)
replace        ccce_z_score_12=-2.0   if [ [ inrange(ccce_12 ,   0    ,    12
     )    & yrschool==0] |      [ inrange(ccce_12 ,   13   ,    17   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   13   ,    17   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,80,129)
replace        ccce_z_score_12=-1.5   if [ [ inrange(ccce_12 ,   12   ,    18
     )    & yrschool==0] |      [ inrange(ccce_12 ,   17   ,    23   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   17   ,    23   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,80,129)
replace    ccce_z_score_12=-1.0  if [ [ inrange(ccce_12 ,   18   ,    26   )
     & yrschool==0] |      [ inrange(ccce_12 ,   23   ,    32   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   23   ,    32   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,80,129)
replace    ccce_z_score_12=0.0        if [ [ inrange(ccce_12 ,   26   ,    46
     )    & yrschool==0] |      [ inrange(ccce_12 ,   32   ,    51   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   32   ,    51   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,80,129)
replace    ccce_z_score_12=1.0        if [ [ inrange(ccce_12 ,   46   ,    54
     )    & yrschool==0] |      [ inrange(ccce_12 ,   51   ,    60   )    &
```

```
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   51    ,     60    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_12,80,129)
replace    ccce_z_score_12=1.5         if [ [ inrange(ccce_12 ,   54    ,     59
     )     & yrschool==0] |      [ inrange(ccce_12 ,   60    ,     67    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   60    ,     67    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_12,80,129)
replace    ccce_z_score_12=2.0         if [ [ inrange(ccce_12 ,   59    ,     67
     )     & yrschool==0] |      [ inrange(ccce_12 ,   67    ,     80    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   67    ,     80    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_12,80,129)
replace    ccce_z_score_12=3.0         if [ [ inrange(ccce_12 ,   67    ,     99
     )     & yrschool==0] |      [ inrange(ccce_12 ,   80    ,     99    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_12 ,   80    ,     99    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_12,80,129)

replace    ccce_z_score_12= ccce_12 if mi(ccce_12) & ccce_z_score_12==.
replace    ccce_z_score_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
ccce_z_score_12==.
replace    ccce_z_score_12= .p if inlist(tipent_12,3,4)
label variable ccce_z_score_12 "MHAS 2012 CCCE Z-Scores"

** Impairment Status  **
gen cognitive_imp_12 = .
label variable cognitive_imp_12 "MHAS 2012 Cognitive Impairment (Total CCCE)"
** Age 69< & Years of Education=0
replace cognitive_imp_12=2 if inrange(age_12,21,69) & yrschool==0 &
inrange(ccce_12,0,25)
replace cognitive_imp_12=1 if inrange(age_12,21,69) & yrschool==0 &
inrange(ccce_12,25,30)
replace cognitive_imp_12=0 if inrange(age_12,21,69) & yrschool==0 &
inrange(ccce_12,30,99)
** Age 69< & Years of Education 1-6
replace cognitive_imp_12=2  if inrange(age_12,21,69) & inrange(yrschool,1,6) &
inrange(ccce_12,0,31)
replace cognitive_imp_12=1  if inrange(age_12,21,69) & inrange(yrschool,1,6) &
inrange(ccce_12,31,38)
replace cognitive_imp_12=0  if inrange(age_12,21,69) & inrange(yrschool,1,6) &
inrange(ccce_12,38,99)
** Age 69< & Years of Education 7+
replace cognitive_imp_12=2  if inrange(age_12,21,69) & inrange(yrschool,7,25) &
inrange(ccce_12,0,48)
replace cognitive_imp_12=1  if inrange(age_12,21,69) & inrange(yrschool,7,25) &
inrange(ccce_12,48,54)
replace cognitive_imp_12=0  if inrange(age_12,21,69) & inrange(yrschool,7,25) &
inrange(ccce_12,54,99)

** Age 70-79 & Years of Education=0
replace cognitive_imp_12=2 if inrange(age_12,70,79) & yrschool==0 &
inrange(ccce_12,0,22)
replace cognitive_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(ccce_12,22,26)
replace cognitive_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(ccce_12,26,99)
** Age 70-79 & Years of Education 1-6
replace cognitive_imp_12=2 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(ccce_12,0,25)
```

```
replace cognitive_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(ccce_12,25,31)
replace cognitive_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(ccce_12,31,99)
** Age 70-79 & Years of Education 7+
replace cognitive_imp_12=2 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(ccce_12,0,41)
replace cognitive_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(ccce_12,41,45)
replace cognitive_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(ccce_12,45,99)

** Age 80+ & Years of Education=0
replace cognitive_imp_12=2 if inrange(age_12,80,120) & yrschool==0 &
inrange(ccce_12,0,12)
replace cognitive_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(ccce_12,12,18)
replace cognitive_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(ccce_12,18,99)
** Age 80+ & Years of Education 1-6
replace cognitive_imp_12=2 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(ccce_12,0,17)
replace cognitive_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(ccce_12,17,23)
replace cognitive_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(ccce_12,23,99)
** Age 80+ & Years of Education 7+
replace cognitive_imp_12=2 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(ccce_12,0,30)
replace cognitive_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(ccce_12,30,36)
replace cognitive_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(ccce_12,36,99)

replace cognitive_imp_12= ccce_12 if mi(ccce_12) & cognitive_imp_12==.
replace cognitive_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
cognitive_imp_12==.
replace cognitive_imp_12= .p if inlist(tipent_12,3,4)
label define cognitive_imp_12 0 "0.Normal" 1 "1.MCI" 2 "2.Impaired", replace
label values cognitive_imp_12 cognitive_imp_12


*** VERBAL LEARNING ***
** Z-SCORES **
gen iwr_z_12=.
replace iwr_z_12=-3.0 if [[ inrange(iwr_12, 0    ,    2    )    & yrschool==0] |
     [ inrange(iwr_12,    0    ,    2    )    & inrange(yrschool,1,6)] | [
inrange(iwr_12,  0    ,    3    )    & inrange(yrschool,7,25)]  ]    &
inrange(age_12,21,69)
replace iwr_z_12=-2.0 if [
                [ inrange(iwr_12,    2    ,    3    )    &
inrange(yrschool,1,6)] |   [ inrange(iwr_12,    3    ,   4 )    &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace iwr_z_12=-1.5 if [[ inrange(iwr_12, 2    ,    3    )    & yrschool==0] |
     [ inrange(iwr_12,    3    ,    4    )    & inrange(yrschool,1,6)] | [
```

```
inrange(iwr_12, 4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace iwr_z_12=-1.0 if [[ inrange(iwr_12, 3     ,     4     )     & yrschool==0] |
      [ inrange(iwr_12,     4     ,     5     )     & inrange(yrschool,1,6)]

      ]     & inrange(age_12,21,69)
replace iwr_z_12= 0.0 if [[ inrange(iwr_12, 4     ,     5     )     & yrschool==0] |
      [ inrange(iwr_12,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12, 5     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace iwr_z_12= 1.0 if [[ inrange(iwr_12, 5     ,     6     )     & yrschool==0] |
      [ inrange(iwr_12,     6     ,     7     )     & inrange(yrschool,1,6)]

      ]     & inrange(age_12,21,69)
replace iwr_z_12= 1.5 if [[ inrange(iwr_12, 6     ,     7     )     & yrschool==0] |

      [ inrange(iwr_12,     7     ,     8     )     & inrange(yrschool,7,25)]   ]
      & inrange(age_12,21,69)
replace iwr_z_12= 2.0 if [[ inrange(iwr_12, 7     ,     8     )     & yrschool==0] |
      [ inrange(iwr_12,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_12,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace iwr_z_12= 3.0 if [[ inlist(iwr_12,  8               )     & yrschool==0] |
      [ inlist(iwr_12, 8               )     & inrange(yrschool,1,6)]
                                                                          ]
      & inrange(age_12,21,69)

replace iwr_z_12=-3.0 if [[ inrange(iwr_12, 0     ,     2     )     & yrschool==0] |
      [ inrange(iwr_12,     0     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12, 0     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace iwr_z_12=-2.0 if [[ inrange(iwr_12, 2     ,     3     )     & yrschool==0] |
      [ inrange(iwr_12,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12, 3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace iwr_z_12=-1.5 if [
                [ inrange(iwr_12,     3     ,     4     )     &
inrange(yrschool,1,6)]
                                  ]     & inrange(age_12,70,79)
replace iwr_z_12=-1.0 if [[ inrange(iwr_12, 3     ,     4     )     & yrschool==0] |

      [ inrange(iwr_12,     4     ,     5     )     & inrange(yrschool,7,25)]   ]
      & inrange(age_12,70,79)
replace iwr_z_12= 0.0 if [[ inrange(iwr_12, 4     ,     5     )     & yrschool==0] |
      [ inrange(iwr_12,     4     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12, 5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace iwr_z_12= 1.0 if [[ inrange(iwr_12, 5     ,     6     )     & yrschool==0] |

      [ inrange(iwr_12,     6     ,     7     )     & inrange(yrschool,7,25)]   ]
      & inrange(age_12,70,79)
replace iwr_z_12= 1.5 if [[ inrange(iwr_12, 6     ,     7     )     & yrschool==0] |
      [ inrange(iwr_12,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12, 7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
```

```
replace iwr_z_12= 2.0 if [[ inrange(iwr_12, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_12,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_12,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace iwr_z_12= 3.0 if [[ inlist(iwr_12,  8               )     & yrschool==0] |
     [ inlist(iwr_12, 8               )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_12,70,79)

replace iwr_z_12=-3.0 if [[ inrange(iwr_12, 0     ,     1     )     & yrschool==0] |
     [ inrange(iwr_12,     0     ,     1     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12=-2.0 if [[ inrange(iwr_12, 1     ,     2     )     & yrschool==0] |
     [ inrange(iwr_12,     1     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12=-1.5 if [[ inrange(iwr_12, 2     ,     3     )     & yrschool==0] |
     [ inrange(iwr_12,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  2     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12=-1.0 if [
                [ inrange(iwr_12,     3     ,     4     )     &
inrange(yrschool,1,6)] |    [ inrange(iwr_12,     3     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace iwr_z_12= 0.0 if [[ inrange(iwr_12, 3     ,     5     )     & yrschool==0] |
     [ inrange(iwr_12,     4     ,     5     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12= 1.0 if [[ inrange(iwr_12, 5     ,     6     )     & yrschool==0] |
     [ inrange(iwr_12,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12= 1.5 if [[ inrange(iwr_12, 6     ,     7     )     & yrschool==0] |
     [ inrange(iwr_12,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  6     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12= 2.0 if [[ inrange(iwr_12, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_12,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inrange(iwr_12,  7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace iwr_z_12= 3.0 if [[ inlist(iwr_12,  8               )     & yrschool==0] |
     [ inlist(iwr_12, 8               )     & inrange(yrschool,1,6)] | [
inlist(iwr_12,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)

replace iwr_z_12= iwr_12 if mi(iwr_12) & iwr_z_12==.
replace iwr_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] & iwr_z_12==.
replace iwr_z_12= .p if inlist(tipent_12,3,4)
label variable iwr_z_12 "MHAS 2012 Verbal Learning - Z-Scores"

** Impairment Status **
gen iwr_imp_12 = .
label variable iwr_imp_12 "MHAS 2012 Verbal Learning - Normal/Impaired"
* age_12 69< & Years of Education=0
replace iwr_imp_12=1 if inrange(age_12,18,69) & yrschool==0 & inrange(iwr_12,0,3)
```

```
replace iwr_imp_12=0 if inrange(age_12,18,69) & yrschool==0 & inrange(iwr_12,3,8)
* age_12 69< & Years of Education 1-6
replace iwr_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(iwr_12,0,4)
replace iwr_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(iwr_12,4,8)
* age_12 69< & Years of Education 7+
replace iwr_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(iwr_12,0,5)
replace iwr_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(iwr_12,5,8)

* age_12 70-79 & Years of Education=0
replace iwr_imp_12=1 if inrange(age_12,70,79) & yrschool==0 & inrange(iwr_12,0,3)
replace iwr_imp_12=0 if inrange(age_12,70,79) & yrschool==0 & inrange(iwr_12,3,8)
* age_12 70-79 & Years of Education 1-6
replace iwr_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(iwr_12,0,4)
replace iwr_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(iwr_12,4,8)
* age_12 70-79 & Years of Education 7+
replace iwr_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(iwr_12,0,4)
replace iwr_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(iwr_12,4,8)

* age_12 80+ & Years of Education=0
replace iwr_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(iwr_12,0,3)
replace iwr_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(iwr_12,3,8)
* age_12 80+ & Years of Education 1-6
replace iwr_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(iwr_12,0,3)
replace iwr_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(iwr_12,3,8)
* age_12 80+ & Years of Education 7+
replace iwr_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(iwr_12,0,3)
replace iwr_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(iwr_12,3,8)

replace iwr_imp_12= iwr_12 if mi(iwr_12) & iwr_imp_12==.
replace iwr_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
iwr_imp_12==.
replace iwr_imp_12= .p if inlist(tipent_12,3,4)
label define cognitive_12 0 "0.Normal" 1 "1.Impaired", replace
label values iwr_imp_12 cognitive_12


*** DELAYED VERBAL RECALL ***
** Z-SCORES **
gen dwr_z_12=.
replace dwr_z_12= 2.0 if [[ inlist(dwr_12,  8               )     & yrschool==0] |
     [ inlist(dwr_12, 8               )     & inrange(yrschool,1,6)]
```

```
                                                                                ]
     & inrange(age_12,21,69)
replace dwr_z_12= 1.5 if [[ inlist(dwr_12,  7               )     & yrschool==0] |
     [ inlist(dwr_12, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12= 1.0 if [[ inlist(dwr_12,  6               )     & yrschool==0] |
     [ inlist(dwr_12, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   7               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12= 0.0 if [[ inrange(dwr_12, 3    ,    5    )     & yrschool==0] |
     [ inlist(dwr_12, 4    ,    5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   5    ,    6    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12=-1.0 if [[ inlist(dwr_12,  2               )     & yrschool==0] |
     [ inlist(dwr_12, 3               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   4               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12=-1.5 if [[ inlist(dwr_12,  1               )     & yrschool==0] |
     [ inlist(dwr_12, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   3               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12=-2.0 if [[ inlist(dwr_12,  0               )     & yrschool==0] |
     [ inlist(dwr_12, 0    ,    1    )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   2               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)
replace dwr_z_12=-3.0 if [

                     [ inlist(dwr_12, 0    ,    1    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)

replace dwr_z_12= 2.0 if [[ inlist(dwr_12,  8               )     & yrschool==0] |
     [ inlist(dwr_12, 8               )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(age_12,70,79)
replace dwr_z_12= 1.5 if [[ inlist(dwr_12,  7               )     & yrschool==0] |
     [ inlist(dwr_12, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace dwr_z_12= 1.0 if [[ inlist(dwr_12,  5    ,    6    )     & yrschool==0] |
     [ inlist(dwr_12, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   6    ,    7    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace dwr_z_12= 0.0 if [[ inlist(dwr_12,  3    ,    4    )     & yrschool==0] |
     [ inrange(dwr_12,    3    ,    5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   4    ,    5    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace dwr_z_12=-1.0 if [[ inlist(dwr_12,  2               )     & yrschool==0] |
     [ inlist(dwr_12, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   3               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
replace dwr_z_12=-1.5 if [[ inlist(dwr_12,  1               )     & yrschool==0] |
     [ inlist(dwr_12, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   2               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)
```

```
replace dwr_z_12=-2.0 if [[ inlist(dwr_12,  0               )     & yrschool==0] |
     [ inlist(dwr_12, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,70,79)

replace dwr_z_12= 3.0 if [[ inlist(dwr_12,  8               )     & yrschool==0]


                ]     & inrange(age_12,80,129)
replace dwr_z_12= 2.0 if [[ inlist(dwr_12,  7               )     & yrschool==0] |
     [ inlist(dwr_12, 7     ,     8     )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_12,80,129)
replace dwr_z_12= 1.5 if [[ inlist(dwr_12,  6               )     & yrschool==0] |
     [ inlist(dwr_12, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace dwr_z_12= 1.0 if [[ inlist(dwr_12,  5               )     & yrschool==0] |
     [ inlist(dwr_12, 5               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace dwr_z_12= 0.0 if [[ inrange(dwr_12, 2     ,     4     )     & yrschool==0] |
     [ inrange(dwr_12,     2     ,     4     )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace dwr_z_12=-1.0 if [[ inlist(dwr_12,  1               )     & yrschool==0] |
     [ inlist(dwr_12, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)
replace dwr_z_12=-1.5 if [[ inlist(dwr_12,  0               )     & yrschool==0] |
     [ inlist(dwr_12, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_12,   0               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)

replace dwr_z_12= dwr_12 if mi(dwr_12) & dwr_z_12==.
replace dwr_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] & dwr_z_12==.
replace dwr_z_12= .p if inlist(tipent_12,3,4)
label variable dwr_z_12 "MHAS 2012 Delayed Verbal Recall - Z-Scores"

** Impairment Status **
gen dwr_imp_12 = .
label variable dwr_imp_12 "MHAS 2012 Delayed Verbal Recall - Normal/Impaired"
* age_12 69< & Years of Education=0
replace dwr_imp_12=1 if inrange(age_12,18,69) & yrschool==0 & inrange(dwr_12,0,2)
replace dwr_imp_12=0 if inrange(age_12,18,69) & yrschool==0 & inrange(dwr_12,2,8)
* age_12 69< & Years of Education 1-6
replace dwr_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(dwr_12,0,3)
replace dwr_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(dwr_12,3,8)
* age_12 69< & Years of Education 7+
replace dwr_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(dwr_12,0,4)
replace dwr_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(dwr_12,4,8)
```

```
* age_12 70-79 & Years of Education=0
replace dwr_imp_12=1 if inrange(age_12,70,79) & yrschool==0 & inrange(dwr_12,0,2)
replace dwr_imp_12=0 if inrange(age_12,70,79) & yrschool==0 & inrange(dwr_12,2,8)
* age_12 70-79 & Years of Education 1-6
replace dwr_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(dwr_12,0,2)
replace dwr_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(dwr_12,2,8)
* age_12 70-79 & Years of Education 7+
replace dwr_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(dwr_12,0,3)
replace dwr_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(dwr_12,3,8)

* age_12 80+ & Years of Education=0
replace dwr_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(dwr_12,0,1)
replace dwr_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(dwr_12,1,8)
* age_12 80+ & Years of Education 1-6
replace dwr_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(dwr_12,0,1)
replace dwr_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(dwr_12,1,8)
* age_12 80+ & Years of Education 7+
replace dwr_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(dwr_12,0,1)
replace dwr_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(dwr_12,1,8)

replace dwr_imp_12= dwr_12 if mi(dwr_12) & dwr_imp_12==.
replace dwr_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
dwr_imp_12==.
replace dwr_imp_12= .p if inlist(tipent_12,3,4)
label values dwr_imp_12 cognitive_12


*** CONSTRUCTIONAL PRAXIS RECALL ***
** Z-SCORES **
gen construction_m_z_12=.
replace construction_m_z_12= 1.0 if [[ inlist(construction_m_12,  6
     )     & yrschool==0] | [ inlist(construction_m_12, 6               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_12,21,69)
replace construction_m_z_12= 0.0 if [[ inlist(construction_m_12,  4     ,     5
     )     & yrschool==0] | [ inlist(construction_m_12, 4     ,     5     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12, 5     ,     6     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace construction_m_z_12=-1.0 if [[ inlist(construction_m_12,  3
     )     & yrschool==0]

                                                                    ]     &
inrange(age_12,21,69)
replace construction_m_z_12=-1.5 if [[ inlist(construction_m_12,  2
     )     & yrschool==0] | [ inlist(construction_m_12, 3               )     &
```

```
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,4                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace construction_m_z_12=-2.0 if [[ inlist(construction_m_12,  1
     )     & yrschool==0] | [ inlist(construction_m_12,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,3               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace construction_m_z_12=-3.0 if [[ inlist(construction_m_12,  0
     )     & yrschool==0] | [ inlist(construction_m_12,0    ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_m_12,0    ,     2     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)

replace construction_m_z_12= 1.0 if [[ inlist(construction_m_12,  6
     )     & yrschool==0] | [ inlist(construction_m_12,6               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,6               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_m_z_12= 0.0 if [[ inlist(construction_m_12,  4     ,     5
     )     & yrschool==0] | [ inlist(construction_m_12,4     ,     5     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,5               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_m_z_12=-1.0 if [[ inlist(construction_m_12,  2     ,     3
     )     & yrschool==0] | [ inlist(construction_m_12,3               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,4               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_m_z_12=-1.5 if [[ inlist(construction_m_12,  1
     )     & yrschool==0] | [ inlist(construction_m_12,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,3               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_m_z_12=-2.0 if [[ inlist(construction_m_12,  0
     )     & yrschool==0] | [ inlist(construction_m_12,1               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_m_z_12=-3.0 if [
                                  [ inlist(construction_m_12,0
     )     & inrange(yrschool,1,6)] | [ inrange(construction_m_12,0    ,     1
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,70,79)

replace construction_m_z_12= 1.0 if [[ inlist(construction_m_12,  5     ,     6
     )     & yrschool==0] | [ inlist(construction_m_12,5     ,     6     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,6               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_m_z_12= 0.0 if [[ inlist(construction_m_12,  3     ,     4
     )     & yrschool==0] | [ inlist(construction_m_12,3     ,     4     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,4     ,     5     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_m_z_12=-1.0 if [[ inlist(construction_m_12,  2
     )     & yrschool==0] | [ inlist(construction_m_12,2               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,3               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_m_z_12=-1.5 if [[ inlist(construction_m_12,  1
     )     & yrschool==0] | [ inlist(construction_m_12,1               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,2               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_m_z_12=-2.0 if [[ inlist(construction_m_12,  0
     )     & yrschool==0] | [ inlist(construction_m_12,0               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_12,1               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
```

```
replace construction_m_z_12=-3.0 if [

                                                    [ inlist(construction_m_12,
     0                )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,80,129)

replace construction_m_z_12= construction_m_12 if mi(construction_m_12) &
construction_m_z_12==.
replace construction_m_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
construction_m_z_12==.
replace construction_m_z_12= .p if inlist(tipent_12,3,4)
label variable construction_m_z_12 "MHAS 2012 Constructional Praxis Recall - Z-
Scores"


