



The Association between Omega-3s and Cognitive Function in older adults: Cooper Center Longitudinal Study

Juliana Blazek, David Leonard, PhD; Kerem Shuval, PhD; Beth Wright, PhD; and Laura F. DeFina, MD

The Cooper Institute, Dallas, Texas

ABSTRACT

Importance: In the United States, on average, two out of three people experience some form of cognitive impairment, usually as an older adult. Omega-3 fatty acids are a group of polyunsaturated fatty acids that play a role in making hormones that regulate inflammation. Previous research notes an association between Omega-3 intake and risk of cardiovascular disease. However, the relationship between Omega-3 levels and cognitive health is clear.

Objective: To investigate the association between Omega-3s and cognitive function in older adults.

Design: Cross-sectional study.

Setting: A preventive medicine clinic in Dallas, Texas.

Participants: 11,559 men and women who completed a medical examination between the years 2009-2022. Participants with a history of MI (n=78), stroke (n=65), diabetes (n=273), or cancer (n=836) were excluded. In addition, those with a missing BMI (n=87), LDL (n=77), BP (n=359), education history (n=182), smoking history (n=221), sex (n=2), or Omega-3 index (n=1262) were also excluded. The participants who were not between the ages of 55 and 85 (n=524) and who wore a face mask (n=765) were excluded too. With these exclusions accounted for, the final number of participants in this study was 6,828.

Methods: To obtain Omega-3 index, the patient's blood was sent in an EDTA tube to OmegaQuant Analytics, LLC. The samples were then examined for fatty acid composition by comparing the measure of EPA and DHA (the two main types of Omega-3s) to other fatty acids in the blood. Three categories used for studying index were <4.0%, 4.0-7.9%, $\geq 8.0\%$. Cognitive function was tested using the Montreal Cognitive Assessment (MoCA) test which is a 10-minute paper and pencil test administered by a technician. Scores between 26-30 are considered normal, while <26 indicates impairment.

Results: Table 1 shows the characteristics of the subjects with most as white, educated males having a mean age of 61.3 ± 6.4 . The table was divided into three categories showing different ranges of Omega-3 Index: <4.0%, 4.0-7.9%, $\geq 8.0\%$. There were numerous other variables shown that indicate a patient's medical history and how that could affect cognitive function in relation to its Omega-3 index. The largest number of subjects (4780) fell under the middle Omega-3 index category which was from 4.0-7.9%. The mean MoCA score was 26.8 ± 2.4 , suggesting that the cognitive function of the subjects was generally good and not impaired. Figure 2 then shows the relationship between cognitive impairment (a MoCA score ≤ 25) and Omega-3 index in a bar graph format. Those subjects who had a lower Omega-3 index (0-3.9 %) were more likely to have a lower MoCA score in comparison to those with the higher index. In Table 2, the coefficient for the line that compares Omega-3 index with cognitive impairment is indicated as a result of 5 different variables. The confidence interval is specified below the b coefficient for each variable. The relative risk for cognitive impairment of a subject with a certain variable is described in Figure 3. If a variable indicates relative risk as >1 , then that subject would have increased risk for cognitive impairment. The column showing Omega-3 index <4% v $>8\%$ demonstrates a relative risk of 1.19 (with a confidence interval of 1.02, 1.38).

RESULTS

Table 1. Descriptive characteristics of 6,828 men and women according to Omega-3 index category, Cooper Center Longitudinal Study, 2009-2022

