Mediterranean Diet Adherence Across Several European Countries, Including North Macedonia

Prof. Dr.sc Tatjana Ruskovska

Faculty of Medical Sciences
Goce Delcev University
Stip, North Macedonia

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Mediterranean Diet

- The Mediterranean diet has been recognized AND promoted worldwide, including by the WHO, as one of the healthiest dietary patterns.

- The Mediterranean diet provides an important source of minerals, vitamins, mono- and polyunsaturated fatty acids, and fiber, as well as a broad range of bioactive antioxidant and anti-inflammatory compounds.

Mediterranean Diet

- The traditional Mediterranean diet originated in the olive-growing areas of the Mediterranean region.

- The traditional Mediterranean diet has been recognized by UNESCO as an Intangible Cultural Heritage of Humanity.

- **Studies have shown an association between Mediterranean diet and good health.**

- An **umbrella review** of meta-analyses of observational studies and randomized clinical trials **including a total population of ≈ 13,000,000 subjects** established that **a greater adherence to the Mediterranean diet reduced the risk of**
  - **Cardiovascular diseases**
  - **Cancer incidence**
  - **Neurodegenerative diseases**
  - **Type 2 diabetes**
  - **Overall mortality**

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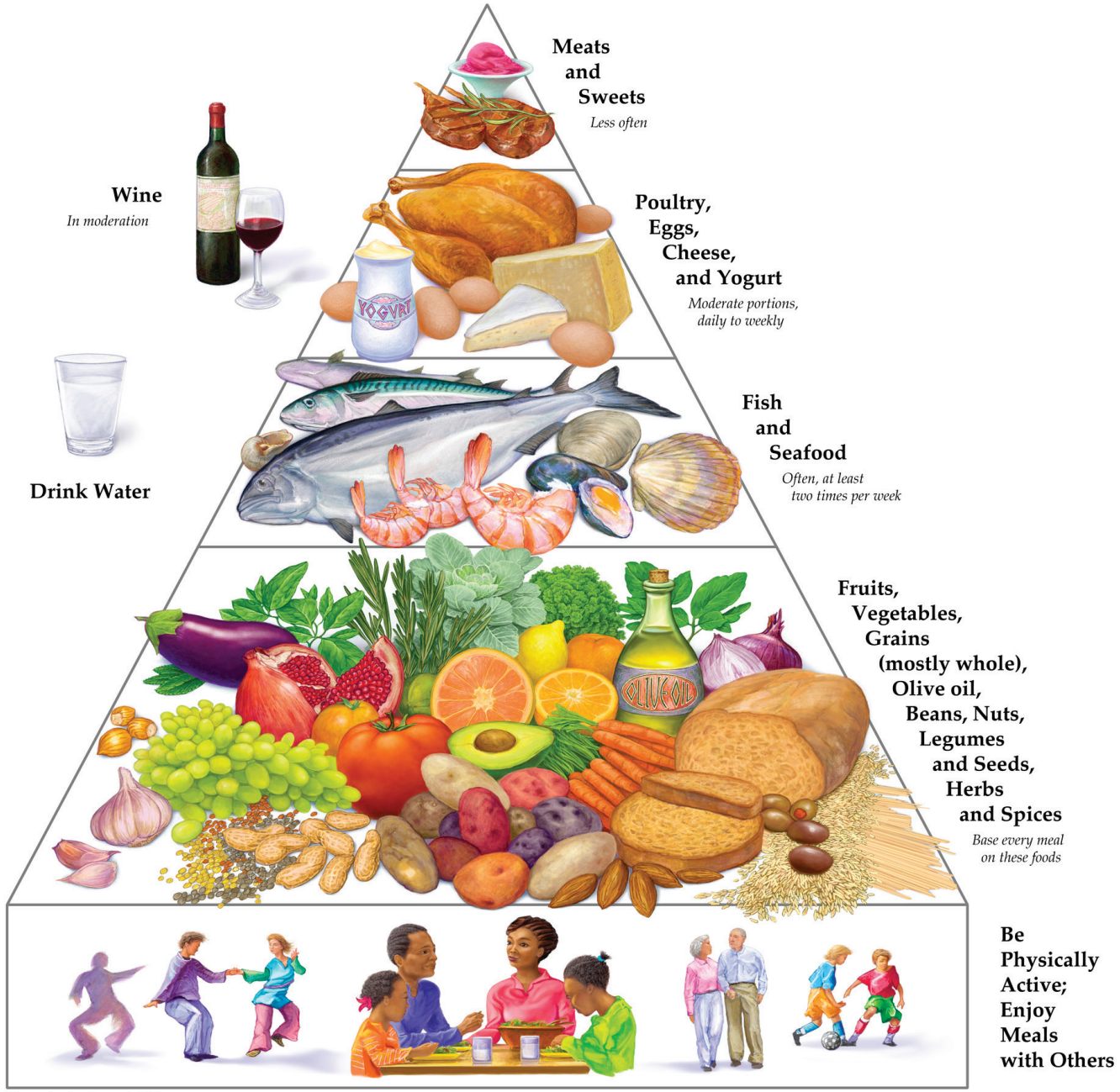