** Impairment Status **
gen construction_m_imp_12 = .
label variable construction_m_imp_12 "MHAS 2012 Constructional Praxis Recall -
Normal/Impaired"

* age_12 69< & Years of Education=0
replace construction_m_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(construction_m_12,0,2)
replace construction_m_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(construction_m_12,3,6)
* age_12 69< & Years of Education 1-6
replace construction_m_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6)
& inrange(construction_m_12,0,3)
replace construction_m_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6)
& inrange(construction_m_12,4,6)
* age_12 69< & Years of Education 7+
replace construction_m_imp_12=1  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inrange(construction_m_12,0,4)
replace construction_m_imp_12=0  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inrange(construction_m_12,5,6)

* age_12 70-79 & Years of Education=0
replace construction_m_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(construction_m_12,0,1)
replace construction_m_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(construction_m_12,2,6)
* age_12 70-79 & Years of Education 1-6
replace construction_m_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6)
& inrange(construction_m_12,0,2)
replace construction_m_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6)
& inrange(construction_m_12,3,6)
* age_12 70-79 & Years of Education 7+
replace construction_m_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25)
& inrange(construction_m_12,0,3)
replace construction_m_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25)
& inrange(construction_m_12,4,6)

* age_12 80+ & Years of Education=0
replace construction_m_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(construction_m_12,0,1)
```

```
replace construction_m_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(construction_m_12,2,6)
* age_12 80+ & Years of Education 1-6
replace construction_m_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6)
& inrange(construction_m_12,0,1)
replace construction_m_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6)
& inrange(construction_m_12,2,6)
* age_12 80+ & Years of Education 7+
replace construction_m_imp_12=1 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inrange(construction_m_12,0,2)
replace construction_m_imp_12=0 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inrange(construction_m_12,3,6)

replace construction_m_imp_12= construction_m_12 if mi(construction_m_12) &
construction_m_imp_12==.
replace construction_m_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
construction_m_imp_12==.
replace construction_m_imp_12= .p if inlist(tipent_12,3,4)
label values construction_m_imp_12 cognitive_12


** Delayed recall/copy of figure z-scores comparable with 2012 & 2012 **
gen construction_m_z_v01_12=.
replace construction_m_z_v01_12= 0.0  if [[ inlist(construction_m_v01_12,   2
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_12,  2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,21,69)
replace construction_m_z_v01_12=-1.0  if [[ inlist(construction_m_v01_12,   1
          )     & yrschool==0]


     ]     & inrange(age_12,21,69)
replace construction_m_z_v01_12=-1.5  if [
                                                [ inlist(construction_m_v01_12,
     1               )     & inrange(yrschool,1,6)]
                                                                              ]
     & inrange(age_12,21,69)
replace construction_m_z_v01_12=-2.0  if [

                                                                        [
inlist(construction_m_v01_12,    1               )     & inrange(yrschool,7,25)]
     ]     & inrange(age_12,21,69)

replace construction_m_z_v01_12=-3.0  if [[ inlist(construction_m_v01_12,   0
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  0
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_12,  0
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,21,69)

replace construction_m_z_v01_12= 1.0  if [[ inlist(construction_m_v01_12,   2
          )     & yrschool==0]


     ]     & inrange(age_12,70,79)
replace construction_m_z_v01_12= 0.0  if [[ inlist(construction_m_v01_12,   1
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  2
```

```
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_12,  2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,70,79)
replace construction_m_z_v01_12=-1.0  if [
                                                [ inlist(construction_m_v01_12,
     1               )     & inrange(yrschool,1,6)]
                                                                              ]
     & inrange(age_12,70,79)
replace construction_m_z_v01_12=-1.5  if [

                                                                          [
inlist(construction_m_v01_12,    1               )     & inrange(yrschool,7,25)]
     ]     & inrange(age_12,70,79)
replace construction_m_z_v01_12=-2.0  if [[ inlist(construction_m_v01_12,    0
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  0
     )     & inrange(yrschool,1,6)]
                                                              ]     &
inrange(age_12,70,79)
replace construction_m_z_v01_12=-3.0  if [

                                                                          [
inlist(construction_m_v01_12,    0               )     & inrange(yrschool,7,25)]
     ]     & inrange(age_12,70,79)

replace construction_m_z_v01_12= 1.0  if [[ inlist(construction_m_v01_12,    2
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_12,  2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,80,129)
replace construction_m_z_v01_12= 0.0  if [[ inlist(construction_m_v01_12,    1
          )     & yrschool==0] |[ inlist(construction_m_v01_12,  1
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_12,  1
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,80,129)
replace construction_m_z_v01_12=-1.5  if [[ inlist(construction_m_v01_12,    0
          )     & yrschool==0]


     ]     & inrange(age_12,80,129)
replace construction_m_z_v01_12=-2.0  if [
                                                [ inlist(construction_m_v01_12,
     0               )     & inrange(yrschool,1,6)] | [
inlist(construction_m_v01_12,    0               )     & inrange(yrschool,7,25)]
     ]     & inrange(age_12,80,129)

replace construction_m_z_v01_12= construction_m_v01_12 if
mi(construction_m_v01_12) & construction_m_z_v01_12==.
replace construction_m_z_v01_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)]
& construction_m_z_v01_12==.
replace construction_m_z_v01_12= .p if inlist(tipent_12,3,4)
label variable construction_m_z_v01_12 "MHAS 2012 Constructional Praxis Recall -
Z-Scores v2001-2003"

** Impairment Status **
gen construction_m_imp_v01_12 = .
label variable construction_m_imp_v01_12 "MHAS 2012 Constructional Praxis Recall
- Normal/Impaired v2001-2003"

* age_12 69< & Years of Education=0
```

```
replace construction_m_imp_v01_12=1 if inrange(age_12,18,69) & yrschool==0 &
inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,18,69) & yrschool==0 &
inlist(construction_m_v01_12,1,2)
* age_12 69< & Years of Education 1-6
replace construction_m_imp_v01_12=1  if inrange(age_12,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,0,1)
replace construction_m_imp_v01_12=0  if inrange(age_12,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,2)
* age_12 69< & Years of Education 7+
replace construction_m_imp_v01_12=1  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,0,1)
replace construction_m_imp_v01_12=0  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,2)

* age_12 70-79 & Years of Education=0
replace construction_m_imp_v01_12=1 if inrange(age_12,70,79) & yrschool==0 &
inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,70,79) & yrschool==0 &
inlist(construction_m_v01_12,1,2)
* age_12 70-79 & Years of Education 1-6
replace construction_m_imp_v01_12=1 if inrange(age_12,70,79) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,70,79) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,1,2)
* age_12 70-79 & Years of Education 7+
replace construction_m_imp_v01_12=1 if inrange(age_12,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,0,1)
replace construction_m_imp_v01_12=0 if inrange(age_12,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,2)

* age_12 80+ & Years of Education=0
replace construction_m_imp_v01_12=1 if inrange(age_12,80,120) & yrschool==0 &
inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,80,120) & yrschool==0 &
inlist(construction_m_v01_12,1,2)
* age_12 80+ & Years of Education 1-6
replace construction_m_imp_v01_12=1 if inrange(age_12,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_v01_12,1,2)
* age_12 80+ & Years of Education 7+
replace construction_m_imp_v01_12=1 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,0)
replace construction_m_imp_v01_12=0 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_v01_12,1,2)

replace construction_m_imp_v01_12= construction_m_v01_12 if
mi(construction_m_v01_12) & construction_m_imp_v01_12==.
replace construction_m_imp_v01_12= .m if [age_12==999 |
inlist(yrschool,88,99,.m)] & construction_m_imp_v01_12==.
replace construction_m_imp_v01_12= .p if inlist(tipent_12,3,4)
label values construction_m_imp_v01_12 cognitive_12


*** VISUAL SCANNING ***
```

```
** Z-SCORES **
gen visual_scan_z_12=.
replace visual_scan_z_12= 3.0    if [[ inrange(visual_scan_12,    46    ,     60
     )     & yrschool==0] |[ inrange(visual_scan_12,   59    ,     60    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_12,21,69)
replace visual_scan_z_12= 2.0    if [[ inrange(visual_scan_12,    40    ,     45
     )     & yrschool==0] |[ inrange(visual_scan_12,   48    ,     58    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_12,21,69)
replace visual_scan_z_12= 1.5    if [[ inrange(visual_scan_12,    36    ,     39
     )     & yrschool==0] |[ inrange(visual_scan_12,   43    ,     47    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   56    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12= 1.0    if [[ inrange(visual_scan_12,    28    ,     35
     )     & yrschool==0] |[ inrange(visual_scan_12,   35    ,     42    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   47    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12= 0.0    if [[ inrange(visual_scan_12,    14    ,     27
     )     & yrschool==0] |[ inrange(visual_scan_12,   20    ,     34    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   33    ,     46    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12=-1.0    if [[ inrange(visual_scan_12,    7     ,     13
     )     & yrschool==0] |[ inrange(visual_scan_12,   12    ,     19    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   25    ,     32    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12=-1.5    if [[ inrange(visual_scan_12,    3     ,     6
     )     & yrschool==0] |[ inrange(visual_scan_12,   7     ,     11    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   19    ,     24    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12=-2.0    if [[ inrange(visual_scan_12,    0     ,     2
     )     & yrschool==0] |[ inrange(visual_scan_12,   0     ,     6     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   7     ,     18    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace visual_scan_z_12=-3.0    if [

                                                    [ inrange(visual_scan_12,
     0     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_12,21,69)

replace visual_scan_z_12= 3.0    if [[ inrange(visual_scan_12,    39    ,     60
     )     & yrschool==0]

                                                                ]     &
inrange(age_12,70,79)
replace visual_scan_z_12= 2.0    if [[ inrange(visual_scan_12,    32    ,     38
     )     & yrschool==0] |[ inrange(visual_scan_12,   50    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   58    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12= 1.5    if [[ inrange(visual_scan_12,    28    ,     31
     )     & yrschool==0] |[ inrange(visual_scan_12,   42    ,     49    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   52    ,     57    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12= 1.0    if [[ inrange(visual_scan_12,    22    ,     27
     )     & yrschool==0] |[ inrange(visual_scan_12,   37    ,     41    )     &
```

```
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   43    ,     51    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12= 0.0    if [[ inrange(visual_scan_12,    10    ,     21
     )     & yrschool==0] |[ inrange(visual_scan_12,   30    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   28    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12=-1.0    if [[ inrange(visual_scan_12,    4     ,     9
     )     & yrschool==0] |[ inrange(visual_scan_12,   16    ,     29    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   18    ,     27    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12=-1.5    if [[ inrange(visual_scan_12,    0     ,     3
     )     & yrschool==0] |[ inrange(visual_scan_12,   6     ,     15    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   13    ,     17    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace visual_scan_z_12=-2.0    if [
                                      [ inrange(visual_scan_12,   3     ,     5
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_12,   2     ,     12
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,70,79)
replace visual_scan_z_12=-3.0    if [
                                      [ inrange(visual_scan_12,   0     ,     2
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_12,   0     ,     1
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,70,79)

replace visual_scan_z_12= 3.0    if [
                                      [ inrange(visual_scan_12,   51    ,     60
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_12,   56    ,     60
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace visual_scan_z_12= 2.0    if [[ inrange(visual_scan_12,    50    ,     60
     )     & yrschool==0] |[ inrange(visual_scan_12,   37    ,     50    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   46    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12= 1.5    if [[ inrange(visual_scan_12,    30    ,     49
     )     & yrschool==0] |[ inrange(visual_scan_12,   33    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   43    ,     45    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12= 1.0    if [[ inrange(visual_scan_12,    26    ,     29
     )     & yrschool==0] |[ inrange(visual_scan_12,   26    ,     32    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   36    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12= 0.0    if [[ inrange(visual_scan_12,    19    ,     25
     )     & yrschool==0] |[ inrange(visual_scan_12,   11    ,     25    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   21    ,     35    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12=-1.0    if [[ inrange(visual_scan_12,    7     ,     18
     )     & yrschool==0] |[ inrange(visual_scan_12,   2     ,     10    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   11    ,     20    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12=-1.5    if [[ inrange(visual_scan_12,    1     ,     6
     )     & yrschool==0] |[ inrange(visual_scan_12,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_12,   8     ,     10    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace visual_scan_z_12=-2.0    if [[ inlist(visual_scan_12,                  0
     )     & yrschool==0] |
                                        [ inrange(visual_scan_12,   3     ,
     7     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
```

```
replace visual_scan_z_12=-3.0    if [

                                                        [ inrange(visual_scan_12,
     0    ,    2    )    & inrange(yrschool,7,25)]   ]    &
inrange(age_12,80,129)

replace visual_scan_z_12= visual_scan_12 if mi(visual_scan_12) &
visual_scan_z_12==.
replace visual_scan_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
visual_scan_z_12==.
replace visual_scan_z_12= .p if inlist(tipent_12,3,4)
label variable visual_scan_z_12 "MHAS 2012 Visual Scanning - Z-Scores"

** Impairment Status **
gen visual_scan_imp_12 = .
label variable visual_scan_imp_12 "MHAS 2012 Visual Scanning - Normal/Impaired"

* age_12 69< & Years of Education=0
replace visual_scan_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(visual_scan_12,0,7)
replace visual_scan_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(visual_scan_12,7,60)
* age_12 69< & Years of Education 1-6
replace visual_scan_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_12,0,12)
replace visual_scan_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_12,12,60)
* age_12 69< & Years of Education 7+
replace visual_scan_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(visual_scan_12,0,25)
replace visual_scan_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(visual_scan_12,25,60)

* age_12 70-79 & Years of Education=0
replace visual_scan_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(visual_scan_12,0,4)
replace visual_scan_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(visual_scan_12,4,60)
* age_12 70-79 & Years of Education 1-6
replace visual_scan_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_12,0,6)
replace visual_scan_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_12,6,60)
* age_12 70-79 & Years of Education 7+
replace visual_scan_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_12,0,18)
replace visual_scan_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_12,18,60)

* age_12 80+ & Years of Education=0
replace visual_scan_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(visual_scan_12,0,1)
replace visual_scan_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(visual_scan_12,1,60)
* age_12 80+ & Years of Education 1-6
```

```
replace visual_scan_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_12,0,2)
replace visual_scan_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_12,2,60)
* age_12 80+ & Years of Education 7+
replace visual_scan_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(visual_scan_12,0,12)
replace visual_scan_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(visual_scan_12,12,60)

replace visual_scan_imp_12= visual_scan_12 if mi(visual_scan_12) &
visual_scan_imp_12==.
replace visual_scan_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
visual_scan_imp_12==.
replace visual_scan_imp_12= .p if inlist(tipent_12,3,4)
label values visual_scan_imp_12 cognitive_12


*** BACKWARDS COUNTING ***
** Z-SCORES **
gen bwc_time_z_12=.
replace bwc_time_z_12= 1.5 if [[ inrange(bwc_time_12, 3    ,    5    )    &
yrschool==0] |  [ inrange(bwc_time_12,     3    ,    5    )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(age_12,21,69)
replace bwc_time_z_12= 1.0 if [[ inrange(bwc_time_12, 5    ,    10   )    &
yrschool==0] |  [ inrange(bwc_time_12,     5    ,    7    )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     3    ,    6    )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace bwc_time_z_12= 0.0 if [[ inrange(bwc_time_12, 10   ,    22   )    &
yrschool==0] |  [ inrange(bwc_time_12,     7    ,    15   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     6    ,    10   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace bwc_time_z_12=-1.0 if [[ inrange(bwc_time_12, 22   ,    27   )    &
yrschool==0] |  [ inrange(bwc_time_12,     15   ,    19   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     10   ,    12   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace bwc_time_z_12=-1.5 if [[ inrange(bwc_time_12, 27   ,    32   )    &
yrschool==0] |  [ inrange(bwc_time_12,     19   ,    21   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     12   ,    14   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace bwc_time_z_12=-2.0 if [[ inrange(bwc_time_12, 32   ,    36   )    &
yrschool==0] |  [ inrange(bwc_time_12,     21   ,    26   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     14   ,    18   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)
replace bwc_time_z_12=-3.0 if [[ inrange(bwc_time_12, 36   ,    60   )    &
yrschool==0] |  [ inrange(bwc_time_12,     26   ,    60   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,     18   ,    60   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_12,21,69)

replace bwc_time_z_12= 1.5 if [
                           [ inlist(bwc_time_12, 3    ,    4    )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(age_12,70,79)
replace bwc_time_z_12= 1.0 if [[ inrange(bwc_time_12, 3    ,    10   )    &
yrschool==0] |  [ inrange(bwc_time_12,     4    ,    8    )    &
```

```
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      3     ,     6     )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace bwc_time_z_12= 0.0 if [[ inrange(bwc_time_12,  10    ,     23    )     &
yrschool==0] |   [ inrange(bwc_time_12,      8     ,     17    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      6     ,     11    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace bwc_time_z_12=-1.0 if [[ inrange(bwc_time_12,  23    ,     31    )     &
yrschool==0] |   [ inrange(bwc_time_12,      17    ,     21    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      11    ,     14    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace bwc_time_z_12=-1.5 if [[ inrange(bwc_time_12,  31    ,     36    )     &
yrschool==0] |   [ inrange(bwc_time_12,      21    ,     24    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      14    ,     16    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace bwc_time_z_12=-2.0 if [[ inrange(bwc_time_12,  36    ,     41    )     &
yrschool==0] |   [ inrange(bwc_time_12,      24    ,     31    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      16    ,     20    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace bwc_time_z_12=-3.0 if [[ inrange(bwc_time_12,  41    ,     60    )     &
yrschool==0] |   [ inrange(bwc_time_12,      31    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      20    ,     60    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)

replace bwc_time_z_12= 1.5 if [[ inrange(bwc_time_12,  3     ,     7     )     &
yrschool==0] |   [ inrange(bwc_time_12,      3     ,     4     )     &
inrange(yrschool,1,6)]
                                    ]     & inrange(age_12,80,129)
replace bwc_time_z_12= 1.0 if [[ inrange(bwc_time_12,  7     ,     11    )     &
yrschool==0] |   [ inrange(bwc_time_12,      4     ,     8     )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      3     ,     7     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace bwc_time_z_12= 0.0 if [[ inrange(bwc_time_12,  11    ,     19    )     &
yrschool==0] |   [ inrange(bwc_time_12,      8     ,     18    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      7     ,     13    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace bwc_time_z_12=-1.0 if [[ inrange(bwc_time_12,  19    ,     24    )     &
yrschool==0] |   [ inrange(bwc_time_12,      18    ,     21    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      13    ,     16    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace bwc_time_z_12=-1.5 if [[ inrange(bwc_time_12,  24    ,     27    )     &
yrschool==0] |   [ inrange(bwc_time_12,      21    ,     25    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      16    ,     21    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace bwc_time_z_12=-2.0 if [[ inrange(bwc_time_12,  27    ,     33    )     &
yrschool==0] |   [ inrange(bwc_time_12,      25    ,     31    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      21    ,     24    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace bwc_time_z_12=-3.0 if [[ inrange(bwc_time_12,  33    ,     60    )     &
yrschool==0] |   [ inrange(bwc_time_12,      31    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_12,      24    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)

replace bwc_time_z_12=-3.0 if bwc_c_12==0

replace bwc_time_z_12= bwc_time_12 if mi(bwc_time_12) & bwc_time_z_12==.
```

```
replace bwc_time_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
bwc_time_z_12==.
replace bwc_time_z_12= .p if inlist(tipent_12,3,4)
label variable bwc_time_z_12 "MHAS 2012 Backwards Counting - Z-Scores"

** Impairment Status **
gen bwc_time_imp_12 = .
label variable bwc_time_imp_12 "MHAS 2012 Backwards Counting - Normal/Impaired"

* age_12 69< & Years of Education=0
replace bwc_time_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(bwc_time_12,3,27)
replace bwc_time_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(bwc_time_12,27,60)
* age_12 69< & Years of Education 1-6
replace bwc_time_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(bwc_time_12,3,19)
replace bwc_time_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(bwc_time_12,19,60)
* age_12 69< & Years of Education 7+
replace bwc_time_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(bwc_time_12,3,12)
replace bwc_time_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(bwc_time_12,12,60)

* age_12 70-79 & Years of Education=0
replace bwc_time_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(bwc_time_12,3,31)
replace bwc_time_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(bwc_time_12,31,60)
* age_12 70-79 & Years of Education 1-6
replace bwc_time_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(bwc_time_12,3,21)
replace bwc_time_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(bwc_time_12,21,60)
* age_12 70-79 & Years of Education 7+
replace bwc_time_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(bwc_time_12,3,14)
replace bwc_time_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(bwc_time_12,14,60)

* age_12 80+ & Years of Education=0
replace bwc_time_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(bwc_time_12,3,24)
replace bwc_time_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(bwc_time_12,24,60)
* age_12 80+ & Years of Education 1-6
replace bwc_time_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(bwc_time_12,3,21)
replace bwc_time_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(bwc_time_12,21,60)
* age_12 80+ & Years of Education 7+
replace bwc_time_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(bwc_time_12,3,16)
replace bwc_time_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(bwc_time_12,16,60)
```

```
replace bwc_time_imp_12=1   if bwc_c_12==0

replace bwc_time_imp_12= bwc_time_12 if mi(bwc_time_12) & bwc_time_imp_12==.
replace bwc_time_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
bwc_time_imp_12==.
replace bwc_time_imp_12= .p if inlist(tipent_12,3,4)
label values bwc_time_imp_12 cognitive_12


*** ORIENTATION ***
** Z-SCORES **
gen orientation_z_12=.
replace    orientation_z_12= 1.0      if [[ inlist(orientation_12,     3     )
     & yrschool==0]

                                                          ]   & inrange(age_12,21,69)
replace    orientation_z_12= 0.0      if [[ inlist(orientation_12,     2     )
     & yrschool==0] |      [ inlist(orientation_12,    3     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace    orientation_z_12=-1.0      if [
                                     [ inlist(orientation_12,    2     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_12,21,69)
replace    orientation_z_12=-1.5      if [[ inlist(orientation_12,     1     )
     & yrschool==0] |
                                     [ inlist(orientation_12,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace    orientation_z_12=-2.0      if [
                                     [ inlist(orientation_12,    1     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_12,21,69)
replace    orientation_z_12=-3.0      if [[ inlist(orientation_12,     0     )
     & yrschool==0] |      [ inlist(orientation_12,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)

replace    orientation_z_12= 1.0      if [[ inlist(orientation_12,     3     )
     & yrschool==0]