	All	Omega-3 Index <4.0 %	Omega-3 Index 4.0-7.9 %	Omega-3 Index ≥ 8.0 %	p for trend
Participants, n	6828	707	4780	1341	
Mean (SD) age, y	61.3 (6.4)	60.5 (5.8)	61.1 (6.3)	62.2 (7.0)	<.001
Female, n (%)	2152 (31.5)	217 (30.7)	1463 (30.6)	472 (35.2)	0.006
White, n (%)	6404 (93.8)	660 (93.4)	4485 (93.8)	1259 (93.9)	0.299
Bachelor's Degree, n, (%)	5414 (79.3)	457 (64.6)	3821 (79.9)	1136 (84.7)	<.001
Current smoker, n (%)	454 (6.6)	87 (12.3)	315 (6.6)	52 (3.9)	<.001
Mean (SD) cardiorespiratory fitness level, METS	10.1 (2.2)	9.4 (2.2)	10.2 (2.1)	10.4 (2.1)	<.001
History of high blood pressure, n (%)	4749 (69.6)	492 (69.6)	3304 (69.1)	953 (71.1)	0.140
Mean body mass index (SD), kg/m ²	27.0 (4.5)	28.4 (5.1)	27.1 (4.4)	25.7 (4.0)	<.001
Mean glucose level (SD), mg/dL	97.3 (13.0)	98.4 (15.4)	97.5 (12.8)	96.4 (12.1)	<.001
Mean triglycerides level (SD), mg/dL	104.6 (52.2)	120.3 (59.8)	106.3 (51.9)	90.4 (44.8)	<.001
Mean total cholesterol (SD), mg/dL	189.8 (39.4)	194.9 (36.6)	190.0 (38.8)	186.6 (42.6)	<.001
Mean Systolic BP (SD), mmHg	122.9 (13.9)	125.3 (14.7)	123.0 (13.7)	121.4 (14.2)	<.001
Mean Diastolic BP (SD), mmHg	79.0 (8.9)	80.3 (9.6)	79.3 (8.9)	77.5 (8.5)	<.001
Mean (SD) Omega-3 Index, %	6.3 (2.0)	3.4 (0.4)	5.9 (1.1)	9.4 (1.5)	
Mean (SD) MoCA† Score	26.8 (2.4)	26.5 (2.4)	26.8 (2.4)	26.9 (2.3)	<.001

†MoCA: Montreal Cognitive Assessment

Figure 1. Prevalence of cognitive impairment (MoCA ≤ 25) among 6,828 men and women, Cooper Center Longitudinal Study, 2009-2022.