Illustration by George Middleton

Base every meal around:

- Vegetables and fruits (the darker in color, the more anti-oxidants!)
- Legumes/beans, whole grains, nuts (e.g., lentils, walnuts)
- Olive oil as principal source of fat (swap out margarine and butter!)

Eat at least 2x/week:

- Fish, seafood

Eat moderate portions daily to weekly:

- Poultry
- Dairy, cheese and eggs
- Red wine (typically with meals)
  - Females: 1 glass/day
  - Males: 2 glasses/day

Eat less often than other foods:

- Red meat
- Saturated fat
- Sweets

Challenges

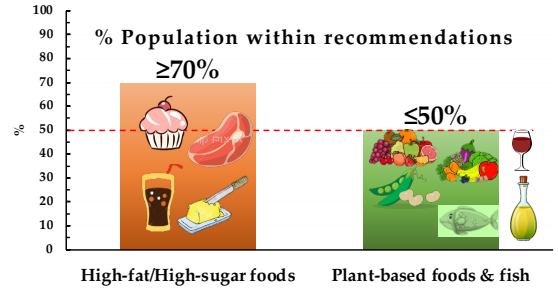
- Convincing individuals and populations across Europe and worldwide to adopt Mediterranean diet is not an easy task.

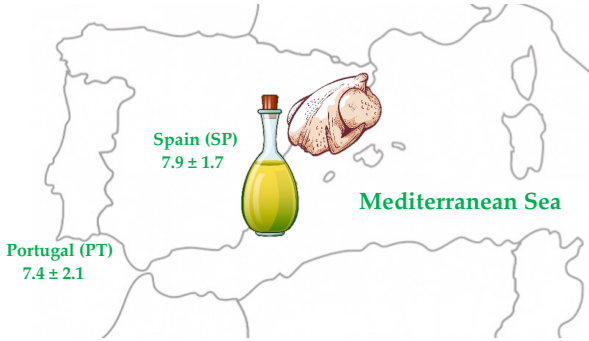
- Populations living in Mediterranean countries slowly but progressively abandon Mediterranean diet, adopting instead a more Westernized dietary pattern.

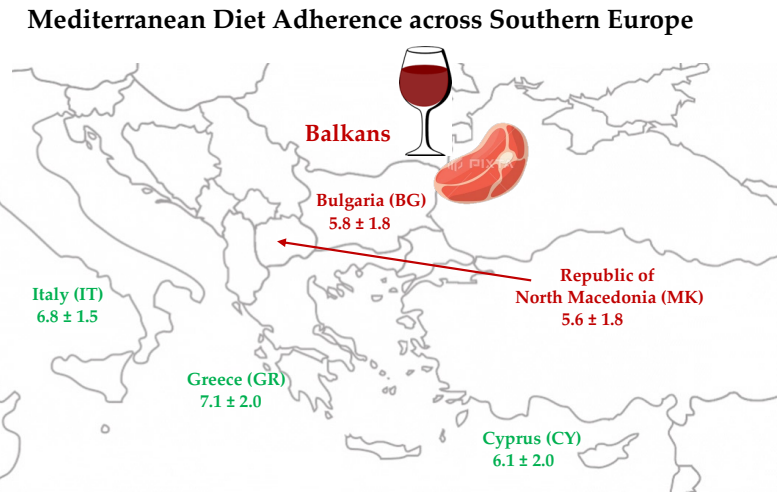
- Therefore, a lot of research is needed in order to identify “the weak spots” that should be addressed in future.