                                                          ]     &
inrange(age_12,70,79)
replace    orientation_z_12= 0.0      if [[ inlist(orientation_12,     2     )
     & yrschool==0] |      [ inlist(orientation_12,    3     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_12,70,79)
replace    orientation_z_12=-1.0      if [
                                     [ inlist(orientation_12,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,70,79)
replace    orientation_z_12=-1.5      if [[ inlist(orientation_12,     1     )
     & yrschool==0] |
                                     [ inlist(orientation_12,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,70,79)
```

```
replace    orientation_z_12=-2.0      if [[ inlist(orientation_12,     0     )
     & yrschool==0] |      [ inlist(orientation_12,    1     )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,70,79)
replace    orientation_z_12=-3.0      if [
                                      [ inlist(orientation_12,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,70,79)

replace    orientation_z_12= 1.0      if [[ inlist(orientation_12,     3     )
     & yrschool==0] |      [ inlist(orientation_12,    3     )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,80,129)
replace    orientation_z_12= 0.0      if [[ inlist(orientation_12,     2     )
     & yrschool==0] |      [ inlist(orientation_12,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace    orientation_z_12=-1.0      if [[ inlist(orientation_12,     1     )
     & yrschool==0] |
                                      [ inlist(orientation_12,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace    orientation_z_12=-1.5      if [
                                      [ inlist(orientation_12,    1     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    1                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace    orientation_z_12=-2.0      if [[ inlist(orientation_12,     0     )
     & yrschool==0]

                                                        ]     &
inrange(age_12,80,129)
replace    orientation_z_12=-3.0      if [
                                      [ inlist(orientation_12,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_12,    0                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)

replace orientation_z_12= orientation_12 if mi(orientation_12) &
orientation_z_12==.
replace orientation_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
orientation_z_12==.
replace orientation_z_12= .p if inlist(tipent_12,3,4)
label variable orientation_z_12 "MHAS 2012 Orientation Z-Scores"

** Impairment Status **
gen orientation_imp_12 = .
label variable orientation_imp_12 "MHAS 2012 Orientation - Normal/Impaired"

* age_12 69< & Years of Education=0
replace orientation_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(orientation_12,0,1)
replace orientation_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(orientation_12,2,3)
* age_12 69< & Years of Education 1-6
replace orientation_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(orientation_12,0,1)
replace orientation_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(orientation_12,2,3)
```

```
* age_12 69< & Years of Education 7+
replace orientation_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inrange(orientation_12,0,2)
replace orientation_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25) &
inlist(orientation_12,3)

* age_12 70-79 & Years of Education=0
replace orientation_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(orientation_12,0,1)
replace orientation_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(orientation_12,2,3)
* age_12 70-79 & Years of Education 1-6
replace orientation_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(orientation_12,0,1)
replace orientation_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(orientation_12,2,3)
* age_12 70-79 & Years of Education 7+
replace orientation_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(orientation_12,0,2)
replace orientation_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inlist(orientation_12,3)

* age_12 80+ & Years of Education=0
replace orientation_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inlist(orientation_12,0)
replace orientation_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(orientation_12,1,3)
* age_12 80+ & Years of Education 1-6
replace orientation_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(orientation_12,0,1)
replace orientation_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(orientation_12,2,3)
* age_12 80+ & Years of Education 7+
replace orientation_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(orientation_12,0,1)
replace orientation_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25) &
inrange(orientation_12,2,3)

replace orientation_imp_12= orientation_12 if mi(orientation_12) &
orientation_imp_12==.
replace orientation_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
orientation_imp_12==.
replace orientation_imp_12= .p if inlist(tipent_12,3,4)
label values orientation_imp_12 cognitive_12


*** CONSTRUCTIONAL PRAXIS ***
** Z-SCORES **
gen construction_z_12=.
replace construction_z_12= 0.0   if [[ inlist(construction_12,    5     ,     6
     )     & yrschool==0] | [ inlist(construction_12,   6                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   6                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace construction_z_12=-1.0   if [[ inlist(construction_12,    4
     )     & yrschool==0] | [ inlist(construction_12,   5                )     &
```

```
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,21,69)
replace construction_z_12=-1.5   if [[ inlist(construction_12,    3
     )     & yrschool==0]


                                                                    ]     &
inrange(age_12,21,69)
replace construction_z_12=-2.0   if [[ inlist(construction_12,    2
     )     & yrschool==0] |[ inlist(construction_12,   4                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)
replace construction_z_12=-3.0   if [[ inlist(construction_12,    0     ,     1
     )     & yrschool==0] |[ inrange(construction_12, 0     ,     3     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_12, 0     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,21,69)

replace construction_z_12= 1.0   if [[ inlist(construction_12,    6
     )     & yrschool==0]


                                                                    ]     &
inrange(age_12,70,79)
replace construction_z_12= 0.0   if [[ inlist(construction_12,    5
     )     & yrschool==0] |[ inlist(construction_12,   6                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   6                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_z_12=-1.0   if [[ inlist(construction_12,    4
     )     & yrschool==0] |[ inlist(construction_12,   5                )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,70,79)
replace construction_z_12=-1.5   if [[ inlist(construction_12,    3
     )     & yrschool==0] |[ inlist(construction_12,   4                )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,70,79)
replace construction_z_12=-2.0   if [[ inlist(construction_12,    2
     )     & yrschool==0] |[ inlist(construction_12,   3                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)
replace construction_z_12=-3.0   if [[ inlist(construction_12,    0     ,     1
     )     & yrschool==0] |[ inrange(construction_12, 0     ,     2     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_12, 0     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,70,79)

replace construction_z_12= 1.0   if [[ inlist(construction_12,    6
     )     & yrschool==0] |[ inlist(construction_12,   6                )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_12,80,129)
replace construction_z_12= 0.0   if [[ inlist(construction_12,    4     ,     5
     )     & yrschool==0] |[ inlist(construction_12,   5                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   6                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_z_12=-1.0   if [[ inlist(construction_12,    3
     )     & yrschool==0] |[ inlist(construction_12,   4                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_12,   5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_z_12=-1.5   if [[ inlist(construction_12,    2
     )     & yrschool==0] |[ inlist(construction_12,   3                )     &
```

```
inrange(yrschool,1,6)] |    [ inlist(construction_12,  4               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)
replace construction_z_12=-2.0   if [[ inlist(construction_12,    1
     )     & yrschool==0] |[ inlist(construction_12,  2               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_12,80,129)
replace construction_z_12=-3.0   if [[ inlist(construction_12,    0
     )     & yrschool==0] |[ inlist(construction_12,  0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_12, 0     ,     3     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_12,80,129)

replace construction_z_12= construction_12 if mi(construction_12) &
construction_z_12==.
replace construction_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
construction_z_12==.
replace construction_z_12= .p if inlist(tipent_12,3,4)
label variable construction_z_12 "MHAS 2012 Constructional Praxis - Z-Scores"

** Impairment Status **
gen construction_imp_12 = .
label variable construction_imp_12 "MHAS 2012 Constructional Praxis -
Normal/Impaired"

* age_12 69< & Years of Education=0
replace construction_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(construction_12,0,3)
replace construction_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(construction_12,4,6)
* age_12 69< & Years of Education 1-6
replace construction_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(construction_12,0,4)
replace construction_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6) &
inrange(construction_12,5,6)
* age_12 69< & Years of Education 7+
replace construction_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,7,25)
& inrange(construction_12,0,5)
replace construction_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,7,25)
& inlist(construction_12,6)

* age_12 70-79 & Years of Education=0
replace construction_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(construction_12,0,3)
replace construction_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(construction_12,4,6)
* age_12 70-79 & Years of Education 1-6
replace construction_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(construction_12,0,4)
replace construction_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6) &
inrange(construction_12,5,6)
* age_12 70-79 & Years of Education 7+
replace construction_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inrange(construction_12,0,5)
replace construction_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25) &
inlist(construction_12,6)

* age_12 80+ & Years of Education=0
```

```
replace construction_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(construction_12,0,2)
replace construction_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(construction_12,3,6)
* age_12 80+ & Years of Education 1-6
replace construction_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(construction_12,0,3)
replace construction_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6) &
inrange(construction_12,4,6)
* age_12 80+ & Years of Education 7+
replace construction_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,7,25)
& inrange(construction_12,0,4)
replace construction_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,7,25)
& inrange(construction_12,5,6)

replace construction_imp_12= construction_12 if mi(construction_12) &
construction_imp_12==.
replace construction_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
construction_imp_12==.
replace construction_imp_12= .p if inlist(tipent_12,3,4)
label values construction_imp_12 cognitive_12


** Copy one figure z-scores comparable with 2012 & 2003 **
gen construction_z_v01_12=.
replace construction_z_v01_12= 0.0    if [[ inlist(construction_v01_12,     2
          )     & yrschool==0] |[ inlist(construction_v01_12,    2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_12,    2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,21,69)
replace construction_z_v01_12=-1.5    if [[ inlist(construction_v01_12,     1
          )     & yrschool==0]


     ]     & inrange(age_12,21,69)
replace construction_z_v01_12=-3.0    if [[ inlist(construction_v01_12,     0
          )     & yrschool==0] |[ inlist(construction_v01_12,    0     ,     1
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_12,    0     ,
     1     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,21,69)

replace construction_z_v01_12= 0.0    if [[ inlist(construction_v01_12,     2
          )     & yrschool==0] |[ inlist(construction_v01_12,    2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_12,    2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,70,79)
replace construction_z_v01_12=-1.0    if [[ inlist(construction_v01_12,     1
          )     & yrschool==0] |[ inlist(construction_v01_12,    1
     )     & inrange(yrschool,1,6)]
                                                        ]     &
inrange(age_12,70,79)
replace construction_z_v01_12=-3.0    if [[ inlist(construction_v01_12,     0
          )     & yrschool==0] |[ inlist(construction_v01_12,    0
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_12,    0     ,
     1     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,70,79)

replace construction_z_v01_12= 0.0    if [[ inlist(construction_v01_12,     2
          )     & yrschool==0] |[ inlist(construction_v01_12,    2
```

```
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_12,    2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_12,80,129)
replace construction_z_v01_12=-1.0    if [[ inlist(construction_v01_12,     1
          )     & yrschool==0]


     ]     & inrange(age_12,80,129)
replace construction_z_v01_12=-1.5    if [
                                                [ inlist(construction_v01_12,
     1               )     & inrange(yrschool,1,6)]
                                                                            ]
     & inrange(age_12,80,129)
replace construction_z_v01_12=-2.0    if [[ inlist(construction_v01_12,     0
          )     & yrschool==0] |
                                                    [
inlist(construction_v01_12,1               )     & inrange(yrschool,7,25)]  ]
     & inrange(age_12,80,129)
replace construction_z_v01_12=-3.0    if [
                                                [ inlist(construction_v01_12,
     0               )     & inrange(yrschool,1,6)] | [
inlist(construction_v01_12,0               )     & inrange(yrschool,7,25)]  ]
     & inrange(age_12,80,129)

replace construction_z_v01_12= construction_v01_12 if mi(construction_v01_12) &
construction_z_v01_12==.
replace construction_z_v01_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
construction_z_v01_12==.
replace construction_z_v01_12= .p if inlist(tipent_12,3,4)
label variable construction_z_v01_12 "MHAS 2012 Constructional Praxis - Z-Scores
v2001-2003"

** Impairment Status **
gen construction_imp_v01_12 = .
label variable construction_imp_v01_12 "MHAS 2012 Constructional Praxis -
Normal/Impaired v2001-2003"

* age_12 69< & Years of Education=0
replace construction_imp_v01_12=1 if inrange(age_12,18,69) & yrschool==0 &
inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0 if inrange(age_12,18,69) & yrschool==0 &
inlist(construction_v01_12,2)
* age_12 69< & Years of Education 1-6
replace construction_imp_v01_12=1  if inrange(age_12,18,69) &
inrange(yrschool,1,6) & inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0  if inrange(age_12,18,69) &
inrange(yrschool,1,6) & inlist(construction_v01_12,2)
* age_12 69< & Years of Education 7+
replace construction_imp_v01_12=1  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inlist(construction_v01_12,2)

* age_12 70-79 & Years of Education=0
replace construction_imp_v01_12=1 if inrange(age_12,70,79) & yrschool==0 &
inlist(construction_v01_12,0)
```

```
replace construction_imp_v01_12=0 if inrange(age_12,70,79) & yrschool==0 &
inlist(construction_v01_12,1,2)
* age_12 70-79 & Years of Education 1-6
replace construction_imp_v01_12=1 if inrange(age_12,70,79) &
inrange(yrschool,1,6) & inlist(construction_v01_12,0)
replace construction_imp_v01_12=0 if inrange(age_12,70,79) &
inrange(yrschool,1,6) & inlist(construction_v01_12,1,2)
* age_12 70-79 & Years of Education 7+
replace construction_imp_v01_12=1 if inrange(age_12,70,79) &
inrange(yrschool,7,25) & inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0 if inrange(age_12,70,79) &
inrange(yrschool,7,25) & inlist(construction_v01_12,2)

* age_12 80+ & Years of Education=0
replace construction_imp_v01_12=1 if inrange(age_12,80,120) & yrschool==0 &
inlist(construction_v01_12,0)
replace construction_imp_v01_12=0 if inrange(age_12,80,120) & yrschool==0 &
inlist(construction_v01_12,1,2)
* age_12 80+ & Years of Education 1-6
replace construction_imp_v01_12=1 if inrange(age_12,80,120) &
inrange(yrschool,1,6) & inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0 if inrange(age_12,80,120) &
inrange(yrschool,1,6) & inlist(construction_v01_12,2)
* age_12 80+ & Years of Education 7+
replace construction_imp_v01_12=1 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inlist(construction_v01_12,0,1)
replace construction_imp_v01_12=0 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inlist(construction_v01_12,2)

replace construction_imp_v01_12= construction_v01_12 if mi(construction_v01_12) &
construction_imp_v01_12==.
replace construction_imp_v01_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)]
& construction_imp_v01_12==.
replace construction_imp_v01_12= .p if inlist(tipent_12,3,4)
label values construction_imp_v01_12 cognitive_12


*** CORRECTED CONSTRUCTION RECALL Impairment Variable ***
* CONTRUCTIONAL PRAXIS          CONSTRUCTIONAL PRAXIS RECALL     ->    NEW
CONSTRUCIONAL PRAXIS RECALL
* construction_imp_12      construction_m_imp_12
     construction_m_imp_c_12
* IMPAIRED=YES                    IMPAIRED=YES
* NO                                   YES                                  ->
     YES
* NO                                   NO                                   ->
     NO
* YES                                  NO                                   ->
     NO
* YES                                  YES                                  ->
     NO

gen construction_m_imp_c_v01_12=construction_m_imp_v01_12
replace construction_m_imp_c_v01_12=1 if  construction_imp_v01_12==0 &
construction_m_imp_v01_12==1
```

```
replace construction_m_imp_c_v01_12=0 if [construction_imp_v01_12==0 &
construction_m_imp_v01_12==0] | ///

[construction_imp_v01_12==1 & construction_m_imp_v01_12==0] | ///

[construction_imp_v01_12==1 & construction_m_imp_v01_12==1]

replace construction_m_imp_c_v01_12= construction_v01_12 if
mi(construction_v01_12) & construction_m_imp_c_v01_12==.
replace construction_m_imp_c_v01_12= .m if [age_12==999 |
inlist(yrschool,88,99,.m)] & construction_m_imp_c_v01_12==.
replace construction_m_imp_c_v01_12= .p if inlist(tipent_12,21,22)
label variable construction_m_imp_c_v01_12 "MHAS 2012 Constructional Praxis -
Normal/Impaired v2001-2003 Reclassified"
label values construction_m_imp_c_v01_12 cognitive_12


*** VERBAL FLUENCY ***
** Z-SCORES **
gen verbal_fluency_z_12=.
replace verbal_fluency_z_12= 3.0 if [[ inrange(verbal_fluency_num_12,  28    ,
     50    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 27    ,     50
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 31    ,
     50    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12= 2.0 if [[ inrange(verbal_fluency_num_12,  23    ,
     27    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 23    ,     26
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 27    ,
     30    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12= 1.5 if [[ inrange(verbal_fluency_num_12,  20    ,
     22    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 21    ,     22
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 25    ,
     26    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12= 1.0 if [[ inrange(verbal_fluency_num_12,  17    ,
     19    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 18    ,     20
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 22    ,
     24    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12= 0.0 if [[ inrange(verbal_fluency_num_12,  11    ,
     16    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 13    ,     17
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 16    ,
     21    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12=-1.0 if [[ inrange(verbal_fluency_num_12,  8     ,
     10    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 10    ,     12
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 13    ,
     15    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12=-1.5 if [[ inrange(verbal_fluency_num_12,  6     ,
     7     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 8     ,     9
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 10    ,
     12    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12=-2.0 if [[ inrange(verbal_fluency_num_12,  3     ,
     5     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 5     ,     7
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 6     ,
     9     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
replace verbal_fluency_z_12=-3.0 if [[ inrange(verbal_fluency_num_12,  0     ,
     2     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 0     ,     4
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 0     ,
     5     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,21,69)
```

```
replace verbal_fluency_z_12= 3.0 if [[ inrange(verbal_fluency_num_12,  25   ,
     50   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 26   ,    50
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 28   ,
     50   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12= 2.0 if [[ inrange(verbal_fluency_num_12,  21   ,
     24   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 22   ,    25
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 25   ,
     27   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12= 1.5 if [[ inrange(verbal_fluency_num_12,  19   ,
     20   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 20   ,    21
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 23   ,
     24   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12= 1.0 if [[ inrange(verbal_fluency_num_12,  16   ,
     18   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 17   ,    19
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 20   ,
     22   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12= 0.0 if [[ inrange(verbal_fluency_num_12,  11   ,
     15   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 12   ,    16
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 15   ,
     19   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12=-1.0 if [[ inrange(verbal_fluency_num_12,  8    ,
     10   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 9    ,    11
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 12   ,
     14   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12=-1.5 if [[ inrange(verbal_fluency_num_12,  5    ,
     7    )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 7    ,    8
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 10   ,
     11   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12=-2.0 if [[ inrange(verbal_fluency_num_12,  3    ,
     4    )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 5    ,    6
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 6    ,
     9    )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)
replace verbal_fluency_z_12=-3.0 if [[ inrange(verbal_fluency_num_12,  0    ,
     2    )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 0    ,    4
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 0    ,
     5    )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,70,79)

replace verbal_fluency_z_12= 3.0 if [[ inrange(verbal_fluency_num_12,  22   ,
     50   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 23   ,    50
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 26   ,
     50   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,80,129)
replace verbal_fluency_z_12= 2.0 if [[ inrange(verbal_fluency_num_12,  19   ,
     21   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 20   ,    22
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 23   ,
     25   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,80,129)
replace verbal_fluency_z_12= 1.5 if [
                                          [ inrange(verbal_fluency_num_12,
     18   ,    19   )    & inrange(yrschool,1,6)] | [
inrange(verbal_fluency_num_12,   21   ,    22   )    & inrange(yrschool,7,25)]
     ]    & inrange(age_12,80,129)
replace verbal_fluency_z_12= 1.0 if [[ inrange(verbal_fluency_num_12,  15   ,
     18   )    & yrschool==0] |[ inrange(verbal_fluency_num_12, 16   ,    17
     )    & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 17   ,
     20   )    & inrange(yrschool,7,25)]  ]    & inrange(age_12,80,129)
```

```
replace verbal_fluency_z_12= 0.0 if [[ inrange(verbal_fluency_num_12,  11    ,
     14    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 10    ,     15
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 12    ,
     16    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace verbal_fluency_z_12=-1.0 if [[ inrange(verbal_fluency_num_12,  8     ,
     10    )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 8     ,     9
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 9     ,
     11    )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace verbal_fluency_z_12=-1.5 if [[ inrange(verbal_fluency_num_12,  6     ,
     7     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 6     ,     7
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 7     ,
     8     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace verbal_fluency_z_12=-2.0 if [[ inrange(verbal_fluency_num_12,  5     ,
     5     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 4     ,     5
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 3     ,
     6     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)
replace verbal_fluency_z_12=-3.0 if [[ inrange(verbal_fluency_num_12,  0     ,
     4     )     & yrschool==0] |[ inrange(verbal_fluency_num_12, 0     ,     3
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_12, 0     ,
     2     )     & inrange(yrschool,7,25)]   ]     & inrange(age_12,80,129)

replace verbal_fluency_z_12= verbal_fluency_num_12 if mi(verbal_fluency_num_12) &
verbal_fluency_z_12==.
replace verbal_fluency_z_12= .e if verbal_fluency_num_12==66
replace verbal_fluency_z_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
verbal_fluency_z_12==.
replace verbal_fluency_z_12= .p if inlist(tipent_12,3,4)
label variable verbal_fluency_z_12 "MHAS 2012 Verbal Fluency - Z-Scores"

** Impairment Status **
gen verbal_fluency_imp_12 = .
label variable verbal_fluency_imp_12 "MHAS 2012 Verbal Fluency - Normal/Impaired
"

* age_12 69< & Years of Education=0
replace verbal_fluency_imp_12=1 if inrange(age_12,18,69) & yrschool==0 &
inrange(verbal_fluency_num_12,0,8)
replace verbal_fluency_imp_12=0 if inrange(age_12,18,69) & yrschool==0 &
inrange(verbal_fluency_num_12,8,50)
* age_12 69< & Years of Education 1-6
replace verbal_fluency_imp_12=1  if inrange(age_12,18,69) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,0,10)
replace verbal_fluency_imp_12=0  if inrange(age_12,18,69) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,10,50)
* age_12 69< & Years of Education 7+
replace verbal_fluency_imp_12=1  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_12,0,13)
replace verbal_fluency_imp_12=0  if inrange(age_12,18,69) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_12,13,50)

* age_12 70-79 & Years of Education=0
replace verbal_fluency_imp_12=1 if inrange(age_12,70,79) & yrschool==0 &
inrange(verbal_fluency_num_12,0,8)
replace verbal_fluency_imp_12=0 if inrange(age_12,70,79) & yrschool==0 &
inrange(verbal_fluency_num_12,8,50)
* age_12 70-79 & Years of Education 1-6
```

