CogDrisk©

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COGNITIVE HEALTH AND DEMENTIA RISK ASSESSMENT SCORING MANUAL

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Terms of Use

When to use CogDrisk

The aetiology of late-life Alzheimer's Dementia (AD) and other dementias is now known to be multifactorial. Age is the main risk factor; however, current estimates suggest over 40% of dementia risk is due to factors that can be modified through lifestyle, health behaviour change, and chronic disease risk management.

CogDrisk is a risk assessment calculator that can be used by clinicians, researchers, policy makers and the public to understand an individual's risk of developing AD and other types of dementia. CogDrisk provides a method of assessing an individual's risk factor profile, identifying target risk factors for management, as well as quantifying the overall risk of developing late life dementia. Understanding an individual's risk profile and overall risk of dementia may assist in developing and implementing tailored dementia prevention programs. CogDrisk is most appropriate for use with individuals aged 40 years and older, or in those with elevated risk due to chronic cardio-metabolic conditions. CogDrisk will provide a risk profile along with recommendations for managing each risk factor. It may be helpful to seek the assistance of a health professional to implement these recommendations most effectively.

How was CogDrisk developed?

Risk quantification was achieved using an evidence-based medicine approach. To do this, we conducted a comprehensive review of systematic reviews and meta-analyses of observational cohort studies reporting risk associations between demographic, health, lifestyle and medical predictors and the incidence of dementia.

CogDrisk evaluates risk exposure level across 13 factors for any dementia, and 11 for AD identified from the comprehensive review. Exposure is measured using standard questions, validated scales, and well-established cut-off points. Responses to the questions are then weighted using an algorithm designed to quantify risk based on the effect sizes reported in the literature. Here, for a given risk factor, the effect size for its association with dementia was pooled across estimates reported in all published high quality observational cohort studies that examined that association[1]. These pooled risk estimates were then transformed into points representing relative weight in predicting dementia risk. The points are then summed to create a total risk score[2,3].

Using CogDrisk in clinical practice

The online CogDrisk assessment (https://cogdrisk.neura.edu.au/) provides the questionnaire, automatic scoring, as well as recommendations.

Using CogDrisk in research

The CogDrisk questionnaire can be used in research including cohort studies, and clinical trials. The questions are numbered [1] to [94]. The scoring instructions below refer to the question number and the categorization of risk exposure levels using response cut-off scores. These exposure levels are associated with a risk score. These risk scores are derived from effect sizes drawn from the literature as explained above and in Anstey et al 2022[2].

Scoring Exposure Levels

***Age and Sex**:* Apply scoring as per the Algorithm on page 4, depending on individual's reported gender. For all ages less than 65 years assign a risk score of 0.

Education: Assign a value for years of education based on the response to Question [10, using the following guidelines: partially completed primary = less than 7; completed primary = 7; school certificate = 11; high school certificate = 13; trade/technician certificate/certificate other than above/associate diploma/undergraduate diploma/bachelor's degree = 17; postgraduate degree/higher degree = 18-20+. These values should be categorized according to the Scoring Algorithm which assigns corresponding risk scores to each education level.

BMI: If the individual is 65 years or older, BMI risk score is 0. If the individual is less than 65 years, convert height [12] and weight [13] to units of kg and meters, then compute the Body Mass Index in kg/m^2 to produce a continuous measure that can be categorized as per the Algorithm.

Cholesterol: If the individual is aged 60 years or older, the Cholesterol risk score is 0. If the individual is younger than 60 years, and either reports cholesterol level as higher than 6.5mmol/L or that a health professional has advised that the levels are high, then code as per the Algorithm. Score 'No' or 'Don't know' responses as 0.

Diabetes: Apply scoring as per the Algorithm, depending on whether the individual reports gender as Male or Female. For individuals respond 'Yes' for Diabetes who report gender as non-Binary, Other category and Prefer not to say, score risk as per Algorithm. 'No' and 'Don't know' responses for Diabetes for all gender categories is scored 0.

TBI: Head injury includes either with or without loss of consciousness.

Hypertension: If the individual is aged 65 years or younger, code as per the Algorithm. If the individual is aged over 65 years, Hypertension risk score is 0.

Stroke: For all ages, code as per the Algorithm.

Atrial Fibrillation: If the individual is aged 65 years or younger, AF risk score is 0. If the individual is aged over 65 years, code as per the Algorithm. Not used for AD risk.

Insomnia: Compute the total score for the 7-item Insomnia Severity Index by summing the score associated with each response for items [26], [27] and [28] where None=0; Mild=1; Moderate=2; Severe=3; Very Severe=4. For Item [29] score Very satisfied=0; Satisfied=1; Moderately satisfied=2; Dissatisfied=3; Very dissatisfied=4. For item [30] score Not at all noticeable=0; A little=1; Somewhat=2; Much=3; Very much noticeable=4. For item [31] score Not at all worried=0; A little=1; Somewhat=2; Much=3; Very much worried=4. For item [32] score Not at all interfering=0; A little=1; Somewhat=2; Much=3; Very much interfering=4. Total score should range from 0 to 28. If the total score is over 15 assign risk score of 2, otherwise 0. Not used for AD risk.