Aims

- **Assessing and comparing the dietary habits across seven European countries.**
- **We used a common questionnaire and scoring system, 14-MEDAS, that consists of 14 questions.**
- MEDAS - Mediterranean Diet Adherence Screener







Materials and Methods

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- The questionnaire was translated in the official language of each country and distributed as a Google Form.
- We collected data of 3350 subjects. N ≈ 300 - 500 subjects per country.
- MeDiWeB was the first study to apply the 14-MEDAS questionnaire and scoring system in MK.

nutrients MDPI

Article

Persistent Moderate-to-Weak Mediterranean Diet Adherence and Low Scoring for Plant-Based Foods across Several Southern European Countries: Are We Overlooking the Mediterranean Diet Recommendations?

Stefano Quarta [1], Marika Massaro [2], Mihail Chervenkov [3,4], Teodora Ivanova [4,5], Dessislava Dimitrova [4,5], Rui Jorge [6,7,8], Vanda Andrade [6], Elena Philippou [9,10], Constantinos Zisimou [9], Viktorija Maksimova [11], Katarina Smilkov [11], Darinka Gjorgieva Ackova [11], Lence Miloseva [11], Tatjana Ruskovska [11], Georgia Eirini Deligiannidou [12], Christos A. Kontogiorgis [12], Julio Sánchez-Meca [13], Paula Pinto [6,7,*] and María-Teresa García-Conesa [14,*]

1 Laboratory of Biochemistry and Molecular Biology, Department of Biological and Environmental Sciences and Technologies, University of Salento, 73100 Lecce, Italy; stefano.quarta3@unisalento.it
2 National Research Council (CNR), Institute of Clinical Physiology, 73100 Lecce, Italy; marika@ifc.cnr.it
3 Faculty of Veterinary Medicine, University of Forestry, 1797 Sofia, Bulgaria; vdmchervenkov@abv.bg
4 Slow Food in Bulgaria, 9 Pierre De Geytre St. bl. 3, 1113 Sofia, Bulgaria; tai@bio.bas.bg (T.I.); dessidim3010@gmail.com (D.D.)

Results

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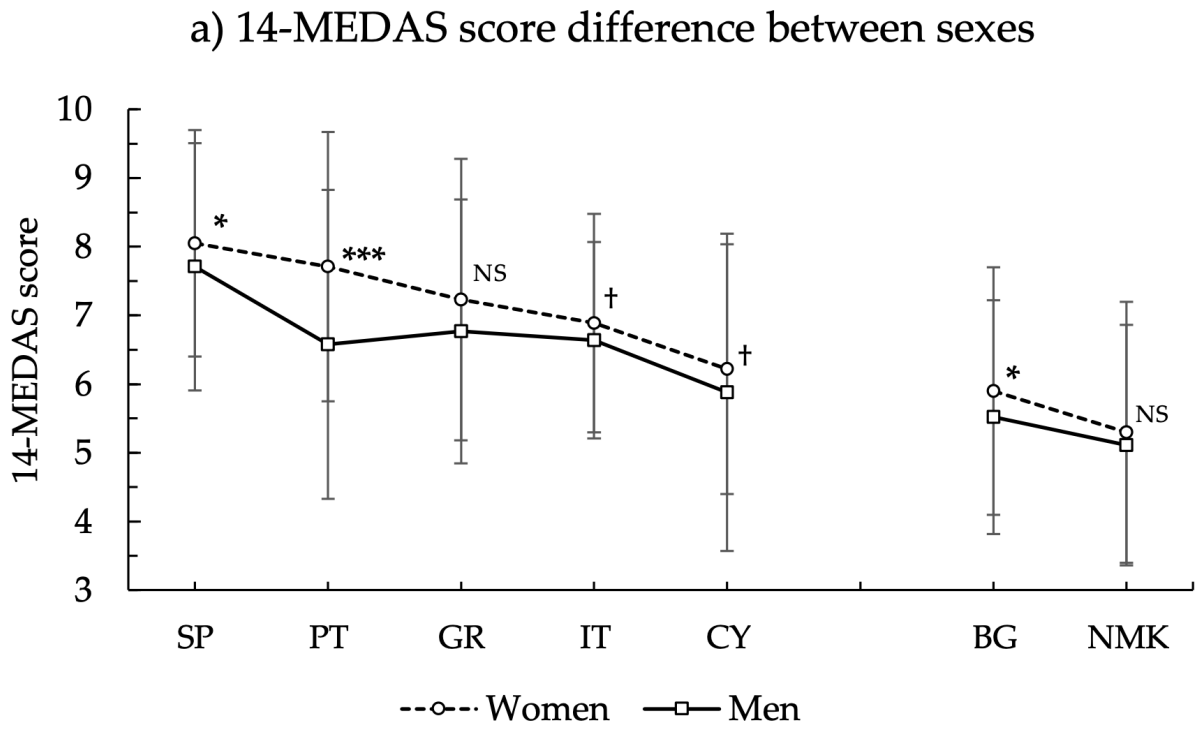
- The final MEDAS score can range between 0 and 14.