```
replace verbal_fluency_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,0,9)
replace verbal_fluency_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,9,50)
* age_12 70-79 & Years of Education 7+
replace verbal_fluency_imp_12=1 if inrange(age_12,70,79) & inrange(yrschool,7,25)
& inrange(verbal_fluency_num_12,0,12)
replace verbal_fluency_imp_12=0 if inrange(age_12,70,79) & inrange(yrschool,7,25)
& inrange(verbal_fluency_num_12,12,50)

* age_12 80+ & Years of Education=0
replace verbal_fluency_imp_12=1 if inrange(age_12,80,120) & yrschool==0 &
inrange(verbal_fluency_num_12,0,8)
replace verbal_fluency_imp_12=0 if inrange(age_12,80,120) & yrschool==0 &
inrange(verbal_fluency_num_12,8,50)
* age_12 80+ & Years of Education 1-6
replace verbal_fluency_imp_12=1 if inrange(age_12,80,120) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,0,8)
replace verbal_fluency_imp_12=0 if inrange(age_12,80,120) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_12,8,50)
* age_12 80+ & Years of Education 7+
replace verbal_fluency_imp_12=1 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_12,0,9)
replace verbal_fluency_imp_12=0 if inrange(age_12,80,120) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_12,9,50)

replace verbal_fluency_imp_12= verbal_fluency_num_12 if mi(verbal_fluency_num_12)
& verbal_fluency_imp_12==.
replace verbal_fluency_imp_12= .e if verbal_fluency_num_12==66
replace verbal_fluency_imp_12= .m if [age_12==999 | inlist(yrschool,88,99,.m)] &
verbal_fluency_imp_12==.
replace verbal_fluency_imp_12= .p if inlist(tipent_12,3,4)
label values verbal_fluency_imp_12 cognitive_12


***  TOTAL NUMBER OF TASKS COMPLETED (max. 5) ***
egen numb_tasks_miss_v01_12= rowmiss(iwr_12 dwr_12 construction_m_v01_12
visual_scan_12 construction_v01_12) if inlist(tipent_12,1,2)

gen numb_tasks_comp_v01_12= 5-numb_tasks_miss_v01_12 if inlist(tipent_12,1,2)
replace numb_tasks_comp_v01_12= .p if inlist(tipent_12,3,4)
label variable numb_tasks_comp_v01_12 "MHAS 2012 Number of Tasks Completed (0-5)"

drop numb_tasks_miss_v01_12

***  TOTAL NUMER OF TASKS COMPLETED (max. 8) ***
egen numb_tasks_miss_12= rowmiss(iwr_12 dwr_12 construction_m_12 visual_scan_12
construction_12 bwc_time_12 orientation_12 verbal_fluency_12) if
inlist(tipent_12,1,2)

gen numb_tasks_comp_12= 8-numb_tasks_miss_12 if inlist(tipent_12,1,2)
replace numb_tasks_comp_12= .p if inlist(tipent_12,3,4)
label variable numb_tasks_comp_12 "MHAS 2012 Number of Tasks Completed (0-8)"

drop numb_tasks_miss_12
```

```
***  TOTAL NUMBER OF TASKS WITH IMPAIRMENT IF COMPLETED 2 OR MORE TASKS(max. 5)
***
egen numb_tasks_imp_v01_12= rowtotal(iwr_imp_12 dwr_imp_12
construction_m_imp_c_v01_12 visual_scan_imp_12 construction_imp_v01_12) ///
      if inrange(numb_tasks_comp_v01_12,2,5)
replace numb_tasks_imp_v01_12= .i if inrange(numb_tasks_comp_v01_12,0,1)
replace numb_tasks_imp_v01_12= .m if age_12==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_v01_12= .s if [iwr_imp_12==.s & dwr_imp_12==.s &
construction_m_imp_c_v01_12==.s & ///
visual_scan_imp_12==.s & construction_imp_v01_12==.s] & mi(numb_tasks_imp_v01_12)
replace numb_tasks_imp_v01_12= .p if inlist(tipent_12,3,4)
label variable numb_tasks_imp_v01_12 "MHAS 2012 Number of Tasks with Impairment
if completed 2+ (0-5)"

gen two_more_tasks_imp_v01_12=.
replace two_more_tasks_imp_v01_12=0 if inrange(numb_tasks_imp_v01_12,0,1)
replace two_more_tasks_imp_v01_12=1 if inrange(numb_tasks_imp_v01_12,2,5)
replace two_more_tasks_imp_v01_12= .i if inrange(numb_tasks_comp_v01_12,0,1)
replace two_more_tasks_imp_v01_12= .m if age_12==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_v01_12= .s if [iwr_imp_12==.s & dwr_imp_12==.s &
construction_m_imp_c_v01_12==.s & ///
visual_scan_imp_12==.s & construction_imp_v01_12==.s] &
mi(two_more_tasks_imp_v01_12)
replace two_more_tasks_imp_v01_12= .p if inlist(tipent_12,3,4)
label variable two_more_tasks_imp_v01_12 "MHAS 2012 Dummy of 2+/5 Tasks with
Impairment if completed 2+ (0-1)"

***  TOTAL NUMBER OF TASKS WITH IMPAIRMENT IF COMPLETED 2 OR MORE TASKS(max. 8)
***
egen numb_tasks_imp_12= rowtotal(iwr_imp_12 dwr_imp_12 construction_m_imp_12
visual_scan_imp_12 construction_imp_12 bwc_time_imp_12 orientation_imp_12
verbal_fluency_imp_12) ///
      if inrange(numb_tasks_comp_12,2,8)
replace numb_tasks_imp_12= .i if inrange(numb_tasks_comp_12,0,1)
replace numb_tasks_imp_12= .m if age_12==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_12= .s if [iwr_imp_12==.s & dwr_imp_12==.s &
construction_m_imp_12==.s & ///
visual_scan_imp_12==.s & construction_imp_12==.s & bwc_time_imp_12==.s &
orientation_imp_12==.s & ///
verbal_fluency_imp_12==.s] & mi(numb_tasks_imp_12)
replace numb_tasks_imp_12= .p if inlist(tipent_12,3,4)
label variable numb_tasks_imp_12 "MHAS 2012 Number of Tasks with Impairment if
completed 2+ (0-8)"

gen two_more_tasks_imp_12=.
replace two_more_tasks_imp_12=0 if inrange(numb_tasks_imp_12,0,1)
replace two_more_tasks_imp_12=1 if inrange(numb_tasks_imp_12,2,8)
replace two_more_tasks_imp_12= .i if inrange(numb_tasks_comp_12,0,1)
replace two_more_tasks_imp_12= .m if age_12==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_12= .s if [iwr_imp_12==.s & dwr_imp_12==.s &
construction_m_imp_12==.s & ///
visual_scan_imp_12==.s & construction_imp_12==.s & bwc_time_imp_12==.s &
orientation_imp_12==.s & ///
verbal_fluency_imp_12==.s] & mi(two_more_tasks_imp_12)
replace two_more_tasks_imp_12= .p if inlist(tipent_12,3,4)
```

```
label variable two_more_tasks_imp_12 "MHAS 2012 Dummy of 2+/8 Tasks with
Impairment if completed 2+ (0-1)"


*********************************************************************
********* MHAS 2012 INSTRUMENTAL ACTIVITIES OF DAILY LIVING *********
*********************************************************************

*** IADL ***
** Managing money **
gen iadl_money_12 =.
replace iadl_money_12 = .m if inlist(tipent_12,1,2,3,4) & h29a_12 == .
replace iadl_money_12 = .d if h29a_12 == 9
replace iadl_money_12 = .r if h29a_12 == 8
replace iadl_money_12 = .p if inlist(tipent_12,3,4)
replace iadl_money_12 = .x if h29a_12 == 7 & inlist(h29b_12,8,9)
replace iadl_money_12 = 0 if h29a_12 == 2 | (h29a_12 == 7 & h29b_12 == 2)
replace iadl_money_12 = 1 if inlist(h29a_12,1,6) | (h29a_12 == 7 & h29b_12 == 1)
label variable iadl_money_12 "IADLs: Difficulty Managing Money 2012"

** Taking medicines **
gen iadl_medicines_12 =.
replace iadl_medicines_12 = .m if inlist(tipent_12,1,2,3,4) & h28a_12 == .
replace iadl_medicines_12 = .d if h28a_12 == 9
replace iadl_medicines_12 = .r if h28a_12 == 8
replace iadl_medicines_12 = .p if inlist(tipent_12,3,4)
replace iadl_medicines_12 = .x if h28a_12 == 7 & inlist(h28b_12,8,9)
replace iadl_medicines_12 = 0 if h28a_12 == 2 | (h28a_12 == 7 & h28b_12 == 2)
replace iadl_medicines_12 = 1 if inlist(h28a_12,1,6) | (h28a_12 == 7 & h28b_12 ==
1)
label variable iadl_medicines_12 "IADLs: Difficulty Taking Medicines 2012"

** Shopping for groceries **
gen iadl_shopping_12 =.
replace iadl_shopping_12 = .m if inlist(tipent_12,1,2,3,4) & h27a_12 == .
replace iadl_shopping_12 = .d if h27a_12 == 9
replace iadl_shopping_12 = .r if h27a_12 == 8
replace iadl_shopping_12 = .p if inlist(tipent_12,3,4)
replace iadl_shopping_12 = .x if h27a_12 == 7 & inlist(h27b_12,8,9)
replace iadl_shopping_12 = 0 if h27a_12 == 2 | (h27a_12 == 7 & h27b_12 == 2)
replace iadl_shopping_12 = 1 if inlist(h27a_12,1,6) | (h27a_12 == 7 & h27b_12 ==
1)
label variable iadl_shopping_12 "IADLs: Difficulty Shopping for Groceries 2012"

** Cooking a hot meal **
gen iadl_cooking_12 =.
replace iadl_cooking_12 = .m if inlist(tipent_12,1,2,3,4) & h26a_12 == .
replace iadl_cooking_12 = .d if h26a_12 == 9
replace iadl_cooking_12 = .r if h26a_12 == 8
replace iadl_cooking_12 = .p if inlist(tipent_12,3,4)
replace iadl_cooking_12 = .x if h26a_12 == 7 & inlist(h26b_12,8,9)
replace iadl_cooking_12 = 0 if h26a_12 == 2 | (h26a_12 == 7 & h26b_12 == 2)
replace iadl_cooking_12 = 1 if inlist(h26a_12,1,6) | (h26a_12 == 7 & h26b_12 ==
1)
label variable iadl_cooking_12 "IADLs: Difficulty Cooking a Meal 2012"
label values iadl_cooking_12 adls
```

```
** Number of Limitations with IADLs (0-4) **
egen iadls_12 = rowtotal(iadl_money_12 iadl_medicines_12 iadl_shopping_12
iadl_cooking_12) if inlist(tipent_12,1,2)
replace iadls_12 = .m if inlist(tipent_12,1,2,3,4)  & h26a_12 == . & h27a_12 == .
& h28a_12 == . & h29a_12 == . & iadls_12==.
replace iadls_12 = .d if iadl_money_12 == .d & iadl_medicines_12 == .d &
iadl_shopping_12 == .d & iadl_cooking_12 == .d
replace iadls_12 = .r if iadl_money_12 == .r & iadl_medicines_12 == .r &
iadl_shopping_12 == .r & iadl_cooking_12 == .r
replace iadls_12 = .x if iadl_money_12 == .x & iadl_medicines_12 == .x &
iadl_shopping_12 == .x & iadl_cooking_12 == .x
replace iadls_12 = .p if inlist(tipent_12,3,4)
label variable iadls_12 "Number of Limitations with IADLs 2012 (0-4)"


*********************************************************
********* MHAS 2012 COGNITIVE STATUS ASSESSMENT  *********
*********************************************************

* COGNITIVE STATUS CLASIFICATION: 1) CIND: impairment in 2+ cognitive tasks and
NO IADLs difficulties
                                /// 2) Dementia: 2a) Proxy subjects who had a score
equal or above 3.4 in the IQCODE
                                        ///              2b) Direct interview
subjects impaired in 2+ cognitive tasks and
                                        ///                  had difficulty in one
or more IADLs
                                         /// 3) Normal with IADLS:
                                         ///              3a) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who had difficulty in one or more IADLs
                                         /// 4) Normal NO IADLS:
                                         ///              4a) Proxy respondents
with a score below 3.4 in the IQCODE
                                         ///              4b) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who did not have difficulty with IADLs

** Cognitive Status Classification using 8 tasks (if 2 or more completed) **
gen cognitive_status_12=.
replace cognitive_status_12=3 if cog_imp_iqcode_12==1 |
[inrange(numb_tasks_imp_12,2,8) & inrange(iadls_12,1,4)]
replace cognitive_status_12=2 if inrange(numb_tasks_imp_12,2,8) & iadls_12==0
replace cognitive_status_12=1 if inrange(numb_tasks_imp_12,0,1) &
inrange(iadls_12,1,4)
replace cognitive_status_12=0 if cog_imp_iqcode_12==0 |
[inrange(numb_tasks_imp_12,0,1) & iadls_12==0]
replace cognitive_status_12=.i if inrange(numb_tasks_comp_12,0,1) |
cog_imp_iqcode_12==.i
replace cognitive_status_12=.m if [age_12==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_12==.
replace cognitive_status_12=.m if iadls_12==.m & cognitive_status_12==.
replace cognitive_status_12=.d if iadls_12==.d & cognitive_status_12==.
```

```
replace cognitive_status_12=.r if iadls_12==.r & cognitive_status_12==.
replace cognitive_status_12=.x if iadls_12==.x & cognitive_status_12==.
replace cognitive_status_12=.d if cog_imp_iqcode_12==.d & cognitive_status_12==.
replace cognitive_status_12=.r if cog_imp_iqcode_12==.r & cognitive_status_12==.
replace cognitive_status_12=.m if cog_imp_iqcode_12==.m & cognitive_status_12==.
replace cognitive_status_12=.s if numb_tasks_imp_12==.s
label variable cognitive_status_12 "MHAS 2012 Cognitive Status (using 8 tasks)"
label define cognitive_status_12 0 "0.Normal" 1 "1.Normal with Instrumental
Impairment" 2 "2.CIND" 3 "3.Dementia", replace
label values cognitive_status_12 cognitive_status_12