Depression: Compute the total score for the 10-item Centre for Epidemiologic Studies of Depression (CESD) Scale by scoring responses for items [33], [34], [35], [36], [38], [39], [41], [42] as: 0 for Less than 1 day; 1 for 1-2 days; 2 for 3-4 days; and 3 for 5-7 days. For items [37] and [40], score 0 for 5-7 days; 1 for 3-4 days; 2 for 1-2 days; 3 for Less than 1 day. The total score should range between 0 and 30. Scores ≥ 10 should be assigned a risk score as per the Algorithm.

Physical Activity: Compute the total MET minutes/week for physical activity using the IPAQ-SF scoring protocol. To do this, for each type of activity (vigorous, moderate, and walking) multiply its MET factor (8 for vigorous, 4 for moderate, and 3.3 for walking) by the reported days of activity and

duration (in minutes). Total the MET mins/wk for each activity type to obtain the total physical activity level. If this is above 500, then assign a risk score of -3 (i.e., this factor is protective).

Cognitive Activity: There are 14 items relating to Cognitive Activity Question [49] to [62] based on the Rush Memory and Ageing Project (MAP). To compute total cognitive activity, score the responses as Don't know=0; Once a year or less=0; Several times a year=1; Several times a month=2; Several times a week=3; Every day or almost every day=4. If [58] is answered, compute the average of 9 items ([50] to [57] and [59]). If [58] is not answered, compute the average of 8 items ([50] to [57]). Questions [60], [61], [62] are not included in the calculations. The mean should be between 0 and 4 and can be categorized as per the Algorithm in low, moderate, and high levels of cognitive engagement with associated risk scores. Low cognitive engagement will be assigned a value of 0, moderate as -4 and high as -5.

Social Engagement*:* The 3-Item Loneliness Scale comprises Question [64], [65], and [66]. Note that [63] is not used in computing a risk score for this factor. For each item score responses as: Hardly ever=1; Some of the time=2; Often=3. Sum the scores to obtain a total score ranging from 3 to 9. Total scores of 6 or greater are assigned a risk score of 2 as per the Algorithm.

Fish Intake: The Modified Food Frequency Questionnaire (FFQ) comprise Questions [67] to [90]. Only Question [83] on fish and seafood intake is scored where risk reduces by -0.25 for each increment of one serving per week for Any Dementia and by -0.40 for AD. Score 0 for Rarely and 1-3 per month. For Any Dementia, score -0.25 for Once a week, 2-3 times per week (-0.25x2.5), and 4 or more times per week (-0.25x4). Compute similarly for AD as per Algorithm.

Alcohol consumption: Questions [91], and [92] provide information for clinicians seeking on an individual's alcohol intake. Current research on alcohol as a risk factor for dementia remains unclear, therefore this is not assigned a risk score as part of the Algorithm.

Smoking: Assign a risk score of as per Algorithm for responses of smoking to Question [93].

Pesticide: Assign a risk score of as per Algorithm for responses of Yes to Question [94].

Note: Some factors are associated with dementia risk only at certain ages and not at others. Some factors are not included in the CogDrisk algorithm (e.g., the association between alcohol exposure level and dementia risk remains unclear at this stage). CogDrisk will still obtain data for risk factors that are not included in computing the risk algorithm as it provides health professionals and consumers with general information for managing health risks.

Computing Dementia risk scores

CogDrisk for any dementia is the sum of risk scores for all factors in the Algorithm except Pesticides. CogDrisk-AD score is the sum of risk scores for all factors except Atrial Fibrillation, Insomnia.

The CogDrisk Dementia score ranges from –4.25 to 44 for late-life adults and from –8.25 to 28 for midlife adults, with a higher score indicating higher risk. A constant must be added to bring the range from 0 to 48.25 (constant=4.25) for late-life adults and 0 to 36.25 (constant = 8.25) for midlife adults.

The CogDrisk-AD ranges from -3.4 to 42 for late-life adults and from –8.4 to 26 for midlife adults. After adding a constant, this results in 0 to 45.4 (constant=3.4) for late-life adults and 0 to 34.4 (constant = 8.4) for midlife adults. Dementia risk categories (for late life) are as follows: Low risk - CogDrisk score of < 7; Moderate risk – CogDrisk score 7 to 12; High risk – CogDrisk score > 12.