- MEDAS score Categorization
  - Low adherence ≤5
  - Medium adherence 6 - 9
  - High adherence ≥10

- **MEDAS score for each country**

(mean ± SD)

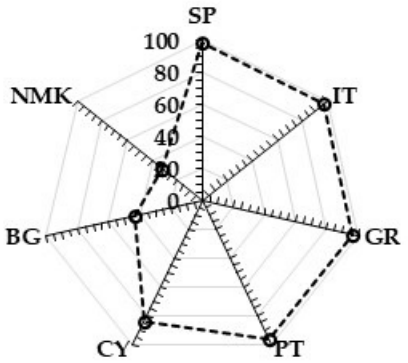
- **Spain** **7.90 ± 1.72**
- **Portugal** **7.38 ± 2.10**
- **Greece** **7.13 ± 2.03**
- **Italy** **6.80 ± 1.54**
- **Cyprus** **6.12 ± 1.99**
- **BG** **5.80 ± 1.80**
- **N. Macedonia** **5.30 ± 1.80**



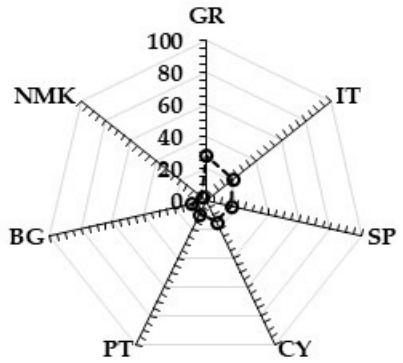
Supplementary Figure S2a-e.- Food choices comparison across all countries. The radar figures indicate the % of participants in each country scoring 1 (within Mediterranean diet recommendations) for each food item of the 14-MEDAS score. SP: Spain; IT: Italy; PT: Portugal; GR: Greece; CY: Cyprus; NMK: Republic of North Macedonia; BG: Bulgaria.

Figure S2a) Oil and fat

Q1. Olive oil as main culinary fat (yes)



Q2. Olive oil quantity (≥ 4 tbsp/day)



Q6. Butter or cream (<1 portion/day)

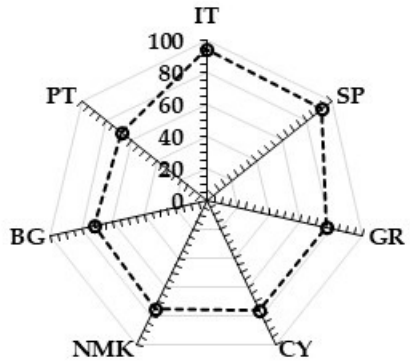
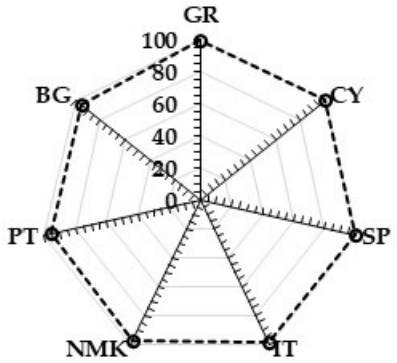
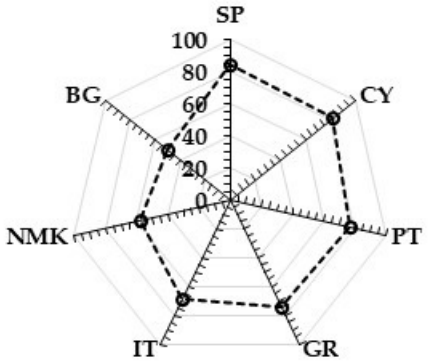