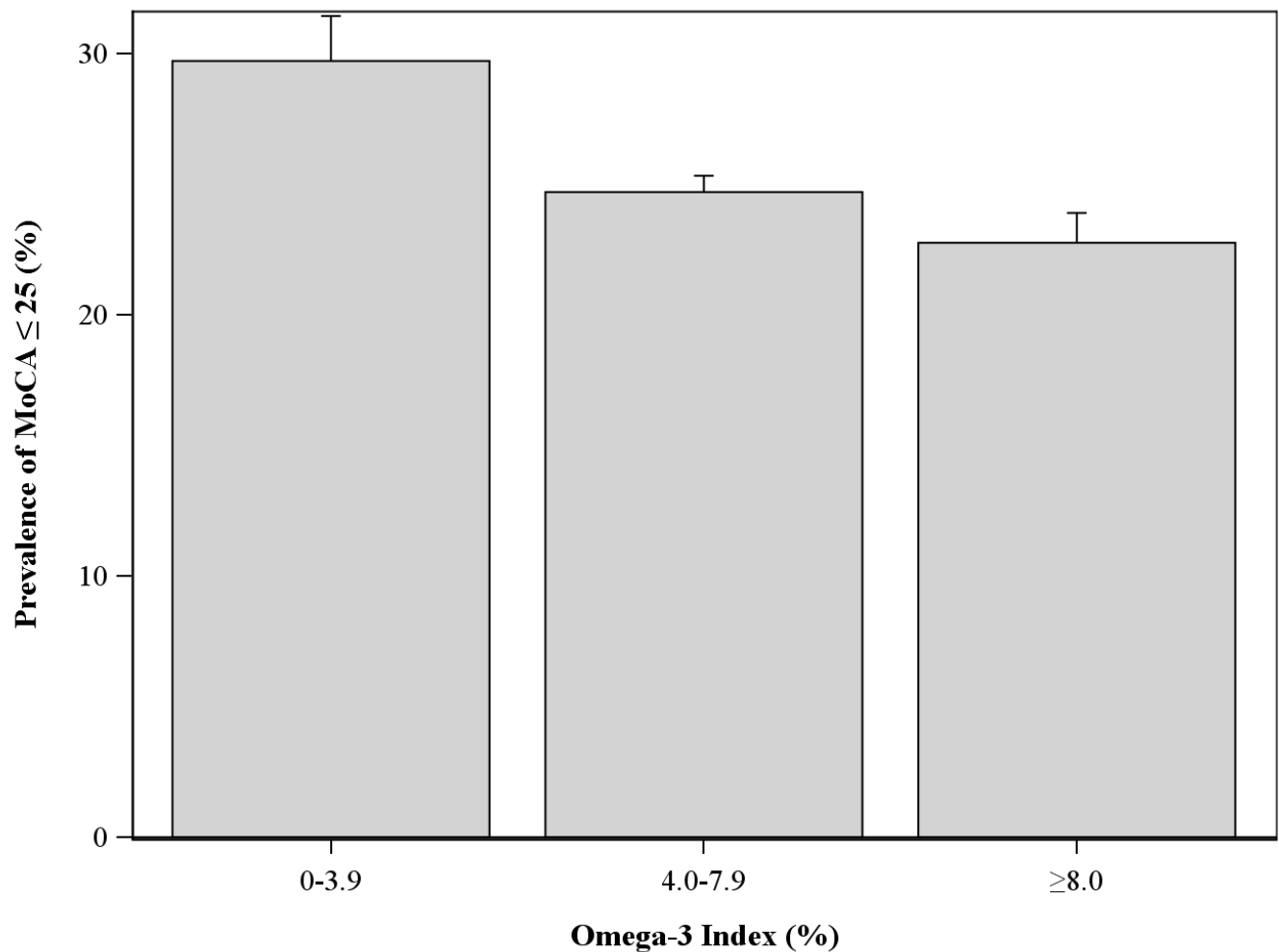


Table 2. Estimated Association of Omega-3 index with cognitive impairment (MoCA ≤ 25).

	β coefficient	p-value
Age (per 10 y)	-0.68 (-0.08,-0.06)	<0.001
Women	0.44 (0.32, 0.56)	<0.001
No Bachelor's Degree	-0.94 (-1.08, -0.80)	<0.001
Current smoking	-0.33 (-0.55, -0.11)	0.004
LDL cholesterol (per 40 mg/dL)	-0.05 (-0.01, 0.00)	0.115

Table 3. Risk of cognitive impairment according to Omega-3 index category.

	Relative Risk (95% Confidence Interval)	p-value
Age (per 10y)	1.45 (1.37, 1.53)	<0.001
Women v Men	0.76 (0.69, 0.83)	<0.001
No Bachelor's Degree	1.65 (1.51, 1.80)	<0.001
Current smoking	1.21 (1.05, 1.39)	0.010
LDL cholesterol (per 40 mg/dL)	1.03 (0.98, 1.08)	0.266
Systolic BP (per 20 mmHg)	1.12 (1.06, 1.18)	<0.001
Omega-3 Index categories		
<4% v 4-8%	1.10 (0.97, 1.25)	0.121
<4% v $>8\%$	1.19 (1.02, 1.38)	0.024
4-8% v $>8\%$	1.08 (0.97, 1.20)	0.166

CONCLUSION

These results show that individuals with greater Omega-3 index (≥ 8.0) have a relatively higher MoCA score. Adults should be encouraged to add Omega-3s into their diet through consuming fatty fish, plant oils, or supplements. As Omega-3s are known to contribute to better cardiovascular health, it can also help in preserving cognitive function for older adults. However, it is also important to note other medical factors that could contribute to both cognitive decline or healthy cognitive function.

STRENGTHS AND LIMITATIONS

Large sample size
Lab reported Omega-3 index
MoCA test administered by trained technician

Cross-sectional study design
Other medical factors, such as cardiovascular fitness, high blood pressure, and cholesterol, accounted for in determining cognitive health

ACKNOWLEDGMENTS

The authors thank the Cooper Clinic physicians and staff along with The Cooper Institute data management team

Disclosures: None