** Cognitive Status Classification using 5 tasks (if 2 or more completed) **
gen cognitive_status_v01_12=.
replace cognitive_status_v01_12=3 if cog_imp_iqcode_12==1 |
[inrange(numb_tasks_imp_v01_12,2,5) & inrange(iadls_12,1,4)]
replace cognitive_status_v01_12=2 if inrange(numb_tasks_imp_v01_12,2,5) &
iadls_12==0
replace cognitive_status_v01_12=1 if inrange(numb_tasks_imp_v01_12,0,1) &
inrange(iadls_12,1,4)
replace cognitive_status_v01_12=0 if cog_imp_iqcode_12==0 |
[inrange(numb_tasks_imp_v01_12,0,1) & iadls_12==0]
replace cognitive_status_v01_12=.i if inrange(numb_tasks_comp_v01_12,0,1) |
cog_imp_iqcode_12==.i
replace cognitive_status_v01_12=.m if [age_12==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_v01_12==.
replace cognitive_status_v01_12=.m if iadls_12==.m & cognitive_status_v01_12==.
replace cognitive_status_v01_12=.d if iadls_12==.d & cognitive_status_v01_12==.
replace cognitive_status_v01_12=.r if iadls_12==.r & cognitive_status_v01_12==.
replace cognitive_status_v01_12=.x if iadls_12==.x & cognitive_status_v01_12==.
replace cognitive_status_v01_12=.d if cog_imp_iqcode_12==.d &
cognitive_status_v01_12==.
replace cognitive_status_v01_12=.r if cog_imp_iqcode_12==.r &
cognitive_status_v01_12==.
replace cognitive_status_v01_12=.m if cog_imp_iqcode_12==.m &
cognitive_status_v01_12==.
replace cognitive_status_v01_12=.s if numb_tasks_imp_12==.s
label variable cognitive_status_v01_12 "MHAS 2012 Cognitive Status v2001-2003"
label values cognitive_status_v01_12 cognitive_status_12
```

2015

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*********************************************************
**** MHAS 2015 COGNITIVE EXERCISES - CCCE (SECTION E) ****
*********************************************************

label data "Version 2. December 2021"

*** CREATING Z-SCORES & IMPAIREMENT STATUS VARIABLES ***
***          BY TOTAL SCORE, TASK & DOMAIN           ***

*** CCCE Total Score (0-104) ***
** Z-SCORES **
gen ccce_z_score_15=.
replace        ccce_z_score_15=-3.0   if [ [ inrange(ccce_15 ,   0    ,    6
     )    & yrschool==0] |      [ inrange(ccce_15 ,   0    ,    18   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   0    ,    38   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace        ccce_z_score_15=-2.0   if [ [ inrange(ccce_15 ,   6    ,    18
     )    & yrschool==0] |      [ inrange(ccce_15 ,   18   ,    33   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   38   ,    52   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace        ccce_z_score_15=-1.5   if [ [ inrange(ccce_15 ,   18   ,    21
     )    & yrschool==0] |      [ inrange(ccce_15 ,   33   ,    41   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   52   ,    60   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=-1.0  if [ [ inrange(ccce_15 ,   21   ,    33   )
     & yrschool==0] |      [ inrange(ccce_15 ,   41   ,    48   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   60   ,    67   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=0.0        if [ [ inrange(ccce_15 ,   33   ,    51
     )    & yrschool==0] |      [ inrange(ccce_15 ,   48   ,    68   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   67   ,    86   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=1.0        if [ [ inrange(ccce_15 ,   51   ,    60
     )    & yrschool==0] |      [ inrange(ccce_15 ,   68   ,    76   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   86   ,    93   )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=1.5        if [ [ inrange(ccce_15 ,   60   ,    65
     )    & yrschool==0] |      [ inrange(ccce_15 ,   76   ,    84   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   93   ,    100  )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=2.0        if [ [ inrange(ccce_15 ,   65   ,    76
     )    & yrschool==0] |      [ inrange(ccce_15 ,   84   ,    98   )    &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   100  ,    104  )    &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace    ccce_z_score_15=3.0        if [ [ inrange(ccce_15 ,   76   ,    104
     )    & yrschool==0] |      [ inrange(ccce_15 ,   98   ,    104  )    &
inrange(yrschool,1,6)]
                                  ]    & inrange(age_15,22,69)

replace        ccce_z_score_15=-3.0   if [
                                       [ inrange(ccce_15 ,   0    ,    12
     )    & inrange(yrschool,1,6)] |      [ inrange(ccce_15 ,   0    ,    23
     )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,70,79)
```

```
replace        ccce_z_score_15=-2.0   if [ [ inrange(ccce_15 ,    0    ,     12
     )     & yrschool==0] |      [ inrange(ccce_15 ,   12    ,     25    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   23    ,     40    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace        ccce_z_score_15=-1.5   if [ [ inrange(ccce_15 ,    12    ,     19
     )     & yrschool==0] |      [ inrange(ccce_15 ,   25    ,     31    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   40    ,     47    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=-1.0  if [ [ inrange(ccce_15 ,    19    ,     27    )
     & yrschool==0] |      [ inrange(ccce_15 ,   31    ,     39    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   47    ,     56    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=0.0         if [ [ inrange(ccce_15 ,    27    ,     46
     )     & yrschool==0] |      [ inrange(ccce_15 ,   39    ,     60    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   56    ,     67    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=1.0         if [ [ inrange(ccce_15 ,    46    ,     53
     )     & yrschool==0] |      [ inrange(ccce_15 ,   60    ,     69    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   67    ,     88    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=1.5         if [ [ inrange(ccce_15 ,    53    ,     61
     )     & yrschool==0] |      [ inrange(ccce_15 ,   69    ,     76    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   88    ,     96    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=2.0         if [ [ inrange(ccce_15 ,    61    ,     73
     )     & yrschool==0] |      [ inrange(ccce_15 ,   76    ,     90    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   96    ,     100   )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace    ccce_z_score_15=3.0         if [ [ inrange(ccce_15 ,    73    ,     104
     )     & yrschool==0] |      [ inrange(ccce_15 ,   90    ,     104   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   100   ,     104   )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)

replace        ccce_z_score_15=-3.0   if [

                                                  [ inrange(ccce_15 ,   0
     ,     10    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace        ccce_z_score_15=-2.0   if [ [ inrange(ccce_15 ,    0    ,     8
     )     & yrschool==0] |      [ inrange(ccce_15 ,   0     ,     12    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   10    ,     27    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace        ccce_z_score_15=-1.5   if [ [ inrange(ccce_15 ,    8    ,     12
     )     & yrschool==0] |      [ inrange(ccce_15 ,   12    ,     19    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   27    ,     35    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=-1.0  if [ [ inrange(ccce_15 ,    12    ,     19    )
     & yrschool==0] |      [ inrange(ccce_15 ,   19    ,     28    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   35    ,     44    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=0.0         if [ [ inrange(ccce_15 ,    19    ,     35
     )     & yrschool==0] |      [ inrange(ccce_15 ,   28    ,     49    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   44    ,     65    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=1.0         if [ [ inrange(ccce_15 ,    35    ,     43
     )     & yrschool==0] |      [ inrange(ccce_15 ,   49    ,     58    )     &
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inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   65    ,     76    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=1.5         if [ [ inrange(ccce_15 ,   43    ,     48
     )     & yrschool==0] |      [ inrange(ccce_15 ,   58    ,     64    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   76    ,     80    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=2.0         if [ [ inrange(ccce_15 ,   48    ,     61
     )     & yrschool==0] |      [ inrange(ccce_15 ,   64    ,     78    )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   80    ,     90    )     &
inrange(yrschool,7,25)]    ]     & inrange(age_15,80,129)
replace    ccce_z_score_15=3.0         if [ [ inrange(ccce_15 ,   61    ,     104
     )     & yrschool==0] |      [ inrange(ccce_15 ,   78    ,     104   )     &
inrange(yrschool,1,6)] |         [ inrange(ccce_15 ,   90    ,     104   )     &
inrange(yrschool,7,25)]    ]     & inrange(age_15,80,129)

replace    ccce_z_score_15= ccce_15 if mi(ccce_15) & ccce_z_score_15==.
replace    ccce_z_score_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
ccce_z_score_15==.
replace    ccce_z_score_15= .p if inlist(tipent_15,3,4)
label variable ccce_z_score_15 "MHAS 2015 CCCE Z-Scores"

** Impairment Status  **
gen cognitive_imp_15 = .
label variable cognitive_imp_15 "MHAS 2015 Cognitive Impairment - Normal, MCI,
Impaired"
** Age 69< & Years of Education=0
replace cognitive_imp_15=2 if inrange(age_15,22,69) & yrschool==0 &
inrange(ccce_15 ,0,18)
replace cognitive_imp_15=1 if inrange(age_15,22,69) & yrschool==0 &
inrange(ccce_15 ,18,21)
replace cognitive_imp_15=0 if inrange(age_15,22,69) & yrschool==0 &
inrange(ccce_15 ,21,104)

** Age 69< & Years of Education 1-6
replace cognitive_imp_15=2  if inrange(age_15,22,69) & inrange(yrschool,1,6) &
inrange(ccce_15 ,0,33)
replace cognitive_imp_15=1  if inrange(age_15,22,69) & inrange(yrschool,1,6) &
inrange(ccce_15 ,33,41)
replace cognitive_imp_15=0  if inrange(age_15,22,69) & inrange(yrschool,1,6) &
inrange(ccce_15 ,41,104)

** Age 69< & Years of Education 7+
replace cognitive_imp_15=2  if inrange(age_15,22,69) & inrange(yrschool,7,25) &
inrange(ccce_15 ,0,52)
replace cognitive_imp_15=1  if inrange(age_15,22,69) & inrange(yrschool,7,25) &
inrange(ccce_15 ,52,60)
replace cognitive_imp_15=0  if inrange(age_15,22,69) & inrange(yrschool,7,25) &
inrange(ccce_15 ,60,104)

** Age 70-79 & Years of Education=0
replace cognitive_imp_15=2 if inrange(age_15,70,79) & yrschool==0 &
inrange(ccce_15 ,0,12)
replace cognitive_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(ccce_15 ,12,19)
replace cognitive_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(ccce_15 ,19,104)
```

```
** Age 70-79 & Years of Education 1-6
replace cognitive_imp_15=2 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(ccce_15 ,0,25)
replace cognitive_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(ccce_15 ,25,31)
replace cognitive_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(ccce_15 ,31,104)

** Age 70-79 & Years of Education 7+
replace cognitive_imp_15=2 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(ccce_15 ,0,40)
replace cognitive_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(ccce_15 ,40,47)
replace cognitive_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(ccce_15 ,47,104)

** Age 80+ & Years of Education=0
replace cognitive_imp_15=2 if inrange(age_15,80,120) & yrschool==0 &
inrange(ccce_15 ,0,8)
replace cognitive_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(ccce_15 ,8,12)
replace cognitive_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(ccce_15 ,12,104)

** Age 80+ & Years of Education 1-6
replace cognitive_imp_15=2 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(ccce_15 ,0,12)
replace cognitive_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(ccce_15 ,12,19)
replace cognitive_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(ccce_15 ,19,104)

** Age 80+ & Years of Education 7+
replace cognitive_imp_15=2 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(ccce_15 ,0,27)
replace cognitive_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(ccce_15 ,27,35)
replace cognitive_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(ccce_15 ,35,104)

replace cognitive_imp_15= ccce_15 if mi(ccce_15) & cognitive_imp_15==.
replace cognitive_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
cognitive_imp_15==.
replace cognitive_imp_15= .p if inlist(tipent_15,3,4)
label define cognitive_imp_15 0 "0.Normal" 1 "1.MCI" 2 "2.Impaired", replace
label values cognitive_imp_15 cognitive_imp_15


*** VERBAL LEARNING ***
** Z-SCORES **
gen iwr_z_15=.
replace iwr_z_15=-3.0 if [[ inrange(iwr_15, 0    ,    2    )    & yrschool==0] |
     [ inrange(iwr_15,    0    ,    2    )    & inrange(yrschool,1,6)] | [
inrange(iwr_15,  0    ,    3    )    & inrange(yrschool,7,25)]   ]    &
inrange(age_15,22,69)
```

```
replace iwr_z_15=-2.0 if [
                [ inrange(iwr_15,     2     ,     3     )     &
inrange(yrschool,1,6)] |    [ inrange(iwr_15,     3     ,    4 )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace iwr_z_15=-1.5 if [[ inrange(iwr_15, 2     ,     3     )     & yrschool==0] |
      [ inrange(iwr_15,     3     ,     4     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace iwr_z_15=-1.0 if [[ inrange(iwr_15, 3     ,     4     )     & yrschool==0] |
      [ inrange(iwr_15,     4     ,     5     )     & inrange(yrschool,1,6)]

      ]     & inrange(age_15,22,69)
replace iwr_z_15= 0.0 if [[ inrange(iwr_15, 4     ,     5     )     & yrschool==0] |
      [ inrange(iwr_15,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  5     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace iwr_z_15= 1.0 if [[ inrange(iwr_15, 5     ,     6     )     & yrschool==0] |
      [ inrange(iwr_15,     6     ,     7     )     & inrange(yrschool,1,6)]

      ]     & inrange(age_15,22,69)
replace iwr_z_15= 1.5 if [[ inrange(iwr_15, 6     ,     7     )     & yrschool==0] |

      [ inrange(iwr_15,     7     ,     8     )     & inrange(yrschool,7,25)]   ]
      & inrange(age_15,22,69)
replace iwr_z_15= 2.0 if [[ inrange(iwr_15, 7     ,     8     )     & yrschool==0] |
      [ inrange(iwr_15,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_15,  8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace iwr_z_15= 3.0 if [[ inlist(iwr_15,  8               )     & yrschool==0] |
      [ inlist(iwr_15, 8               )     & inrange(yrschool,1,6)]
                                                                        ]
      & inrange(age_15,22,69)

replace iwr_z_15=-3.0 if [[ inrange(iwr_15, 0     ,     2     )     & yrschool==0] |
      [ inrange(iwr_15,     0     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  0     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace iwr_z_15=-2.0 if [[ inrange(iwr_15, 2     ,     3     )     & yrschool==0] |
      [ inrange(iwr_15,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace iwr_z_15=-1.5 if [
                [ inrange(iwr_15,     3     ,     4     )     &
inrange(yrschool,1,6)]
                                ]     & inrange(age_15,70,79)
replace iwr_z_15=-1.0 if [[ inrange(iwr_15, 3     ,     4     )     & yrschool==0] |

      [ inrange(iwr_15,     4     ,     5     )     & inrange(yrschool,7,25)]   ]
      & inrange(age_15,70,79)
replace iwr_z_15= 0.0 if [[ inrange(iwr_15, 4     ,     5     )     & yrschool==0] |
      [ inrange(iwr_15,     4     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace iwr_z_15= 1.0 if [[ inrange(iwr_15, 5     ,     6     )     & yrschool==0] |
```

```
     [ inrange(iwr_15,     6     ,     7     )     & inrange(yrschool,7,25)]   ]
     & inrange(age_15,70,79)
replace iwr_z_15= 1.5 if [[ inrange(iwr_15, 6     ,     7     )     & yrschool==0] |
     [ inrange(iwr_15,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace iwr_z_15= 2.0 if [[ inrange(iwr_15, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_15,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inlist(iwr_15,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace iwr_z_15= 3.0 if [[ inlist(iwr_15,  8               )     & yrschool==0] |
     [ inlist(iwr_15, 8               )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_15,70,79)

replace iwr_z_15=-3.0 if [[ inrange(iwr_15, 0     ,     1     )     & yrschool==0] |
     [ inrange(iwr_15,     0     ,     1     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15=-2.0 if [[ inrange(iwr_15, 1     ,     2     )     & yrschool==0] |
     [ inrange(iwr_15,     1     ,     2     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15=-1.5 if [[ inrange(iwr_15, 2     ,     3     )     & yrschool==0] |
     [ inrange(iwr_15,     2     ,     3     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  2     ,     3     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15=-1.0 if [
                [ inrange(iwr_15,     3     ,     4     )     &
inrange(yrschool,1,6)] |    [ inrange(iwr_15,     3     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace iwr_z_15= 0.0 if [[ inrange(iwr_15, 3     ,     5     )     & yrschool==0] |
     [ inrange(iwr_15,     4     ,     5     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  4     ,     5     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15= 1.0 if [[ inrange(iwr_15, 5     ,     6     )     & yrschool==0] |
     [ inrange(iwr_15,     5     ,     6     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15= 1.5 if [[ inrange(iwr_15, 6     ,     7     )     & yrschool==0] |
     [ inrange(iwr_15,     6     ,     7     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  6     ,     7     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15= 2.0 if [[ inrange(iwr_15, 7     ,     8     )     & yrschool==0] |
     [ inrange(iwr_15,     7     ,     8     )     & inrange(yrschool,1,6)] | [
inrange(iwr_15,  7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace iwr_z_15= 3.0 if [[ inlist(iwr_15,  8               )     & yrschool==0] |
     [ inlist(iwr_15, 8               )     & inrange(yrschool,1,6)] | [
inlist(iwr_15,   8               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)

replace iwr_z_15= iwr_15 if mi(iwr_15) & iwr_z_15==.
replace iwr_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] & iwr_z_15==.
replace iwr_z_15= .p if inlist(tipent_15,3,4)
label variable iwr_z_15 "MHAS 2015 Verbal Learning - Z-Scores"
```

```
** Impairment Status **
gen iwr_imp_15 = .
label variable iwr_imp_15 "MHAS 2015 Verbal Learning - Normal/Impaired"
* age_15 69< & Years of Education=0
replace iwr_imp_15=1 if inrange(age_15,18,69) & yrschool==0 & inrange(iwr_15,0,3)
replace iwr_imp_15=0 if inrange(age_15,18,69) & yrschool==0 & inrange(iwr_15,3,8)
* age_15 69< & Years of Education 1-6
replace iwr_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(iwr_15,0,4)
replace iwr_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(iwr_15,4,8)
* age_15 69< & Years of Education 7+
replace iwr_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(iwr_15,0,5)
replace iwr_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(iwr_15,5,8)

* age_15 70-79 & Years of Education=0
replace iwr_imp_15=1 if inrange(age_15,70,79) & yrschool==0 & inrange(iwr_15,0,3)
replace iwr_imp_15=0 if inrange(age_15,70,79) & yrschool==0 & inrange(iwr_15,3,8)
* age_15 70-79 & Years of Education 1-6
replace iwr_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(iwr_15,0,4)
replace iwr_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(iwr_15,4,8)
* age_15 70-79 & Years of Education 7+
replace iwr_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(iwr_15,0,4)
replace iwr_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(iwr_15,4,8)

* age_15 80+ & Years of Education=0
replace iwr_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(iwr_15,0,3)
replace iwr_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(iwr_15,3,8)
* age_15 80+ & Years of Education 1-6
replace iwr_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(iwr_15,0,3)
replace iwr_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(iwr_15,3,8)
* age_15 80+ & Years of Education 7+
replace iwr_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(iwr_15,0,3)
replace iwr_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(iwr_15,3,8)

replace iwr_imp_15= iwr_15 if mi(iwr_15) & iwr_imp_15==.
replace iwr_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
iwr_imp_15==.
replace iwr_imp_15= .p if inlist(tipent_15,3,4)
label define cognitive_15 0 "0.Normal" 1 "1.Impaired", replace
label values iwr_imp_15 cognitive_15
```

```
*** DELAYED VERBAL RECALL ***
** Z-SCORES **
gen dwr_z_15=.
replace dwr_z_15= 2.0 if [[ inlist(dwr_15,  8               )     & yrschool==0] |
     [ inlist(dwr_15, 8               )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(age_15,22,69)
replace dwr_z_15= 1.5 if [[ inlist(dwr_15,  7               )     & yrschool==0] |
     [ inlist(dwr_15, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   8              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15= 1.0 if [[ inlist(dwr_15,  6               )     & yrschool==0] |
     [ inlist(dwr_15, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   7              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15= 0.0 if [[ inrange(dwr_15, 3    ,    5    )     & yrschool==0] |
     [ inlist(dwr_15, 4    ,    5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   5    ,    6    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15=-1.0 if [[ inlist(dwr_15,  2               )     & yrschool==0] |
     [ inlist(dwr_15, 3               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   4              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15=-1.5 if [[ inlist(dwr_15,  1               )     & yrschool==0] |
     [ inlist(dwr_15, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   3              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15=-2.0 if [[ inlist(dwr_15,  0               )     & yrschool==0] |
     [ inlist(dwr_15, 0    ,    1    )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   2              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)
replace dwr_z_15=-3.0 if [

                     [ inlist(dwr_15, 0    ,    1    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)

replace dwr_z_15= 2.0 if [[ inlist(dwr_15,  8               )     & yrschool==0] |
     [ inlist(dwr_15, 8               )     & inrange(yrschool,1,6)]
                                                                                ]
     & inrange(age_15,70,79)
replace dwr_z_15= 1.5 if [[ inlist(dwr_15,  7               )     & yrschool==0] |
     [ inlist(dwr_15, 7               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   8              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace dwr_z_15= 1.0 if [[ inlist(dwr_15,  5    ,    6    )     & yrschool==0] |
     [ inlist(dwr_15, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   6    ,    7    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace dwr_z_15= 0.0 if [[ inlist(dwr_15,  3    ,    4    )     & yrschool==0] |
     [ inrange(dwr_15,    3    ,    5    )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   4    ,    5    )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace dwr_z_15=-1.0 if [[ inlist(dwr_15,  2               )     & yrschool==0] |
     [ inlist(dwr_15, 2               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   3              )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
```

```
replace dwr_z_15=-1.5 if [[ inlist(dwr_15,  1               )     & yrschool==0] |
     [ inlist(dwr_15, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   2               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)
replace dwr_z_15=-2.0 if [[ inlist(dwr_15,  0               )     & yrschool==0] |
     [ inlist(dwr_15, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   0     ,     1     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,70,79)

replace dwr_z_15= 3.0 if [[ inlist(dwr_15,  8               )     & yrschool==0]


                ]     & inrange(age_15,80,129)
replace dwr_z_15= 2.0 if [[ inlist(dwr_15,  7               )     & yrschool==0] |
     [ inlist(dwr_15, 7     ,     8     )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_15,80,129)
replace dwr_z_15= 1.5 if [[ inlist(dwr_15,  6               )     & yrschool==0] |
     [ inlist(dwr_15, 6               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   7     ,     8     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace dwr_z_15= 1.0 if [[ inlist(dwr_15,  5               )     & yrschool==0] |
     [ inlist(dwr_15, 5               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   5     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace dwr_z_15= 0.0 if [[ inrange(dwr_15, 2     ,     4     )     & yrschool==0] |
     [ inrange(dwr_15,     2     ,     4     )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   3     ,     4     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace dwr_z_15=-1.0 if [[ inlist(dwr_15,  1               )     & yrschool==0] |
     [ inlist(dwr_15, 1               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   1     ,     2     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)
replace dwr_z_15=-1.5 if [[ inlist(dwr_15,  0               )     & yrschool==0] |
     [ inlist(dwr_15, 0               )     & inrange(yrschool,1,6)] | [
inlist(dwr_15,   0               )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)

replace dwr_z_15= dwr_15 if mi(dwr_15) & dwr_z_15==.
replace dwr_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] & dwr_z_15==.
replace dwr_z_15= .p if inlist(tipent_15,3,4)
label variable dwr_z_15 "MHAS 2015 Delayed Verbal Recall - Z-Scores"

** Impairment Status **
gen dwr_imp_15 = .
label variable dwr_imp_15 "MHAS 2015 Delayed Verbal Recall - Normal/Impaired"
* age_15 69< & Years of Education=0
replace dwr_imp_15=1 if inrange(age_15,18,69) & yrschool==0 & inrange(dwr_15,0,2)
replace dwr_imp_15=0 if inrange(age_15,18,69) & yrschool==0 & inrange(dwr_15,2,8)
* age_15 69< & Years of Education 1-6
replace dwr_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(dwr_15,0,3)
replace dwr_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(dwr_15,3,8)
* age_15 69< & Years of Education 7+
```

```
replace dwr_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(dwr_15,0,4)
replace dwr_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(dwr_15,4,8)

* age_15 70-79 & Years of Education=0
replace dwr_imp_15=1 if inrange(age_15,70,79) & yrschool==0 & inrange(dwr_15,0,2)
replace dwr_imp_15=0 if inrange(age_15,70,79) & yrschool==0 & inrange(dwr_15,2,8)
* age_15 70-79 & Years of Education 1-6
replace dwr_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(dwr_15,0,2)
replace dwr_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(dwr_15,2,8)
* age_15 70-79 & Years of Education 7+
replace dwr_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(dwr_15,0,3)
replace dwr_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(dwr_15,3,8)

* age_15 80+ & Years of Education=0
replace dwr_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(dwr_15,0,1)
replace dwr_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(dwr_15,1,8)
* age_15 80+ & Years of Education 1-6
replace dwr_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(dwr_15,0,1)
replace dwr_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(dwr_15,1,8)
* age_15 80+ & Years of Education 7+