Figure S2b) Meat and fish

Q5. Red meat (<1 portion/day)



Q13. White meat preference (yes)



Q10. Fish/seafood (≥3 portions/week)

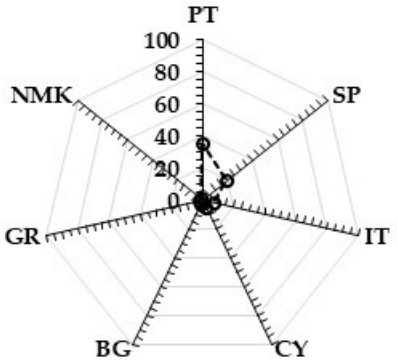
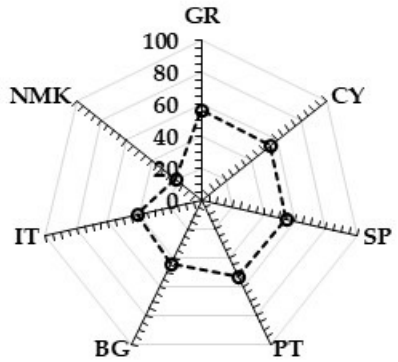
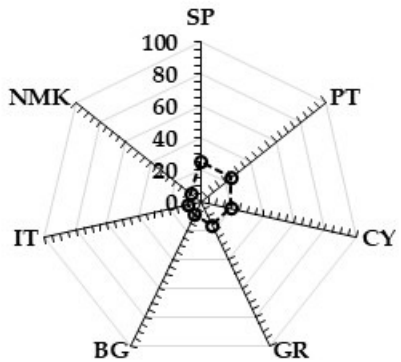


Figure S2c) Vegetables, fruits, legumes and 'sofrito'

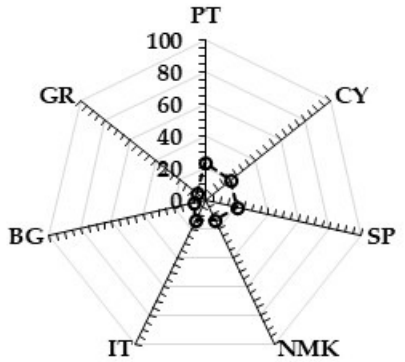
Q3. Vegetables (≥2 portions/day)



Q4. Fruits (≥3 portions/day)



Q9. Legumes (≥3 portions/week)



Q14. 'Sofrito' (≥2 meals/week)

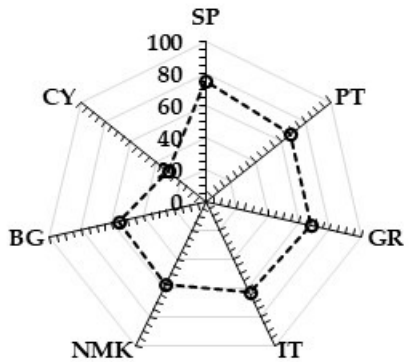
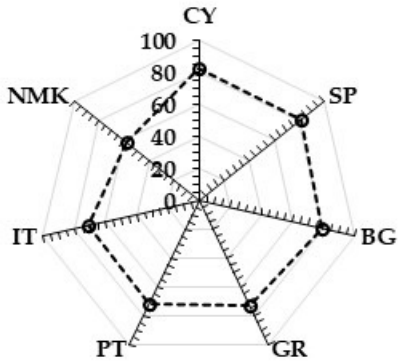