Scoring Algorithm

Factors	Formula	Risk Scores	
		Any Dementia	AD
Age and Sex	For [3]=Male		
	If [1] <65 years	0	0
	If [1] = 65-69 years	6	5
	If [1] = 70-74 years	8	8
	If [1] = 75-79 years	13	12
	If [1] = 80-84 years	17	17
	If [1] = 85-89 years	20	19
	If [1] > 90 years	22	23
	For [3]=Female		
	If [1] <65 years	0	0
	If [1] = 65-69 years	4	5
	If [1] = 70-74 years	7	7
	If [1] = 75-79 years	11	13
	If [1] = 80-84 years	15	16
	If [1] = 85-89 years	19	19
	If [1] > 90 years	23	23
	For [3]= Non-Binary, Other, Prefer not to say		
	If [1] <65 years	0	0
	If [1] = 65-69 years	5	5
	If [1] = 70-74 years	7.5	7.5
	If [1] = 75-79 years	12	12.5
	If [1] = 80-84 years	16	16.5
	If [1] = 85-89 years	19.5	19
	If [1] > 90 years	22.5	23
Education	If [10] <8	4	4
	If [10] = 8 – 11	2	2
	If [10] ≥12	0	0
BMI	For [1]<65:		
	If BMI <18.5	2	3
	If BMI ≥18.5 - ≤24.9	0	0
	If BMI ≥25 - ≤29.9	1	1
	If BMI ≥30	3	2
Cholesterol	For [1]<60		
	If [14]≤6.5mmol/L OR [15]=No OR [15]=Don't know	0	0
	If [14]>6.5mmol/L OR [15]=Yes	3	3

Factors	Formula	Risk scores	
		Any Dementia	AD
Diabetes	For [3]=Male;		
	If [16]=Yes	2	2
	If [16]=No OR [16]= Don't know	0	0
	For [3]=Female;		
	If [16]=Yes	3	2
	If [16]=No OR [16]= Don't know	0	0
	For [3]=Non-Binary, Other, Prefer not to say;		
	If [16]=Yes	2.5	2
	If [16]=No OR [16]= Don't know	0	0
TBI	If [17]=Yes, I lost consciousness OR [17]= Yes, but did not lose consciousness	2	1
	If [17]=No OR [17]= Don't know	0	0
Hypertension	For [1]< 65 OR [20] < 65		
	If [19]=Yes	1	1
	If [19]=No OR [19]= Don't know	0	0
Stroke	If [22]= Yes	2	2
	If [22]= No OR [22]= Don't know	0	0
Atrial fibrillation	For [1] >65		
	If [23]=Yes	2	
	If [23]=No OR [23]= Don't know	0	
Insomnia	If ([26]+[27]+[28]+[29]+[30]+[31]+[32]) ≥15	2	
	If ([26]+[27]+[28]+[29]+[30]+[31]+[32]) <15	0	
Depression	If ([33]+[34]+[35]+[36]+[37]+[38]+[39]+[40]+ [41]+[42]) ≥ 10	3	4
	If ([33]+[34]+[35]+[36]+[37]+[38]+[39]+[40]+ [41]+[42]) < 10	0	0
Physical activity	[43]days*([44]hrs*60 + [44]mins)*8= [vig] [45]days*([46]hrs*60 + [46]mins)*4= [mod] [47]days*([48]hrs*60 + [48]mins)*3.3= [walk]		
	If ([vig]+[mod]+[walk])< 500 METmins/wk	0	0
	If ([vig]+[mod]+[walk])> 500 METmins/wk	-3	-3
Cognitive activity	If [58] answered: (([50]+[51]+[52]+[53]+[54]+[55]+[56]+[57]+[59])/9)= [cognitive activity] If [58] not answered: (([50]+[51]+[52]+[53]+[54]+[55]+[56]+[57])/8)= [cognitive activity]		
	If [cognitive activity] < 2	0	0
	If [cognitive activity] ≥ 2 to 3	-4	-4
	If [cognitive activity] > 3	-5	-5
Social engagement	If ([64] +[65]+[66]) ≥6	2	2
	If ([64] +[65]+[66]) <6	0	0

Factors	Formula	Risk scores	
		Any Dementia	AD
Fish intake	Convert to servings per week		
	If [83] = 4+ serves/week	-1	-1.6
	If [83] = 2.5 serves/week	-0.63	-1.0
	If [83] = 1 serve/week	-0.25	-0.40
	If [83] < 1 serve/week	0	0
Smoking	If [93]= yes, currently	1	2
	If [93]= yes, not currently	0	0.2
	If [93]= never	0	0
Alcohol	Not scored, data collected for clinicians		
Pesticide	If [94]=Yes		2
	If [94]=No		0
	If [94]=Don't know		0

Note: Numbers in [ ] represent question numbers in the latest version of the CogDrisk questionnaire (CogDrisk V1.7); if answers do not match formula above, they will receive 0 (reference).

References

1. Anstey KJ, Ee N, Eramudugolla R, Jagger C, Peters R. A Systematic Review of Meta-Analyses that Evaluate Risk Factors for Dementia to Evaluate the Quantity, Quality, and Global Representativeness of Evidence. *J Alzheimers Dis*. 2019;70(s1):S165-S186. doi:10.3233/JAD-190181

2. Anstey KJ, Kootar S, Huque MH, Eramudugolla R, Peters R. Development of the CogDrisk tool to assess risk factors for dementia. *Alzheimers Dement (Amst)*. 2022;14(1):e12336. doi:10.1002/dad2.12336

3. Huque M, Kootar S, Eramudugolla R, et al. Comparison of the CogDrisk, ANU-ADRI, CAIDE and LIBRA risk scores for predicting dementia. *JAMA Network Open*. 2023;6(8):e2331460-e2331460.