replace dwr_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(dwr_15,0,1)
replace dwr_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(dwr_15,1,8)

replace dwr_imp_15= dwr_15 if mi(dwr_15) & dwr_imp_15==.
replace dwr_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
dwr_imp_15==.
replace dwr_imp_15= .p if inlist(tipent_15,3,4)
label values dwr_imp_15 cognitive_15


*** CONSTRUCTIONAL PRAXIS RECALL ***
** Z-SCORES **
gen construction_m_z_15=.
replace construction_m_z_15= 1.0 if [[ inlist(construction_m_15,  6
     )     & yrschool==0] | [ inlist(construction_m_15, 6               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,22,69)
replace construction_m_z_15= 0.0 if [[ inlist(construction_m_15,  4     ,     5
     )     & yrschool==0] | [ inlist(construction_m_15, 4     ,     5     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15, 5     ,     6     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace construction_m_z_15=-1.0 if [[ inlist(construction_m_15,  3
     )     & yrschool==0]
```

```
                                                                    ]     &
inrange(age_15,22,69)
replace construction_m_z_15=-1.5 if [[ inlist(construction_m_15,  2
     )     & yrschool==0] | [ inlist(construction_m_15,3                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,4                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace construction_m_z_15=-2.0 if [[ inlist(construction_m_15,  1
     )     & yrschool==0] | [ inlist(construction_m_15,2                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,3                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace construction_m_z_15=-3.0 if [[ inlist(construction_m_15,  0
     )     & yrschool==0] | [ inlist(construction_m_15,0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_m_15,0    ,     2     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)

replace construction_m_z_15= 1.0 if [[ inlist(construction_m_15,  6
     )     & yrschool==0] | [ inlist(construction_m_15,6                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,6                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_m_z_15= 0.0 if [[ inlist(construction_m_15,  4     ,     5
     )     & yrschool==0] | [ inlist(construction_m_15,4     ,     5     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_m_z_15=-1.0 if [[ inlist(construction_m_15,  2     ,     3
     )     & yrschool==0] | [ inlist(construction_m_15,3                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,4                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_m_z_15=-1.5 if [[ inlist(construction_m_15,  1
     )     & yrschool==0] | [ inlist(construction_m_15,2                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,3                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_m_z_15=-2.0 if [[ inlist(construction_m_15,  0
     )     & yrschool==0] | [ inlist(construction_m_15,1                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,2                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_m_z_15=-3.0 if [
                                    [ inlist(construction_m_15,0
     )     & inrange(yrschool,1,6)] | [ inrange(construction_m_15,0    ,     1
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)

replace construction_m_z_15= 1.0 if [[ inlist(construction_m_15,  5     ,     6
     )     & yrschool==0] | [ inlist(construction_m_15,5     ,     6     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,6                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_m_z_15= 0.0 if [[ inlist(construction_m_15,  3     ,     4
     )     & yrschool==0] | [ inlist(construction_m_15,3     ,     4     )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,4     ,     5     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_m_z_15=-1.0 if [[ inlist(construction_m_15,  2
     )     & yrschool==0] | [ inlist(construction_m_15,2                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,3                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_m_z_15=-1.5 if [[ inlist(construction_m_15,  1
     )     & yrschool==0] | [ inlist(construction_m_15,1                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,2                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
```

```
replace construction_m_z_15=-2.0 if [[ inlist(construction_m_15,  0
     )     & yrschool==0] |[ inlist(construction_m_15,0                )     &
inrange(yrschool,1,6)] |    [ inlist(construction_m_15,1                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_m_z_15=-3.0 if [

                                                          [ inlist(construction_m_15,
     0                )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,80,129)

replace construction_m_z_15= construction_m_15 if mi(construction_m_15) &
construction_m_z_15==.
replace construction_m_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
construction_m_z_15==.
replace construction_m_z_15= .p if inlist(tipent_15,3,4)
label variable construction_m_z_15 "MHAS 2015 Constructional Praxis Recall - Z-
Scores"

** Impairment Status **
gen construction_m_imp_15 = .
label variable construction_m_imp_15 "MHAS 2015 Constructional Praxis Recall -
Normal/Impaired"

* age_15 69< & Years of Education=0
replace construction_m_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(construction_m_15,0,2)
replace construction_m_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(construction_m_15,3,6)
* age_15 69< & Years of Education 1-6
replace construction_m_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6)
& inrange(construction_m_15,0,3)
replace construction_m_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6)
& inrange(construction_m_15,4,6)
* age_15 69< & Years of Education 7+
replace construction_m_imp_15=1  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inrange(construction_m_15,0,4)
replace construction_m_imp_15=0  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inrange(construction_m_15,5,6)

* age_15 70-79 & Years of Education=0
replace construction_m_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(construction_m_15,0,1)
replace construction_m_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(construction_m_15,2,6)
* age_15 70-79 & Years of Education 1-6
replace construction_m_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6)
& inrange(construction_m_15,0,2)
replace construction_m_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6)
& inrange(construction_m_15,3,6)
* age_15 70-79 & Years of Education 7+
replace construction_m_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25)
& inrange(construction_m_15,0,3)
replace construction_m_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25)
& inrange(construction_m_15,4,6)

* age_15 80+ & Years of Education=0
```

```
replace construction_m_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(construction_m_15,0,1)
replace construction_m_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(construction_m_15,2,6)
* age_15 80+ & Years of Education 1-6
replace construction_m_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6)
& inrange(construction_m_15,0,1)
replace construction_m_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6)
& inrange(construction_m_15,2,6)
* age_15 80+ & Years of Education 7+
replace construction_m_imp_15=1 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inrange(construction_m_15,0,2)
replace construction_m_imp_15=0 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inrange(construction_m_15,3,6)

replace construction_m_imp_15= construction_m_15 if mi(construction_m_15) &
construction_m_imp_15==.
replace construction_m_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
construction_m_imp_15==.
replace construction_m_imp_15= .p if inlist(tipent_15,3,4)
label values construction_m_imp_15 cognitive_15


** Delayed recall/copy of figure z-scores comparable with 2001 & 2003 **
gen construction_m_z_v01_15=.
replace construction_m_z_v01_15= 0.0  if [[ inlist(construction_m_v01_15,   2
          )     & yrschool==0] |[ inlist(construction_m_v01_15,  2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_15,  2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace construction_m_z_v01_15=-1.0  if [[ inlist(construction_m_v01_15,   1
          )     & yrschool==0]


     ]     & inrange(age_15,22,69)
replace construction_m_z_v01_15=-1.5  if [
                                                [ inlist(construction_m_v01_15,
     1               )     & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_15,22,69)
replace construction_m_z_v01_15=-2.0  if [

                                                                    [
inlist(construction_m_v01_15,    1               )     & inrange(yrschool,7,25)]
     ]     & inrange(age_15,22,69)

replace construction_m_z_v01_15=-3.0  if [[ inlist(construction_m_v01_15,   0
          )     & yrschool==0] |[ inlist(construction_m_v01_15,  0
     )     & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_15,  0
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)

replace construction_m_z_v01_15= 1.0  if [[ inlist(construction_m_v01_15,   2
          )     & yrschool==0]


     ]     & inrange(age_15,70,79)
```

```
replace construction_m_z_v01_15= 0.0  if [[ inlist(construction_m_v01_15,   1
          )    & yrschool==0] |[ inlist(construction_m_v01_15,  2
     )    & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_15,  2
     )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,70,79)
replace construction_m_z_v01_15=-1.0  if [
                                                [ inlist(construction_m_v01_15,
     1               )    & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_15,70,79)
replace construction_m_z_v01_15=-1.5  if [

                                                                        [
inlist(construction_m_v01_15,    1               )    & inrange(yrschool,7,25)]
     ]    & inrange(age_15,70,79)
replace construction_m_z_v01_15=-2.0  if [[ inlist(construction_m_v01_15,   0
          )    & yrschool==0] |[ inlist(construction_m_v01_15,  0
     )    & inrange(yrschool,1,6)]
                                                          ]    &
inrange(age_15,70,79)
replace construction_m_z_v01_15=-3.0  if [

                                                                        [
inlist(construction_m_v01_15,    0               )    & inrange(yrschool,7,25)]
     ]    & inrange(age_15,70,79)

replace construction_m_z_v01_15= 1.0  if [[ inlist(construction_m_v01_15,   2
          )    & yrschool==0] |[ inlist(construction_m_v01_15,  2
     )    & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_15,  2
     )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,80,129)
replace construction_m_z_v01_15= 0.0  if [[ inlist(construction_m_v01_15,   1
          )    & yrschool==0] |[ inlist(construction_m_v01_15,  1
     )    & inrange(yrschool,1,6)] | [ inlist(construction_m_v01_15,  1
     )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,80,129)
replace construction_m_z_v01_15=-1.5  if [[ inlist(construction_m_v01_15,   0
          )    & yrschool==0]


     ]    & inrange(age_15,80,129)
replace construction_m_z_v01_15=-2.0  if [
                                                [ inlist(construction_m_v01_15,
     0               )    & inrange(yrschool,1,6)] | [
inlist(construction_m_v01_15,    0               )    & inrange(yrschool,7,25)]
     ]    & inrange(age_15,80,129)

replace construction_m_z_v01_15= construction_m_v01_15 if
mi(construction_m_v01_15) & construction_m_z_v01_15==.
replace construction_m_z_v01_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)]
& construction_m_z_v01_15==.
replace construction_m_z_v01_15= .p if inlist(tipent_15,3,4)
label variable construction_m_z_v01_15 "MHAS 2015 Constructional Praxis Recall -
Z-Scores v2001-2003"

** Impairment Status **
gen construction_m_imp_v01_15 = .
label variable construction_m_imp_v01_15 "MHAS 2015 Constructional Praxis Recall
- Normal/Impaired v2001-2003"
```

```
* age_15 69< & Years of Education=0
replace construction_m_imp_v01_15=1 if inrange(age_15,18,69) & yrschool==0 &
inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,18,69) & yrschool==0 &
inlist(construction_m_v01_15,1,2)
* age_15 69< & Years of Education 1-6
replace construction_m_imp_v01_15=1  if inrange(age_15,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,0,1)
replace construction_m_imp_v01_15=0  if inrange(age_15,18,69) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,2)
* age_15 69< & Years of Education 7+
replace construction_m_imp_v01_15=1  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,0,1)
replace construction_m_imp_v01_15=0  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,2)

* age_15 70-79 & Years of Education=0
replace construction_m_imp_v01_15=1 if inrange(age_15,70,79) & yrschool==0 &
inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,70,79) & yrschool==0 &
inlist(construction_m_v01_15,1,2)
* age_15 70-79 & Years of Education 1-6
replace construction_m_imp_v01_15=1 if inrange(age_15,70,79) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,70,79) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,1,2)
* age_15 70-79 & Years of Education 7+
replace construction_m_imp_v01_15=1 if inrange(age_15,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,0,1)
replace construction_m_imp_v01_15=0 if inrange(age_15,70,79) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,2)

* age_15 80+ & Years of Education=0
replace construction_m_imp_v01_15=1 if inrange(age_15,80,120) & yrschool==0 &
inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,80,120) & yrschool==0 &
inlist(construction_m_v01_15,1,2)
* age_15 80+ & Years of Education 1-6
replace construction_m_imp_v01_15=1 if inrange(age_15,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,80,120) &
inrange(yrschool,1,6) & inlist(construction_m_v01_15,1,2)
* age_15 80+ & Years of Education 7+
replace construction_m_imp_v01_15=1 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,0)
replace construction_m_imp_v01_15=0 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inlist(construction_m_v01_15,1,2)

replace construction_m_imp_v01_15= construction_m_v01_15 if
mi(construction_m_v01_15) & construction_m_imp_v01_15==.
replace construction_m_imp_v01_15= .m if [age_15==999 |
inlist(yrschool,88,99,.m)] & construction_m_imp_v01_15==.
replace construction_m_imp_v01_15= .p if inlist(tipent_15,3,4)
label values construction_m_imp_v01_15 cognitive_15
```

```
*** VISUAL SCANNING ***
** Z-SCORES **
gen visual_scan_z_15=.
replace visual_scan_z_15= 3.0    if [[ inrange(visual_scan_15,    46    ,     60
     )     & yrschool==0] | [ inrange(visual_scan_15,   59    ,     60    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,22,69)
replace visual_scan_z_15= 2.0    if [[ inrange(visual_scan_15,    40    ,     45
     )     & yrschool==0] | [ inrange(visual_scan_15,   48    ,     58    )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,22,69)
replace visual_scan_z_15= 1.5    if [[ inrange(visual_scan_15,    36    ,     39
     )     & yrschool==0] | [ inrange(visual_scan_15,   43    ,     47    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   56    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15= 1.0    if [[ inrange(visual_scan_15,    28    ,     35
     )     & yrschool==0] | [ inrange(visual_scan_15,   35    ,     42    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   47    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15= 0.0    if [[ inrange(visual_scan_15,    14    ,     27
     )     & yrschool==0] | [ inrange(visual_scan_15,   20    ,     34    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   33    ,     46    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15=-1.0    if [[ inrange(visual_scan_15,    7     ,     13
     )     & yrschool==0] | [ inrange(visual_scan_15,   12    ,     19    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   25    ,     32    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15=-1.5    if [[ inrange(visual_scan_15,    3     ,     6
     )     & yrschool==0] | [ inrange(visual_scan_15,   7     ,     11    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   19    ,     24    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15=-2.0    if [[ inrange(visual_scan_15,    0     ,     2
     )     & yrschool==0] | [ inrange(visual_scan_15,   0     ,     6     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   7     ,     18    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace visual_scan_z_15=-3.0    if [

                                                    [ inrange(visual_scan_15,
     0     ,     6     )     & inrange(yrschool,7,25)]   ]     &
inrange(age_15,22,69)

replace visual_scan_z_15= 3.0    if [[ inrange(visual_scan_15,    39    ,     60
     )     & yrschool==0]

                                                                ]     &
inrange(age_15,70,79)
replace visual_scan_z_15= 2.0    if [[ inrange(visual_scan_15,    32    ,     38
     )     & yrschool==0] | [ inrange(visual_scan_15,   50    ,     60    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   58    ,     60    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace visual_scan_z_15= 1.5    if [[ inrange(visual_scan_15,    28    ,     31
     )     & yrschool==0] | [ inrange(visual_scan_15,   42    ,     49    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   52    ,     57    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
```

```
replace visual_scan_z_15= 1.0    if [[ inrange(visual_scan_15,    22    ,     27
     )     & yrschool==0] |[ inrange(visual_scan_15,   37    ,     41    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   43    ,     51    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace visual_scan_z_15= 0.0    if [[ inrange(visual_scan_15,    10    ,     21
     )     & yrschool==0] |[ inrange(visual_scan_15,   30    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   28    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace visual_scan_z_15=-1.0    if [[ inrange(visual_scan_15,    4     ,     9
     )     & yrschool==0] |[ inrange(visual_scan_15,   16    ,     29    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   18    ,     27    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace visual_scan_z_15=-1.5    if [[ inrange(visual_scan_15,    0     ,     3
     )     & yrschool==0] |[ inrange(visual_scan_15,   6     ,     15    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   13    ,     17    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace visual_scan_z_15=-2.0    if [
                                      [ inrange(visual_scan_15,   3     ,     5
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_15,   2     ,     12
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace visual_scan_z_15=-3.0    if [
                                      [ inrange(visual_scan_15,   0     ,     2
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_15,   0     ,     1
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)

replace visual_scan_z_15= 3.0    if [
                                      [ inrange(visual_scan_15,   51    ,     60
     )     & inrange(yrschool,1,6)] | [ inrange(visual_scan_15,   56    ,     60
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,80,129)
replace visual_scan_z_15= 2.0    if [[ inrange(visual_scan_15,    50    ,     60
     )     & yrschool==0] |[ inrange(visual_scan_15,   37    ,     50    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   46    ,     55    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15= 1.5    if [[ inrange(visual_scan_15,    30    ,     49
     )     & yrschool==0] |[ inrange(visual_scan_15,   33    ,     36    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   43    ,     45    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15= 1.0    if [[ inrange(visual_scan_15,    26    ,     29
     )     & yrschool==0] |[ inrange(visual_scan_15,   26    ,     32    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   36    ,     42    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15= 0.0    if [[ inrange(visual_scan_15,    19    ,     25
     )     & yrschool==0] |[ inrange(visual_scan_15,   11    ,     25    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   21    ,     35    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15=-1.0    if [[ inrange(visual_scan_15,    7     ,     18
     )     & yrschool==0] |[ inrange(visual_scan_15,   2     ,     10    )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   11    ,     20    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15=-1.5    if [[ inrange(visual_scan_15,    1     ,     6
     )     & yrschool==0] |[ inrange(visual_scan_15,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(visual_scan_15,   8     ,     10    )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace visual_scan_z_15=-2.0    if [[ inlist(visual_scan_15,                   0
     )     & yrschool==0] |
```

```
                                                [ inrange(visual_scan_15,  3    ,
     7    )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,80,129)
replace visual_scan_z_15=-3.0    if [

                                                              [ inrange(visual_scan_15,
     0    ,    2    )    & inrange(yrschool,7,25)]  ]    &
inrange(age_15,80,129)

replace visual_scan_z_15= visual_scan_15 if mi(visual_scan_15) &
visual_scan_z_15==.
replace visual_scan_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
visual_scan_z_15==.
replace visual_scan_z_15= .p if inlist(tipent_15,3,4)
label variable visual_scan_z_15 "MHAS 2015 Visual Scanning - Z-Scores"

** Impairment Status **
gen visual_scan_imp_15 = .
label variable visual_scan_imp_15 "MHAS 2015 Visual Scanning - Normal/Impaired"

* age_15 69< & Years of Education=0
replace visual_scan_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(visual_scan_15,0,7)
replace visual_scan_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(visual_scan_15,7,60)
* age_15 69< & Years of Education 1-6
replace visual_scan_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_15,0,12)
replace visual_scan_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(visual_scan_15,12,60)
* age_15 69< & Years of Education 7+
replace visual_scan_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(visual_scan_15,0,25)
replace visual_scan_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(visual_scan_15,25,60)

* age_15 70-79 & Years of Education=0
replace visual_scan_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(visual_scan_15,0,4)
replace visual_scan_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(visual_scan_15,4,60)
* age_15 70-79 & Years of Education 1-6
replace visual_scan_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_15,0,6)
replace visual_scan_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(visual_scan_15,6,60)
* age_15 70-79 & Years of Education 7+
replace visual_scan_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_15,0,18)
replace visual_scan_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(visual_scan_15,18,60)

* age_15 80+ & Years of Education=0
replace visual_scan_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(visual_scan_15,0,1)
replace visual_scan_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(visual_scan_15,1,60)
```

```
* age_15 80+ & Years of Education 1-6
replace visual_scan_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_15,0,2)
replace visual_scan_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(visual_scan_15,2,60)
* age_15 80+ & Years of Education 7+
replace visual_scan_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(visual_scan_15,0,12)
replace visual_scan_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(visual_scan_15,12,60)

replace visual_scan_imp_15= visual_scan_15 if mi(visual_scan_15) &
visual_scan_imp_15==.
replace visual_scan_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
visual_scan_imp_15==.
replace visual_scan_imp_15= .p if inlist(tipent_15,3,4)
label values visual_scan_imp_15 cognitive_15


*** BACKWARDS COUNTING ***
** Z-SCORES **
gen bwc_time_z_15=.
replace bwc_time_z_15= 1.5 if [[ inrange(bwc_time_15, 3    ,    5    )    &
yrschool==0] |   [ inrange(bwc_time_15,     3    ,    5    )    &
inrange(yrschool,1,6)]
                                    ]    & inrange(age_15,22,69)
replace bwc_time_z_15= 1.0 if [[ inrange(bwc_time_15, 5    ,    10   )    &
yrschool==0] |   [ inrange(bwc_time_15,     5    ,    7    )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     3    ,    6    )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace bwc_time_z_15= 0.0 if [[ inrange(bwc_time_15, 10   ,    22   )    &
yrschool==0] |   [ inrange(bwc_time_15,     7    ,    15   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     6    ,    10   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace bwc_time_z_15=-1.0 if [[ inrange(bwc_time_15, 22   ,    27   )    &
yrschool==0] |   [ inrange(bwc_time_15,     15   ,    19   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     10   ,    12   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace bwc_time_z_15=-1.5 if [[ inrange(bwc_time_15, 27   ,    32   )    &
yrschool==0] |   [ inrange(bwc_time_15,     19   ,    21   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     12   ,    14   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace bwc_time_z_15=-2.0 if [[ inrange(bwc_time_15, 32   ,    36   )    &
yrschool==0] |   [ inrange(bwc_time_15,     21   ,    26   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     14   ,    18   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)
replace bwc_time_z_15=-3.0 if [[ inrange(bwc_time_15, 36   ,    60   )    &
yrschool==0] |   [ inrange(bwc_time_15,     26   ,    60   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     18   ,    60   )   &
inrange(yrschool,7,25)]    ]    & inrange(age_15,22,69)

replace bwc_time_z_15= 1.5 if [
                           [ inlist(bwc_time_15, 3    ,    4    )    &
inrange(yrschool,1,6)]
                                    ]    & inrange(age_15,70,79)
```

```
replace bwc_time_z_15= 1.0 if [[ inrange(bwc_time_15, 3    ,    10   )    &
yrschool==0] |   [ inrange(bwc_time_15,     4    ,    8    )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     3    ,    6    )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace bwc_time_z_15= 0.0 if [[ inrange(bwc_time_15, 10   ,    23   )    &
yrschool==0] |   [ inrange(bwc_time_15,     8    ,    17   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     6    ,    11   )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace bwc_time_z_15=-1.0 if [[ inrange(bwc_time_15, 23   ,    31   )    &
yrschool==0] |   [ inrange(bwc_time_15,     17   ,    21   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     11   ,    14   )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace bwc_time_z_15=-1.5 if [[ inrange(bwc_time_15, 31   ,    36   )    &
yrschool==0] |   [ inrange(bwc_time_15,     21   ,    24   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     14   ,    16   )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace bwc_time_z_15=-2.0 if [[ inrange(bwc_time_15, 36   ,    41   )    &
yrschool==0] |   [ inrange(bwc_time_15,     24   ,    31   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     16   ,    20   )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace bwc_time_z_15=-3.0 if [[ inrange(bwc_time_15, 41   ,    60   )    &