Figure S2d) Desserts and nuts

Q11. Desserts (<3 portions/week)



Q12. Nuts (≥3 portions/week)

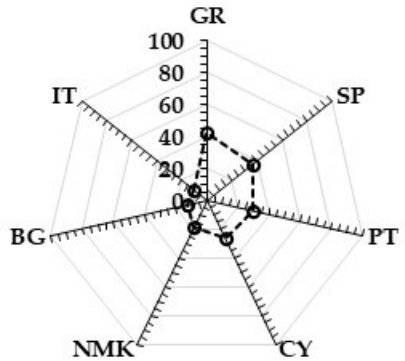
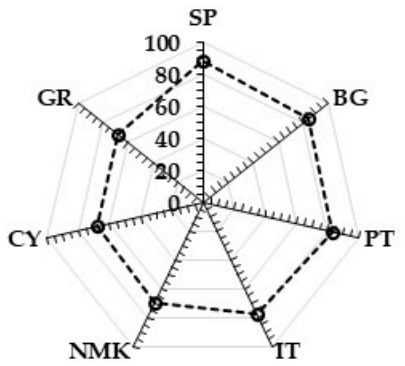
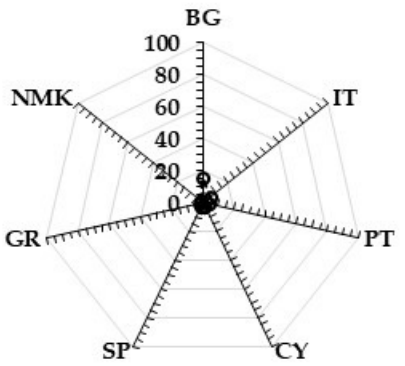


Figure S2e) Sweet drinks and wine

Q7. Sweet drinks (<1 drink/day)



Q8. Wine (7 to 14 glasses/week)



Conclusions

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- Our study showed and confirmed that a high percentage of the adult population in this region deviates from adherence to the Mediterranean diet.

- Our study emphasize the necessity to improve dietary habits, particularly by increasing the current low consumption of plant-based foods.

- **How to best improve dietary habits?**

- **PREDIMED –** They achieved several points improvement of the Mediterranean diet adherence *after one-year of hard work of a highly trained multidisciplinary team (personalized recommendations, motivation, and direct communication with the participants).*

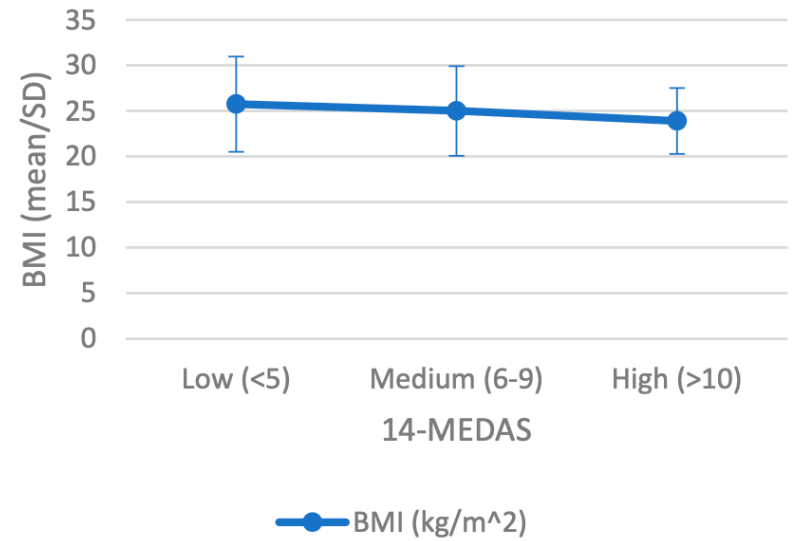
- **The translation of this success to the general population is not an easy task.**
- **Different strategies have been proposed:**
  - Impulse stronger and country-adapted food mandatory **policies** and **guidelines** (e.g., increase the promotion and availability of traditional, locally produced, and sustainable plant-based foods)
  - Reinforce and improve **communication** and **information** about the Mediterranean diet as well as the means to get the messages across the population (social media, public events, local retailers, nutritional services)
  - Increase the population knowledge and understanding of the health benefits but also and, importantly, of the sustainability of the Mediterranean diet through specific **education** programs with an especial focus on younger generations

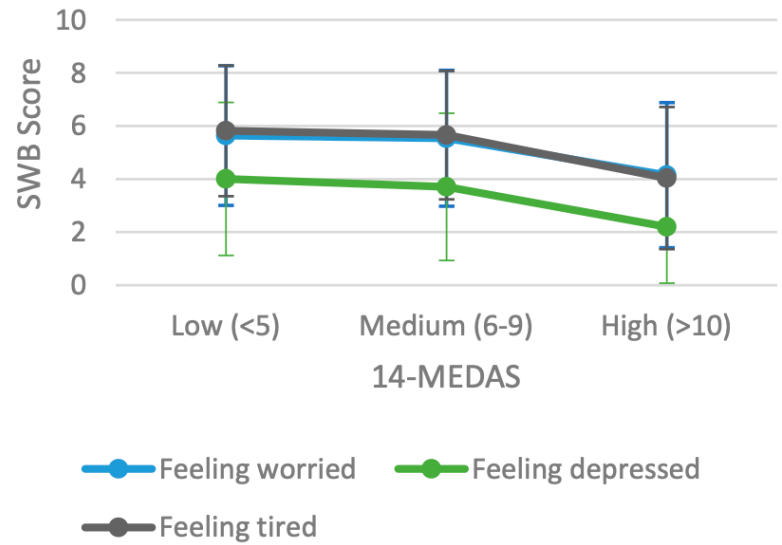
Mediterranean Diet and Subjective Well-being

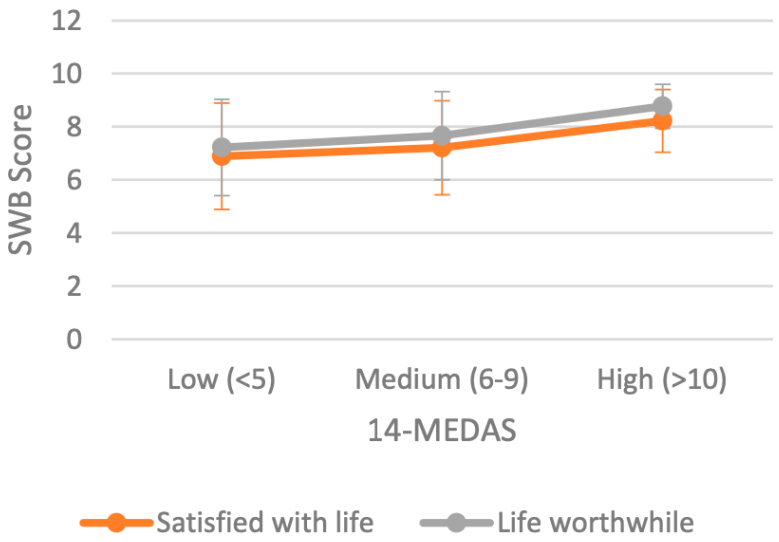
- **Well-being is a broad concept,** including different objective factors (availability of social support and sanitation facilities, unemployment, income, and education), but also the subjective well-being.

- **Subjective well-being: -the extent to which a person believes or feels that their life is going well.**

Figure S1: BMI and SWB items variation of means (SD) in response to 14-MEDAS groups.