yrschool==0] |   [ inrange(bwc_time_15,     31   ,    60   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     20   ,    60   )   &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)

replace bwc_time_z_15= 1.5 if [[ inrange(bwc_time_15, 3    ,    7    )    &
yrschool==0] |   [ inrange(bwc_time_15,     3    ,    4    )    &
inrange(yrschool,1,6)]
                                    ]     & inrange(age_15,80,129)
replace bwc_time_z_15= 1.0 if [[ inrange(bwc_time_15, 7    ,    11   )    &
yrschool==0] |   [ inrange(bwc_time_15,     4    ,    8    )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     3    ,    7    )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace bwc_time_z_15= 0.0 if [[ inrange(bwc_time_15, 11   ,    19   )    &
yrschool==0] |   [ inrange(bwc_time_15,     8    ,    18   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     7    ,    13   )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace bwc_time_z_15=-1.0 if [[ inrange(bwc_time_15, 19   ,    24   )    &
yrschool==0] |   [ inrange(bwc_time_15,     18   ,    21   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     13   ,    16   )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace bwc_time_z_15=-1.5 if [[ inrange(bwc_time_15, 24   ,    27   )    &
yrschool==0] |   [ inrange(bwc_time_15,     21   ,    25   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     16   ,    21   )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace bwc_time_z_15=-2.0 if [[ inrange(bwc_time_15, 27   ,    33   )    &
yrschool==0] |   [ inrange(bwc_time_15,     25   ,    31   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     21   ,    24   )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace bwc_time_z_15=-3.0 if [[ inrange(bwc_time_15, 33   ,    60   )    &
yrschool==0] |   [ inrange(bwc_time_15,     31   ,    60   )    &
inrange(yrschool,1,6)] |    [ inrange(bwc_time_15,     24   ,    60   )    &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)

replace bwc_time_z_15=-3.0 if bwc_c_15==0
```

```
replace bwc_time_z_15= bwc_time_15 if mi(bwc_time_15) & bwc_time_z_15==.
replace bwc_time_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
bwc_time_z_15==.
replace bwc_time_z_15= .p if inlist(tipent_15,3,4)
label variable bwc_time_z_15 "MHAS 2015 Backwards Counting - Z-Scores"

** Impairment Status **
gen bwc_time_imp_15 = .
label variable bwc_time_imp_15 "MHAS 2015 Backwards Counting - Normal/Impaired"

* age_15 69< & Years of Education=0
replace bwc_time_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(bwc_time_15,3,27)
replace bwc_time_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(bwc_time_15,27,60)
* age_15 69< & Years of Education 1-6
replace bwc_time_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(bwc_time_15,3,19)
replace bwc_time_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(bwc_time_15,19,60)
* age_15 69< & Years of Education 7+
replace bwc_time_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(bwc_time_15,3,12)
replace bwc_time_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(bwc_time_15,12,60)

* age_15 70-79 & Years of Education=0
replace bwc_time_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(bwc_time_15,3,31)
replace bwc_time_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(bwc_time_15,31,60)
* age_15 70-79 & Years of Education 1-6
replace bwc_time_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(bwc_time_15,3,21)
replace bwc_time_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(bwc_time_15,21,60)
* age_15 70-79 & Years of Education 7+
replace bwc_time_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(bwc_time_15,3,14)
replace bwc_time_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(bwc_time_15,14,60)

* age_15 80+ & Years of Education=0
replace bwc_time_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(bwc_time_15,3,24)
replace bwc_time_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(bwc_time_15,24,60)
* age_15 80+ & Years of Education 1-6
replace bwc_time_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(bwc_time_15,3,21)
replace bwc_time_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(bwc_time_15,21,60)
* age_15 80+ & Years of Education 7+
replace bwc_time_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(bwc_time_15,3,16)
```

```
replace bwc_time_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(bwc_time_15,16,60)

replace bwc_time_imp_15=1   if bwc_c_15==0

replace bwc_time_imp_15= bwc_time_15 if mi(bwc_time_15) & bwc_time_imp_15==.
replace bwc_time_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
bwc_time_imp_15==.
replace bwc_time_imp_15= .p if inlist(tipent_15,3,4)
label values bwc_time_imp_15 cognitive_15


*** ORIENTATION ***
** Z-SCORES **
gen orientation_z_15=.
replace    orientation_z_15= 1.0      if [[ inlist(orientation_15,     3     )
     & yrschool==0]

                                                          ]   & inrange(age_15,22,69)
replace    orientation_z_15= 0.0      if [[ inlist(orientation_15,     2     )
     & yrschool==0] |      [ inlist(orientation_15,    3     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    3                )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,22,69)
replace    orientation_z_15=-1.0      if [
                                      [ inlist(orientation_15,    2     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_15,22,69)
replace    orientation_z_15=-1.5      if [[ inlist(orientation_15,     1     )
     & yrschool==0] |
                                      [ inlist(orientation_15,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,22,69)
replace    orientation_z_15=-2.0      if [
                                      [ inlist(orientation_15,    1     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_15,22,69)
replace    orientation_z_15=-3.0      if [[ inlist(orientation_15,     0     )
     & yrschool==0] |      [ inlist(orientation_15,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,22,69)

replace    orientation_z_15= 1.0      if [[ inlist(orientation_15,     3     )
     & yrschool==0]

                                                          ]     &
inrange(age_15,70,79)
replace    orientation_z_15= 0.0      if [[ inlist(orientation_15,     2     )
     & yrschool==0] |      [ inlist(orientation_15,    3     )     &
inrange(yrschool,1,6)]
                                                    ]     & inrange(age_15,70,79)
replace    orientation_z_15=-1.0      if [
                                      [ inlist(orientation_15,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    3                )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)
replace    orientation_z_15=-1.5      if [[ inlist(orientation_15,     1     )
     & yrschool==0] |
```

```
                                        [ inlist(orientation_15,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)
replace    orientation_z_15=-2.0       if [[ inlist(orientation_15,     0     )
     & yrschool==0] |      [ inlist(orientation_15,    1     )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_15,70,79)
replace    orientation_z_15=-3.0       if [
                                        [ inlist(orientation_15,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    0     ,     1     )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)

replace    orientation_z_15= 1.0       if [[ inlist(orientation_15,     3     )
     & yrschool==0] |      [ inlist(orientation_15,    3     )     &
inrange(yrschool,1,6)]
                                                ]     & inrange(age_15,80,129)
replace    orientation_z_15= 0.0       if [[ inlist(orientation_15,     2     )
     & yrschool==0] |      [ inlist(orientation_15,    2     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    3                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace    orientation_z_15=-1.0       if [[ inlist(orientation_15,     1     )
     & yrschool==0] |
                                        [ inlist(orientation_15,    2
     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace    orientation_z_15=-1.5       if [
                                        [ inlist(orientation_15,    1     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    1                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace    orientation_z_15=-2.0       if [[ inlist(orientation_15,     0     )
     & yrschool==0]

                                                                  ]     &
inrange(age_15,80,129)
replace    orientation_z_15=-3.0       if [
                                        [ inlist(orientation_15,    0     )     &
inrange(yrschool,1,6)] |         [ inlist(orientation_15,    0                 )
     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)

replace orientation_z_15= orientation_15 if mi(orientation_15) &
orientation_z_15==.
replace orientation_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
orientation_z_15==.
replace orientation_z_15= .p if inlist(tipent_15,3,4)
label variable orientation_z_15 "MHAS 2015 Orientation - Z-Scores"

** Impairment Status **
gen orientation_imp_15 = .
label variable orientation_imp_15 "MHAS 2015 Orientation - Normal/Impaired"

* age_15 69< & Years of Education=0
replace orientation_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(orientation_15,0,1)
replace orientation_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(orientation_15,2,3)
* age_15 69< & Years of Education 1-6
replace orientation_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(orientation_15,0,1)
```

```
replace orientation_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(orientation_15,2,3)
* age_15 69< & Years of Education 7+
replace orientation_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(orientation_15,0,2)
replace orientation_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inlist(orientation_15,3)

* age_15 70-79 & Years of Education=0
replace orientation_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(orientation_15,0,1)
replace orientation_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(orientation_15,2,3)
* age_15 70-79 & Years of Education 1-6
replace orientation_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(orientation_15,0,1)
replace orientation_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(orientation_15,2,3)
* age_15 70-79 & Years of Education 7+
replace orientation_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(orientation_15,0,2)
replace orientation_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inlist(orientation_15,3)

* age_15 80+ & Years of Education=0
replace orientation_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inlist(orientation_15,0)
replace orientation_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(orientation_15,1,3)
* age_15 80+ & Years of Education 1-6
replace orientation_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(orientation_15,0,1)
replace orientation_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(orientation_15,2,3)
* age_15 80+ & Years of Education 7+
replace orientation_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(orientation_15,0,1)
replace orientation_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(orientation_15,2,3)

replace orientation_imp_15= orientation_15 if mi(orientation_15) &
orientation_imp_15==.
replace orientation_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
orientation_imp_15==.
replace orientation_imp_15= .p if inlist(tipent_15,3,4)
label values orientation_imp_15 cognitive_15


*** VERBAL FLUENCY ***
** Z-SCORES **
gen verbal_fluency_z_15=.
replace verbal_fluency_z_15= 3.0 if [[ inrange(verbal_fluency_num_15,  28    ,
     50    )     & yrschool==0] | [ inrange(verbal_fluency_num_15, 27    ,     50
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 31    ,
     50    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,22,69)
```

```
replace verbal_fluency_z_15= 2.0 if [[ inrange(verbal_fluency_num_15,  23    ,
     27    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 23    ,     26
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 27    ,
     30    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15= 1.5 if [[ inrange(verbal_fluency_num_15,  20    ,
     22    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 21    ,     22
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 25    ,
     26    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15= 1.0 if [[ inrange(verbal_fluency_num_15,  17    ,
     19    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 18    ,     20
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 22    ,
     24    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15= 0.0 if [[ inrange(verbal_fluency_num_15,  11    ,
     16    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 13    ,     17
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 16    ,
     21    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15=-1.0 if [[ inrange(verbal_fluency_num_15,  8     ,
     10    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 10    ,     12
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 13    ,
     15    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15=-1.5 if [[ inrange(verbal_fluency_num_15,  6     ,
     7     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 8     ,     9
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 10    ,
     12    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15=-2.0 if [[ inrange(verbal_fluency_num_15,  3     ,
     5     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 5     ,     7
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 6     ,
     9     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace verbal_fluency_z_15=-3.0 if [[ inrange(verbal_fluency_num_15,  0     ,
     2     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 0     ,     4
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 0     ,
     5     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)

replace verbal_fluency_z_15= 3.0 if [[ inrange(verbal_fluency_num_15,  25    ,
     50    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 26    ,     50
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 28    ,
     50    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15= 2.0 if [[ inrange(verbal_fluency_num_15,  21    ,
     24    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 22    ,     25
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 25    ,
     27    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15= 1.5 if [[ inrange(verbal_fluency_num_15,  19    ,
     20    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 20    ,     21
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 23    ,
     24    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15= 1.0 if [[ inrange(verbal_fluency_num_15,  16    ,
     18    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 17    ,     19
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 20    ,
     22    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15= 0.0 if [[ inrange(verbal_fluency_num_15,  11    ,
     15    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 12    ,     16
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 15    ,
     19    )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15=-1.0 if [[ inrange(verbal_fluency_num_15,  8     ,
     10    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 9     ,     11
```

```
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 12    ,
     14    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15=-1.5 if [[ inrange(verbal_fluency_num_15,  5     ,
     7     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 7     ,     8
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 10    ,
     11    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15=-2.0 if [[ inrange(verbal_fluency_num_15,  3     ,
     4     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 5     ,     6
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 6     ,
     9     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)
replace verbal_fluency_z_15=-3.0 if [[ inrange(verbal_fluency_num_15,  0     ,
     2     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 0     ,     4
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 0     ,
     5     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,70,79)

replace verbal_fluency_z_15= 3.0 if [[ inrange(verbal_fluency_num_15,  22    ,
     50    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 23    ,     50
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 26    ,
     50    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15= 2.0 if [[ inrange(verbal_fluency_num_15,  19    ,
     21    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 20    ,     22
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 23    ,
     25    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15= 1.5 if [
                                                [ inrange(verbal_fluency_num_15,
     18    ,     19    )     & inrange(yrschool,1,6)] | [
inrange(verbal_fluency_num_15,   21    ,     21    )     & inrange(yrschool,7,25)]
     ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15= 1.0 if [[ inrange(verbal_fluency_num_15,  15    ,
     18    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 16    ,     17
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 17    ,
     20    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15= 0.0 if [[ inrange(verbal_fluency_num_15,  11    ,
     14    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 10    ,     15
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 12    ,
     16    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15=-1.0 if [[ inrange(verbal_fluency_num_15,  8     ,
     10    )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 8     ,     9
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 9     ,
     11    )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15=-1.5 if [[ inrange(verbal_fluency_num_15,  6     ,
     7     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 6     ,     7
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 7     ,
     8     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15=-2.0 if [[ inrange(verbal_fluency_num_15,  5     ,
     5     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 4     ,     5
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 3     ,
     6     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)
replace verbal_fluency_z_15=-3.0 if [[ inrange(verbal_fluency_num_15,  0     ,
     4     )     & yrschool==0] |[ inrange(verbal_fluency_num_15, 0     ,     3
     )     & inrange(yrschool,1,6)] | [ inrange(verbal_fluency_num_15, 0     ,
     2     )     & inrange(yrschool,7,25)]   ]     & inrange(age_15,80,129)

replace verbal_fluency_z_15= verbal_fluency_num_15 if mi(verbal_fluency_num_15) &
verbal_fluency_z_15==.
```

```
replace verbal_fluency_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
verbal_fluency_z_15==.
replace verbal_fluency_z_15= .p if inlist(tipent_15,3,4)
label variable verbal_fluency_z_15 "MHAS 2015 Verbal Fluency - Z-Scores"

** Impairment Status **
gen verbal_fluency_imp_15 = .
label variable verbal_fluency_imp_15 "MHAS 2015 Verbal Fluency - Normal/Impaired"

* age_15 69< & Years of Education=0
replace verbal_fluency_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(verbal_fluency_num_15,0,8)
replace verbal_fluency_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(verbal_fluency_num_15,8,50)
* age_15 69< & Years of Education 1-6
replace verbal_fluency_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,0,10)
replace verbal_fluency_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,10,50)
* age_15 69< & Years of Education 7+
replace verbal_fluency_imp_15=1  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_15,0,13)
replace verbal_fluency_imp_15=0  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_15,13,50)

* age_15 70-79 & Years of Education=0
replace verbal_fluency_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(verbal_fluency_num_15,0,8)
replace verbal_fluency_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(verbal_fluency_num_15,8,50)
* age_15 70-79 & Years of Education 1-6
replace verbal_fluency_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,0,9)
replace verbal_fluency_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,9,50)
* age_15 70-79 & Years of Education 7+
replace verbal_fluency_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25)
& inrange(verbal_fluency_num_15,0,12)
replace verbal_fluency_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25)
& inrange(verbal_fluency_num_15,12,50)

* age_15 80+ & Years of Education=0
replace verbal_fluency_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(verbal_fluency_num_15,0,8)
replace verbal_fluency_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(verbal_fluency_num_15,8,50)
* age_15 80+ & Years of Education 1-6
replace verbal_fluency_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,0,8)
replace verbal_fluency_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6)
& inrange(verbal_fluency_num_15,8,50)
* age_15 80+ & Years of Education 7+
replace verbal_fluency_imp_15=1 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_15,0,9)
replace verbal_fluency_imp_15=0 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inrange(verbal_fluency_num_15,9,50)
```

```
replace verbal_fluency_imp_15= verbal_fluency_num_15 if mi(verbal_fluency_num_15)
& verbal_fluency_imp_15==.
replace verbal_fluency_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
verbal_fluency_imp_15==.
replace verbal_fluency_imp_15= .p if inlist(tipent_15,3,4)
label values verbal_fluency_imp_15 cognitive_15


*** SERIAL 7 ***
** Z-SCORES **
gen serial7_z_15=.
replace serial7_z_15= 3.0  if [[ inlist(serial7_15,   5               )     &
yrschool==0]

                                        ]     & inrange(age_15,22,69)
replace serial7_z_15= 2.0  if [[ inlist(serial7_15,   4               )     &
yrschool==0]

                                        ]     & inrange(age_15,22,69)
replace serial7_z_15= 1.5  if [[ inlist(serial7_15,   3               )     &
yrschool==0] |   [ inlist(serial7_15,  5               )     &
inrange(yrschool,1,6)]
                                    ]     & inrange(age_15,22,69)
replace serial7_z_15= 1.0  if [[ inlist(serial7_15,   2               )     &
yrschool==0] |   [ inlist(serial7_15,  4               )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  5               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace serial7_z_15= 0.0  if [[ inlist(serial7_15,   1               )     &
yrschool==0] |   [ inlist(serial7_15,  2     ,     3     )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  3     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace serial7_z_15=-1.0  if [[ inlist(serial7_15,   0               )     &
yrschool==0] |   [ inlist(serial7_15,  1               )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  2               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace serial7_z_15=-1.5  if [
                            [ inlist(serial7_15,  0               )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  1               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace serial7_z_15=-2.0  if [

                                    [ inlist(serial7_15,  0               )
     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)

replace serial7_z_15= 3.0  if [[ inlist(serial7_15,   5               )     &
yrschool==0]

                                        ]     & inrange(age_15,70,79)
replace serial7_z_15= 2.0  if [[ inlist(serial7_15,   4               )     &
yrschool==0] |   [ inlist(serial7_15,  5               )     &
inrange(yrschool,1,6)]
                                    ]     & inrange(age_15,70,79)
replace serial7_z_15= 1.5  if [[ inlist(serial7_15,   3               )     &
yrschool==0] |   [ inlist(serial7_15,  4               )     &
```

```
inrange(yrschool,1,6)]
                                    ]     & inrange(age_15,70,79)
replace serial7_z_15= 1.0  if [[ inlist(serial7_15,   2                )     &
yrschool==0] |   [ inlist(serial7_15,  3                )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace serial7_z_15= 0.0  if [[ inlist(serial7_15,   1                )     &
yrschool==0] |   [ inlist(serial7_15,  1     ,     2     )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  3     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace serial7_z_15=-1.0  if [[ inlist(serial7_15,   0                )     &
yrschool==0] |   [ inlist(serial7_15,  0                )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  2                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace serial7_z_15=-1.5  if [

                                    [ inlist(serial7_15,  1                )
     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace serial7_z_15=-2.0  if [

                                    [ inlist(serial7_15,  0                )
     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)

replace serial7_z_15= 3.0  if [[ inrange(serial7_15,  3     ,     5     )     &
yrschool==0] |   [ inlist(serial7_15,  5                )     &
inrange(yrschool,1,6)]
                                    ]     & inrange(age_15,80,129)
replace serial7_z_15= 1.5  if [[ inlist(serial7_15,   2                )     &
yrschool==0] |   [ inlist(serial7_15,  4                )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  5                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace serial7_z_15= 1.0  if [
                            [ inlist(serial7_15,  3                )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  4                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace serial7_z_15= 0.0  if [[ inlist(serial7_15,   0     ,     1     )     &
yrschool==0] |   [ inlist(serial7_15,  1     ,     2     )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  2     ,     3     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace serial7_z_15=-1.0  if [
                            [ inlist(serial7_15,  0                )     &
inrange(yrschool,1,6)] |    [ inlist(serial7_15,  1                )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace serial7_z_15=-1.5  if [

                                    [ inlist(serial7_15,  0                )
     & inrange(yrschool,7,25)]  ]     & inrange(age_15,80,129)

replace serial7_z_15= serial7_15 if mi(serial7_15) & serial7_z_15==.
replace serial7_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
serial7_z_15==.
replace serial7_z_15= .p if inlist(tipent_15,3,4)
label variable serial7_z_15 "MHAS 2015 Series of subtractions 7 from 100 - Z-
Scores"

** Impairment Status **
```

```
gen serial7_imp_15 = .
label variable serial7_imp_15 "MHAS 2015 Series of subtractions 7 from 100 -
Normal/Impaired"

* age_15 69< & Years of Education=0
replace serial7_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(serial7_15,0,5)
* age_15 69< & Years of Education 1-6
replace serial7_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inlist(serial7_15,0)
replace serial7_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(serial7_15,1,5)
* age_15 69< & Years of Education 7+
replace serial7_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(serial7_15,0,1)