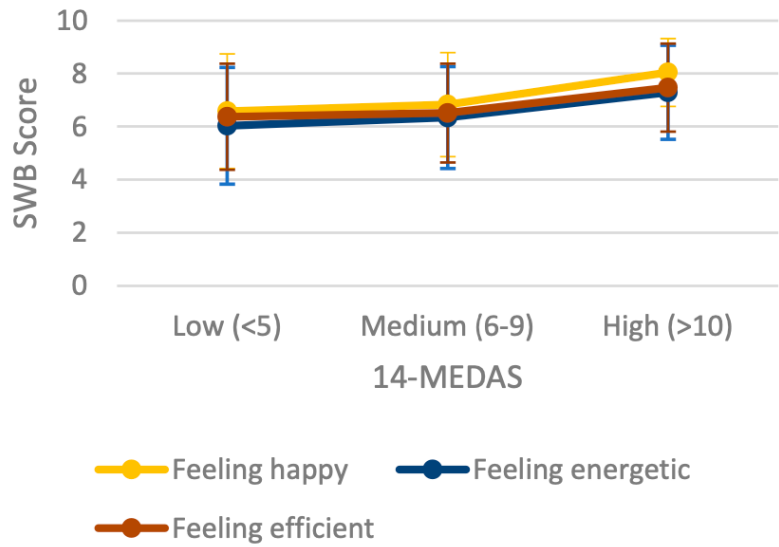


Table 2. Associations between BMI and SWB items by 14-MEDAS categories (Low–Medium–High).

	14-MEDAS_Groups [+]						
	Low (<5)		Medium (6–9)		High (>10)		
	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)	*p*-Value *
BMI (kg/m^2)	25.75 ± 5.23	24.84 (6.36)	25.01 ± 4.92	24.03 (6.07)	23.90 ± 3.62	23.18 (6.13)	**0.047**
Satisfied with life [+]	6.89 ± 2.00	7 (3.00)	7.21 ± 1.77	8 (2.00)	8.22 ± 1.18	8 (1.00)	**<0.001**
Life worthwhile [+]	7.22 ± 1.81	7 (2.00)	7.66 ± 1.66	8 (2.00)	8.77 ± 0.83	9 (1.00)	**<0.001**
Feeling happy [+]	6.58 ± 2.16	7 (2.00)	6.83 ± 1.96	7 (2.00)	8.04 ± 1.28	8 (2.00)	**<0.001**
Feeling worried [+]	5.64 ± 2.63	6 (5.00)	5.54 ± 2.56	6 (5.00)	4.15 ± 2.73	4 (4.00)	**0.005**
Feeling depressed [+]	4.01 ± 2.88	4 (6.00)	3.71 ± 2.77	3 (5.00)	2.20 ± 2.12	2 (2.50)	**0.001**
Feeling energetic [+]	6.03 ± 2.20	6 (3.00)	6.34 ± 1.92	6 (3.00)	7.29 ± 1.77	7 (1.50)	**0.001**
Feeling efficient [+]	6.37 ± 2.00	7 (3.00)	6.51 ± 1.86	7 (3.00)	7.47 ± 1.66	8 (1.50)	**0.001**
Feeling tired [+]	5.82 ± 2.46	6 (4.00)	5.66 ± 2.42	6 (4.00)	4.04 ± 2.68	4.5 (4.00)	**<0.001**
Feeling nervous and stressed [#]	2.85 ± 0.90	3 (1.00)	2.75 ± 0.88	3 (1.00)	2.75 ± 0.65	3 (1.00)	0.342
Feeling unable to cope [#]	3.10 ± 1.05	3 (2.00)	3.15 ± 1.04	3 (2.00)	3.35 ± 1.16	3 (2.00)	0.450
Feeling confident to handle problems [#]	2.53 ± 1.01	2 (1.00)	2.39 ± 0.97	2 (1.00)	2.34 ± 0.83	2 (1.00)	0.337
Employment satisfaction [+]	7.03 ± 2.02	7 (2.00)	7.25 ± 2.02	8 (3.00)	7.73 ± 1.98	8 (2.00)	0.069

* Differences between 14-MEDAS groups were assessed using Kruskal–Wallis one-way ANOVA; $p < 0.05$ was considered statistically significant. [+] MEDAS scale from 0 (no adherence) to 14 points (total adherence); SWB items scale and Employment satisfaction scale from 0 (not at all/never) to 10 (completely/always). [#] SWB items scale from 1 (not at all/never) to 5 (completely/always).

Mediterranean Diet and Subjective Well-being

- **However, due to the cross-sectional nature of our study, cause-and-effect associations cannot be established.**

- Future research should aim to identify other covariates that play important roles in well-being and effective interventions to improve the factors shaping well-being.

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Thank you for your attention

15.05.2024

Ohio State University Student Visit to Goce Delcev University