replace serial7_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25) &
inrange(serial7_15,2,5)

* age_15 70-79 & Years of Education=0
replace serial7_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(serial7_15,0,5)
* age_15 70-79 & Years of Education 1-6
replace serial7_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(serial7_15,0,5)
* age_15 70-79 & Years of Education 7+
replace serial7_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(serial7_15,0,1)
replace serial7_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(serial7_15,2,5)

* age_15 80+ & Years of Education=0
replace serial7_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(serial7_15,0,5)
* age_15 80+ & Years of Education 1-6
replace serial7_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(serial7_15,0,5)
* age_15 80+ & Years of Education 7+
replace serial7_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inlist(serial7_15,0)
replace serial7_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25) &
inrange(serial7_15,1,5)

replace serial7_imp_15= serial7_15 if mi(serial7_15) & serial7_imp_15==.
replace serial7_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
serial7_imp_15==.
replace serial7_imp_15= .p if inlist(tipent_15,3,4)
label values serial7_imp_15 cognitive_15


*** CONSTRUCTIONAL PRAXIS ***
** Z-SCORES **
gen construction_z_15=.
replace construction_z_15= 0.0   if [[ inlist(construction_15,    5    ,     6
     )     & yrschool==0] | [ inlist(construction_15,   6              )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,   6              )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
```

```
replace construction_z_15=-1.0   if [[ inlist(construction_15,    4
     )     & yrschool==0] |[ inlist(construction_15,  5               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,22,69)
replace construction_z_15=-1.5   if [[ inlist(construction_15,    3
     )     & yrschool==0]

                                                                    ]     &
inrange(age_15,22,69)
replace construction_z_15=-2.0   if [[ inlist(construction_15,    2
     )     & yrschool==0] |[ inlist(construction_15,  4               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,  5               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)
replace construction_z_15=-3.0   if [[ inlist(construction_15,    0     ,     1
     )     & yrschool==0] |[ inrange(construction_15, 0     ,     3     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_15, 0     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,22,69)

replace construction_z_15= 1.0   if [[ inlist(construction_15,    6
     )     & yrschool==0]

                                                                    ]     &
inrange(age_15,70,79)
replace construction_z_15= 0.0   if [[ inlist(construction_15,    5
     )     & yrschool==0] |[ inlist(construction_15,  6               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,  6               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_z_15=-1.0   if [[ inlist(construction_15,    4
     )     & yrschool==0] |[ inlist(construction_15,  5               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,70,79)
replace construction_z_15=-1.5   if [[ inlist(construction_15,    3
     )     & yrschool==0] |[ inlist(construction_15,  4               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,70,79)
replace construction_z_15=-2.0   if [[ inlist(construction_15,    2
     )     & yrschool==0] |[ inlist(construction_15,  3               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,  5               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)
replace construction_z_15=-3.0   if [[ inlist(construction_15,    0     ,     1
     )     & yrschool==0] |[ inrange(construction_15, 0     ,     2     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_15, 0     ,     4     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,70,79)

replace construction_z_15= 1.0   if [[ inlist(construction_15,    6
     )     & yrschool==0] |[ inlist(construction_15,  6               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,80,129)
replace construction_z_15= 0.0   if [[ inlist(construction_15,    4     ,     5
     )     & yrschool==0] |[ inlist(construction_15,  5               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,  6               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_z_15=-1.0   if [[ inlist(construction_15,    3
     )     & yrschool==0] |[ inlist(construction_15,  4               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,  5               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
```

```
replace construction_z_15=-1.5   if [[ inlist(construction_15,    2
     )     & yrschool==0] |[ inlist(construction_15,   3               )     &
inrange(yrschool,1,6)] |    [ inlist(construction_15,   4               )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)
replace construction_z_15=-2.0   if [[ inlist(construction_15,    1
     )     & yrschool==0] |[ inlist(construction_15,   2               )     &
inrange(yrschool,1,6)]
                                          ]     & inrange(age_15,80,129)
replace construction_z_15=-3.0   if [[ inlist(construction_15,    0
     )     & yrschool==0] |[ inlist(construction_15,   0     ,     1     )     &
inrange(yrschool,1,6)] |    [ inrange(construction_15, 0     ,     3     )     &
inrange(yrschool,7,25)]     ]     & inrange(age_15,80,129)

replace construction_z_15= construction_15 if mi(construction_15) &
construction_z_15==.
replace construction_z_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
construction_z_15==.
replace construction_z_15= .p if inlist(tipent_15,3,4)
label variable construction_z_15 "MHAS 2015 Constructional Praxis - Z-Scores"

** Impairment Status (using 0-6 score) **
gen construction_imp_15 = .
label variable construction_imp_15 "MHAS 2015 Constructional Praxis -
Normal/Impaired"

* age_15 69< & Years of Education=0
replace construction_imp_15=1 if inrange(age_15,18,69) & yrschool==0 &
inrange(construction_15,0,3)
replace construction_imp_15=0 if inrange(age_15,18,69) & yrschool==0 &
inrange(construction_15,4,6)
* age_15 69< & Years of Education 1-6
replace construction_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(construction_15,0,4)
replace construction_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,1,6) &
inrange(construction_15,5,6)
* age_15 69< & Years of Education 7+
replace construction_imp_15=1  if inrange(age_15,18,69) & inrange(yrschool,7,25)
& inrange(construction_15,0,5)
replace construction_imp_15=0  if inrange(age_15,18,69) & inrange(yrschool,7,25)
& inlist(construction_15,6)

* age_15 70-79 & Years of Education=0
replace construction_imp_15=1 if inrange(age_15,70,79) & yrschool==0 &
inrange(construction_15,0,3)
replace construction_imp_15=0 if inrange(age_15,70,79) & yrschool==0 &
inrange(construction_15,4,6)
* age_15 70-79 & Years of Education 1-6
replace construction_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(construction_15,0,4)
replace construction_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,1,6) &
inrange(construction_15,5,6)
* age_15 70-79 & Years of Education 7+
replace construction_imp_15=1 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inrange(construction_15,0,5)
replace construction_imp_15=0 if inrange(age_15,70,79) & inrange(yrschool,7,25) &
inlist(construction_15,6)
```

```
* age_15 80+ & Years of Education=0
replace construction_imp_15=1 if inrange(age_15,80,120) & yrschool==0 &
inrange(construction_15,0,2)
replace construction_imp_15=0 if inrange(age_15,80,120) & yrschool==0 &
inrange(construction_15,3,6)
* age_15 80+ & Years of Education 1-6
replace construction_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(construction_15,0,3)
replace construction_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,1,6) &
inrange(construction_15,4,6)
* age_15 80+ & Years of Education 7+
replace construction_imp_15=1 if inrange(age_15,80,120) & inrange(yrschool,7,25)
& inrange(construction_15,0,4)
replace construction_imp_15=0 if inrange(age_15,80,120) & inrange(yrschool,7,25)
& inrange(construction_15,5,6)

replace construction_imp_15= construction_15 if mi(construction_15) &
construction_imp_15==.
replace construction_imp_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
construction_imp_15==.
replace construction_imp_15= .p if inlist(tipent_15,3,4)
label values construction_imp_15 cognitive_15


** Copy one figure z-scores comparable with 2001 & 2003 **
gen construction_z_v01_15=.
replace construction_z_v01_15= 0.0    if [[ inlist(construction_v01_15,     2
          )     & yrschool==0] |[ inlist(construction_v01_15,    2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_15,    2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)
replace construction_z_v01_15=-1.5    if [[ inlist(construction_v01_15,     1
          )     & yrschool==0]


     ]     & inrange(age_15,22,69)
replace construction_z_v01_15=-3.0    if [[ inlist(construction_v01_15,     0
          )     & yrschool==0] |[ inlist(construction_v01_15,    0     ,     1
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_15,    0     ,
     1     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,22,69)

replace construction_z_v01_15= 0.0    if [[ inlist(construction_v01_15,     2
          )     & yrschool==0] |[ inlist(construction_v01_15,    2
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_15,    2
     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
replace construction_z_v01_15=-1.0    if [[ inlist(construction_v01_15,     1
          )     & yrschool==0] |[ inlist(construction_v01_15,    1
     )     & inrange(yrschool,1,6)]
                                                        ]     &
inrange(age_15,70,79)
replace construction_z_v01_15=-3.0    if [[ inlist(construction_v01_15,     0
          )     & yrschool==0] |[ inlist(construction_v01_15,    0
     )     & inrange(yrschool,1,6)] | [ inlist(construction_v01_15,    0     ,
     1     )     & inrange(yrschool,7,25)]  ]     & inrange(age_15,70,79)
```

```
replace construction_z_v01_15= 0.0    if [[ inlist(construction_v01_15,     2
          )    & yrschool==0] |[ inlist(construction_v01_15,    2
     )    & inrange(yrschool,1,6)] | [ inlist(construction_v01_15,    2
     )    & inrange(yrschool,7,25)]  ]    & inrange(age_15,80,129)
replace construction_z_v01_15=-1.0    if [[ inlist(construction_v01_15,     1
          )    & yrschool==0]


     ]    & inrange(age_15,80,129)
replace construction_z_v01_15=-1.5    if [
                                                [ inlist(construction_v01_15,
     1              )    & inrange(yrschool,1,6)]
                                                                          ]
     & inrange(age_15,80,129)
replace construction_z_v01_15=-2.0    if [[ inlist(construction_v01_15,     0
          )    & yrschool==0] |
                                                    [
inlist(construction_v01_15,1              )    & inrange(yrschool,7,25)]  ]
     & inrange(age_15,80,129)
replace construction_z_v01_15=-3.0    if [
                                                [ inlist(construction_v01_15,
     0              )    & inrange(yrschool,1,6)] | [
inlist(construction_v01_15,0              )    & inrange(yrschool,7,25)]  ]
     & inrange(age_15,80,129)

replace construction_z_v01_15= construction_v01_15 if mi(construction_v01_15) &
construction_z_v01_15==.
replace construction_z_v01_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)] &
construction_z_v01_15==.
replace construction_z_v01_15= .p if inlist(tipent_15,3,4)
label variable construction_z_v01_15 "MHAS 2015 Constructional Praxis - Z-Scores
v2001-2003"

** Impairment Status (using 0-2 score comparable to 2001 and 2003) **
gen construction_imp_v01_15 = .
label variable construction_imp_v01_15 "MHAS 2015 Constructional Praxis -
Normal/Impaired v2001-2003"

* age_15 69< & Years of Education=0
replace construction_imp_v01_15=1 if inrange(age_15,18,69) & yrschool==0 &
inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0 if inrange(age_15,18,69) & yrschool==0 &
inlist(construction_v01_15,2)
* age_15 69< & Years of Education 1-6
replace construction_imp_v01_15=1  if inrange(age_15,18,69) &
inrange(yrschool,1,6) & inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0  if inrange(age_15,18,69) &
inrange(yrschool,1,6) & inlist(construction_v01_15,2)
* age_15 69< & Years of Education 7+
replace construction_imp_v01_15=1  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0  if inrange(age_15,18,69) &
inrange(yrschool,7,25) & inlist(construction_v01_15,2)

* age_15 70-79 & Years of Education=0
```

```
replace construction_imp_v01_15=1 if inrange(age_15,70,79) & yrschool==0 &
inlist(construction_v01_15,0)
replace construction_imp_v01_15=0 if inrange(age_15,70,79) & yrschool==0 &
inlist(construction_v01_15,1,2)
* age_15 70-79 & Years of Education 1-6
replace construction_imp_v01_15=1 if inrange(age_15,70,79) &
inrange(yrschool,1,6) & inlist(construction_v01_15,0)
replace construction_imp_v01_15=0 if inrange(age_15,70,79) &
inrange(yrschool,1,6) & inlist(construction_v01_15,1,2)
* age_15 70-79 & Years of Education 7+
replace construction_imp_v01_15=1 if inrange(age_15,70,79) &
inrange(yrschool,7,25) & inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0 if inrange(age_15,70,79) &
inrange(yrschool,7,25) & inlist(construction_v01_15,2)

* age_15 80+ & Years of Education=0
replace construction_imp_v01_15=1 if inrange(age_15,80,120) & yrschool==0 &
inlist(construction_v01_15,0)
replace construction_imp_v01_15=0 if inrange(age_15,80,120) & yrschool==0 &
inlist(construction_v01_15,1,2)
* age_15 80+ & Years of Education 1-6
replace construction_imp_v01_15=1 if inrange(age_15,80,120) &
inrange(yrschool,1,6) & inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0 if inrange(age_15,80,120) &
inrange(yrschool,1,6) & inlist(construction_v01_15,2)
* age_15 80+ & Years of Education 7+
replace construction_imp_v01_15=1 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inlist(construction_v01_15,0,1)
replace construction_imp_v01_15=0 if inrange(age_15,80,120) &
inrange(yrschool,7,25) & inlist(construction_v01_15,2)

replace construction_imp_v01_15= construction_v01_15 if mi(construction_v01_15) &
construction_imp_v01_15==.
replace construction_imp_v01_15= .m if [age_15==999 | inlist(yrschool,88,99,.m)]
& construction_imp_v01_15==.
replace construction_imp_v01_15= .p if inlist(tipent_15,3,4)
label values construction_imp_v01_15 cognitive_15


*** ADJUSTED CONSTRUCTION RECALL Impairment Variable ***
* IF CONTRUCTIONAL PRAXIS  THEN CONSTRUCTIONAL PRAXIS RECALL     ->    NEW
CONSTRUCIONAL PRAXIS RECALL
* construction_imp_15      construction_m_imp_15
     construction_m_imp_c_15
* IMPAIRED=YES                    IMPAIRED=YES

* NO                                    YES
     ->    YES
* NO                                    NO
     ->    NO
* YES                                   NO
     ->    NO
* YES                                   YES
     ->    NO

gen construction_m_imp_c_v01_15=construction_m_imp_v01_15
```

```
replace construction_m_imp_c_v01_15=1 if  construction_imp_v01_15==0 &
construction_m_imp_v01_15==1
replace construction_m_imp_c_v01_15=0 if [construction_imp_v01_15==0 &
construction_m_imp_v01_15==0] | ///

[construction_imp_v01_15==1 & construction_m_imp_v01_15==0] | ///

[construction_imp_v01_15==1 & construction_m_imp_v01_15==1]

replace construction_m_imp_c_v01_15= construction_v01_15 if
mi(construction_v01_15) & construction_m_imp_c_v01_15==.
replace construction_m_imp_c_v01_15= .m if [age_15==999 |
inlist(yrschool,88,99,.m)] & construction_m_imp_c_v01_15==.
replace construction_m_imp_c_v01_15= .p if inlist(tipent_15,21,22)
label variable construction_m_imp_c_v01_15 "MHAS 2015 Constructional Praxis -
Normal/Impaired v2001-2003 Reclassified"
label values construction_m_imp_c_v01_15 cognitive_15


***  TOTAL NUMBER OF TASKS COMPLETED (max. 5) ***
egen numb_tasks_miss_v01_15= rowmiss(iwr_15 dwr_15 construction_m_15
visual_scan_15 construction_15) if inlist(tipent_15,1,2)

gen numb_tasks_comp_v01_15= 5-numb_tasks_miss_v01_15 if inlist(tipent_15,1,2)
replace numb_tasks_comp_v01_15= .p if inlist(tipent_15,3,4)
label variable numb_tasks_comp_v01_15 "MHAS 2015 Number of Tasks Completed (0-5)"

drop numb_tasks_miss_v01_15

***  TOTAL NUMER OF TASKS COMPLETED (max. 8) ***
egen numb_tasks_miss_15= rowmiss(iwr_15 dwr_15 construction_m_15 visual_scan_15
construction_15 bwc_time_15 orientation_15 verbal_fluency_15) if
inlist(tipent_15,1,2)

gen numb_tasks_comp_15= 8-numb_tasks_miss_15 if inlist(tipent_15,1,2)
replace numb_tasks_comp_15= .p if inlist(tipent_15,3,4)
label variable numb_tasks_comp_15 "MHAS 2015 Number of Tasks Completed (0-8)"

drop numb_tasks_miss_15

***  TOTAL NUMBER OF TASKS WITH IMPAIRMENT IF COMPLETED 2 OR MORE TASKS(max. 5)
***
egen numb_tasks_imp_v01_15= rowtotal(iwr_imp_15 dwr_imp_15
construction_m_imp_c_v01_15 visual_scan_imp_15 construction_imp_v01_15) ///
      if inrange(numb_tasks_comp_v01_15,2,5)
replace numb_tasks_imp_v01_15= .i if inrange(numb_tasks_comp_v01_15,0,1)
replace numb_tasks_imp_v01_15= .m if age_15==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_v01_15= .s if [iwr_imp_15==.s & dwr_imp_15==.s &
construction_m_imp_c_v01_15==.s & ///
visual_scan_imp_15==.s & construction_imp_v01_15==.s] & mi(numb_tasks_imp_v01_15)
replace numb_tasks_imp_v01_15= .p if inlist(tipent_15,3,4)
label variable numb_tasks_imp_v01_15 "MHAS 2015 Number of Tasks with Impairment
if completed 2+ (0-5)"

gen two_more_tasks_imp_v01_15=.
replace two_more_tasks_imp_v01_15=0 if inrange(numb_tasks_imp_v01_15,0,1)
```

```
replace two_more_tasks_imp_v01_15=1 if inrange(numb_tasks_imp_v01_15,2,5)
replace two_more_tasks_imp_v01_15= .i if inrange(numb_tasks_comp_v01_15,0,1)
replace two_more_tasks_imp_v01_15= .m if age_15==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_v01_15= .s if [iwr_imp_15==.s & dwr_imp_15==.s &
construction_m_imp_c_v01_15==.s & ///
visual_scan_imp_15==.s & construction_imp_v01_15==.s] &
mi(two_more_tasks_imp_v01_15)
replace two_more_tasks_imp_v01_15= .p if inlist(tipent_15,3,4)
label variable two_more_tasks_imp_v01_15 "MHAS 2015 Dummy of 2+/5 Tasks with
Impairment if completed 2+ (0-1)"

***  TOTAL NUMBER OF TASKS WITH IMPAIRMENT IF COMPLETED 2 OR MORE TASKS(max. 8)
***
egen numb_tasks_imp_15= rowtotal(iwr_imp_15 dwr_imp_15 construction_m_imp_15
visual_scan_imp_15 construction_imp_15 bwc_time_imp_15 orientation_imp_15
verbal_fluency_imp_15) ///
      if inrange(numb_tasks_comp_15,2,8)
replace numb_tasks_imp_15= .i if inrange(numb_tasks_comp_15,0,1)
replace numb_tasks_imp_15= .m if age_15==999 | inlist(yrschool,88,99,.m)
replace numb_tasks_imp_15= .s if [iwr_imp_15==.s & dwr_imp_15==.s &
construction_m_imp_15==.s & ///
visual_scan_imp_15==.s & construction_imp_15==.s & bwc_time_imp_15==.s &
orientation_imp_15==.s & ///
verbal_fluency_imp_15==.s] & mi(numb_tasks_imp_15)
replace numb_tasks_imp_15= .p if inlist(tipent_15,3,4)
label variable numb_tasks_imp_15 "MHAS 2012 Number of Tasks with Impairment if
completed 2+ (0-8)"

gen two_more_tasks_imp_15=.
replace two_more_tasks_imp_15=0 if inrange(numb_tasks_imp_15,0,1)
replace two_more_tasks_imp_15=1 if inrange(numb_tasks_imp_15,2,8)
replace two_more_tasks_imp_15= .i if inrange(numb_tasks_comp_15,0,1)
replace two_more_tasks_imp_15= .m if age_15==999 | inlist(yrschool,88,99,.m)
replace two_more_tasks_imp_15= .s if [iwr_imp_15==.s & dwr_imp_15==.s &
construction_m_imp_15==.s & ///
visual_scan_imp_15==.s & construction_imp_15==.s & bwc_time_imp_15==.s &
orientation_imp_15==.s & ///
verbal_fluency_imp_15==.s] & mi(two_more_tasks_imp_15)
replace two_more_tasks_imp_15= .p if inlist(tipent_15,3,4)
label variable two_more_tasks_imp_15 "MHAS 2015 Dummy of 2+/8 Tasks with
Impairment if completed 2+ (0-1)"


*********************************************************************
********* MHAS 2015 INSTRUMENTAL ACTIVITIES OF DAILY LIVING *********
*********************************************************************

*** IADL ***
** Managing money **
gen iadl_money_15 =.
replace iadl_money_15 = .m if inlist(tipent_15,1,2,3,4) & h29a_15 == .i
replace iadl_money_15 = .d if h29a_15 == 9
replace iadl_money_15 = .r if h29a_15 == 8
replace iadl_money_15 = .p if inlist(tipent_15,3,4)
replace iadl_money_15 = .x if h29a_15 == 7 & inlist(h29b_15,8,9)
replace iadl_money_15 = 0 if h29a_15 == 2 | (h29a_15 == 7 & h29b_15 == 2)
```

```
replace iadl_money_15 = 1 if inlist(h29a_15,1,6) | (h29a_15 == 7 & h29b_15 == 1)
label variable iadl_money_15 "IADLs: Difficulty Managing Money 2015"

** Taking medicines **
gen iadl_medicines_15 =.
replace iadl_medicines_15 = .m if inlist(tipent_15,1,2,3,4) & h28a_15 == .i
replace iadl_medicines_15 = .d if h28a_15 == 9
replace iadl_medicines_15 = .r if h28a_15 == 8
replace iadl_medicines_15 = .p if inlist(tipent_15,3,4)
replace iadl_medicines_15 = .x if h28a_15 == 7 & inlist(h28b_15,8,9)
replace iadl_medicines_15 = 0 if h28a_15 == 2 | (h28a_15 == 7 & h28b_15 == 2)
replace iadl_medicines_15 = 1 if inlist(h28a_15,1,6) | (h28a_15 == 7 & h28b_15 ==
1)
label variable iadl_medicines_15 "IADLs: Difficulty Taking Medicines 2015"

** Shopping for groceries **
gen iadl_shopping_15 =.
replace iadl_shopping_15 = .m if inlist(tipent_15,1,2,3,4) & h27a_15 == .i
replace iadl_shopping_15 = .d if h27a_15 == 9
replace iadl_shopping_15 = .r if h27a_15 == 8
replace iadl_shopping_15 = .p if inlist(tipent_15,3,4)
replace iadl_shopping_15 = .x if h27a_15 == 7 & inlist(h27b_15,8,9)
replace iadl_shopping_15 = 0 if h27a_15 == 2 | (h27a_15 == 7 & h27b_15 == 2)
replace iadl_shopping_15 = 1 if inlist(h27a_15,1,6) | (h27a_15 == 7 & h27b_15 ==
1)
label variable iadl_shopping_15 "IADLs: Difficulty Shopping for Groceries 2015"

** Cooking a hot meal **
gen iadl_cooking_15 =.
replace iadl_cooking_15 = .m if inlist(tipent_15,1,2,3,4) & h26a_15 == .i
replace iadl_cooking_15 = .d if h26a_15 == 9
replace iadl_cooking_15 = .r if h26a_15 == 8
replace iadl_cooking_15 = .p if inlist(tipent_15,3,4)
replace iadl_cooking_15 = .x if h26a_15 == 7 & inlist(h26b_15,8,9)
replace iadl_cooking_15 = 0 if h26a_15 == 2 | (h26a_15 == 7 & h26b_15 == 2)
replace iadl_cooking_15 = 1 if inlist(h26a_15,1,6) | (h26a_15 == 7 & h26b_15 ==
1)
label variable iadl_cooking_15 "IADLs: Difficulty Cooking a Meal 2015"
label values iadl_cooking_15 adls

** Number of Limitations with IADLs (0-4) **
egen iadls_15 = rowtotal(iadl_money_15 iadl_medicines_15 iadl_shopping_15
iadl_cooking_15) if inlist(tipent_15,1,2)
replace iadls_15 = .m if inlist(tipent_15,1,2,3,4)  & h26a_15 == .i & h27a_15 ==
.i & h28a_15 == .i & h29a_15 == .i & iadls_15==.
replace iadls_15 = .d if iadl_money_15 == .d & iadl_medicines_15 == .d &
iadl_shopping_15 == .d & iadl_cooking_15 == .d
replace iadls_15 = .r if iadl_money_15 == .r & iadl_medicines_15 == .r &
iadl_shopping_15 == .r & iadl_cooking_15 == .r
replace iadls_15 = .x if iadl_money_15 == .x & iadl_medicines_15 == .x &
iadl_shopping_15 == .x & iadl_cooking_15 == .x
replace iadls_15 = .p if inlist(tipent_15,3,4)
label variable iadls_15 "Number of Limitations with IADLs 2015 (0-4)"
```

```
*********************************************************
********* MHAS 2015 COGNITIVE STATUS ASSESSMENT  *********
*********************************************************

* COGNITIVE STATUS CLASIFICATION: 1) CIND: impairment in 2+ cognitive tasks and
NO IADLs difficulties
                                /// 2) Dementia: 2a) Proxy subjects who had a score
equal or above 3.4 in the IQCODE
                                        ///              2b) Direct interview
subjects impaired in 2+ cognitive tasks and
                                        ///                  had difficulty in one
or more IADLs
                                         /// 3) Normal with IADLS:
                                         ///              3a) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who had difficulty in one or more IADLs
                                         /// 4) Normal NO IADLS:
                                         ///              4a) Proxy respondents
with a score below 3.4 in the IQCODE
                                         ///              4b) Direct interview
subjects with no impairment
                                         ///                  or with impairment
in only one cognitive task and who did not have difficulty with IADLs

** Cognitive Status Classification using 8 tasks (if 2 or more completed) **
gen cognitive_status_15=.
replace cognitive_status_15=3 if cog_imp_iqcode_15==1 |
[inrange(numb_tasks_imp_15,2,8) & inrange(iadls_15,1,4)]
replace cognitive_status_15=2 if inrange(numb_tasks_imp_15,2,8) & iadls_15==0
replace cognitive_status_15=1 if inrange(numb_tasks_imp_15,0,1) &
inrange(iadls_15,1,4)
replace cognitive_status_15=0 if cog_imp_iqcode_15==0 |
[inrange(numb_tasks_imp_15,0,1) & iadls_15==0]
replace cognitive_status_15=.i if inrange(numb_tasks_comp_15,0,1) |
cog_imp_iqcode_15==.i
replace cognitive_status_15=.m if [age_15==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_15==.
replace cognitive_status_15=.m if iadls_15==.m & cognitive_status_15==.
replace cognitive_status_15=.d if iadls_15==.d & cognitive_status_15==.
replace cognitive_status_15=.r if iadls_15==.r & cognitive_status_15==.
replace cognitive_status_15=.x if iadls_15==.x & cognitive_status_15==.
replace cognitive_status_15=.d if cog_imp_iqcode_15==.d & cognitive_status_15==.
replace cognitive_status_15=.r if cog_imp_iqcode_15==.r & cognitive_status_15==.
replace cognitive_status_15=.m if cog_imp_iqcode_15==.m & cognitive_status_15==.
replace cognitive_status_15=.s if numb_tasks_imp_15==.s
label variable cognitive_status_15 "MHAS 2015 Cognitive Status (using 8 tasks)"
label define cognitive_status_15 0 "0.Normal" 1 "1.Normal with Instrumental
Impairment" 2 "2.CIND" 3 "3.Dementia", replace
label values cognitive_status_15 cognitive_status_15

** Cognitive Status Classification using 5 tasks (if 2 or more completed) **
gen cognitive_status_v01_15=.
replace cognitive_status_v01_15=3 if cog_imp_iqcode_15==1 |
[inrange(numb_tasks_imp_v01_15,2,5) & inrange(iadls_15,1,4)]
```

```
replace cognitive_status_v01_15=2 if inrange(numb_tasks_imp_v01_15,2,5) &
iadls_15==0
replace cognitive_status_v01_15=1 if inrange(numb_tasks_imp_v01_15,0,1) &
inrange(iadls_15,1,4)
replace cognitive_status_v01_15=0 if cog_imp_iqcode_15==0 |
[inrange(numb_tasks_imp_v01_15,0,1) & iadls_15==0]
replace cognitive_status_v01_15=.i if inrange(numb_tasks_comp_v01_15,0,1) |
cog_imp_iqcode_15==.i
replace cognitive_status_v01_15=.m if [age_15==999 | inlist(yrschool,88,99,.m)] &
cognitive_status_v01_15==.
replace cognitive_status_v01_15=.m if iadls_15==.m & cognitive_status_v01_15==.
replace cognitive_status_v01_15=.d if iadls_15==.d & cognitive_status_v01_15==.
replace cognitive_status_v01_15=.r if iadls_15==.r & cognitive_status_v01_15==.
replace cognitive_status_v01_15=.x if iadls_15==.x & cognitive_status_v01_15==.
replace cognitive_status_v01_15=.d if cog_imp_iqcode_15==.d &
cognitive_status_v01_15==.
replace cognitive_status_v01_15=.r if cog_imp_iqcode_15==.r &
cognitive_status_v01_15==.
replace cognitive_status_v01_15=.i if cog_imp_iqcode_15==.i &
cognitive_status_v01_15==.
replace cognitive_status_v01_15=.s if numb_tasks_imp_15==.s
label variable cognitive_status_v01_15 "MHAS 2015 Cognitive Status v2001-2003"
label values cognitive_status_v01_15 cognitive_status_15
```