Students Perceptions about Food Offer in University Canteens and Adherence to Mediterranean Diet

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OBJECTIVES

- To examine students' perceptions of canteen services and its food supply

- To verify students` knowledge and promptness to comply with a Mediterranean Diet (MD) menu.

- To explore how the individual characteristics influence students' perceptions about canteens and knowledge about MD.

METHODS - Participants

Recruited **3400** participants

Campus Flyers; Institutional Emails; Student Networks; Social Media

1660 completed the survey

Final sample = 1614 [e.g., systematic responses]

Participants were mostly full-time students (85.1%) holding a bachelor's degree (76.8%;) in life sciences (26.8%) or Formal sciences (23.6%)

n = 500   *n* = 604   *n* = 510

METHODS - Instrument

Online survey (Qualtrics) to assess students' perceptions of their university canteens and the Mediterranean Diet (available in 4 languages).

Sociodemographic screening	Health status screening	Dietary practices scale

Perceptions about food services and offers in campus canteens scale

- NET promotion score

- Willingness to pay

| Mediterranean Diet index (MEDAS)	Mediterranean Diet Knowledge scale & Information seeking

Open-ended questions :

➔Qualitative assessments of perceptions of enablers & barriers to the use of campus canteens
➔Qualitative assessments of perceptions regarding MD and its compliance

METHODS – Data Analysis

DATA EXPLORATION & ANALYSIS

Data summary:
Descriptive statistics

Scales validation:
PCA
(intra-level consistency)

Factors associations:
correlational scores

Cross-country differences:
ANOVA/post-hoc tests

Cross-country level:
correlational scores

Profiling choices:
Stepwise regressions
Machine Learning
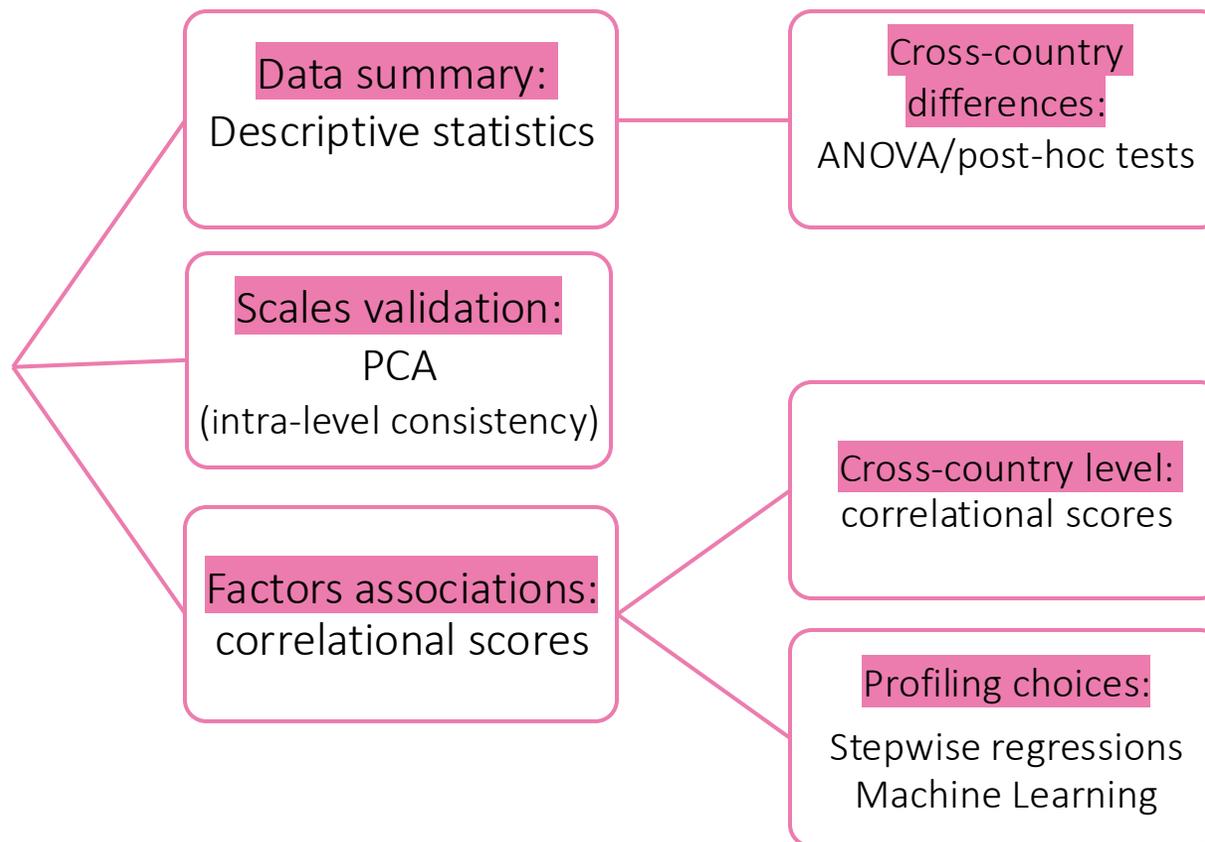
- **Stepwise linear RM**: to uncover the influence and weight of each co-factor in canteen assessment & MD compliance.

- **Fuzzy C-means cluster algorithm**: to define clusters combining food habits on campus, perception of the food offer in canteens, & overall perceived health.

  - PREDICTIVE BEHAVIOR CATEGORIES: to compare groups & capture trends in compliance with MD, canteens promotion & WTP for better services.

RESULTS – Health-Related Characteristics

OVERALL

*** > (Croatia M = 3.82 > Portugal M = 3.55)
* > (Portugal M = 3.55 > Turkey M = 3.46)
*** > (Croatia M = 3.82 > Turkey M = 3.46)

$F(2, 1591) = 23.657, p < .001$

MENTAL

*** > (Croatia M = 3.79 > Portugal M = 3.50)
*** > (Portugal M = 3.50 > Turkey M = 3.24)
*** > (Croatia M = 3.79 > Turkey M = 3.24)

$F(2, 1591) = 33.709, p < .001$

PHYSICAL

*** > (Croatia M = 3.84 > Portugal M = 3.61)
*** > (Croatia M = 3.84 > Turkey M = 3.68)

$F(2, 1589) = 8.736, p < .001$
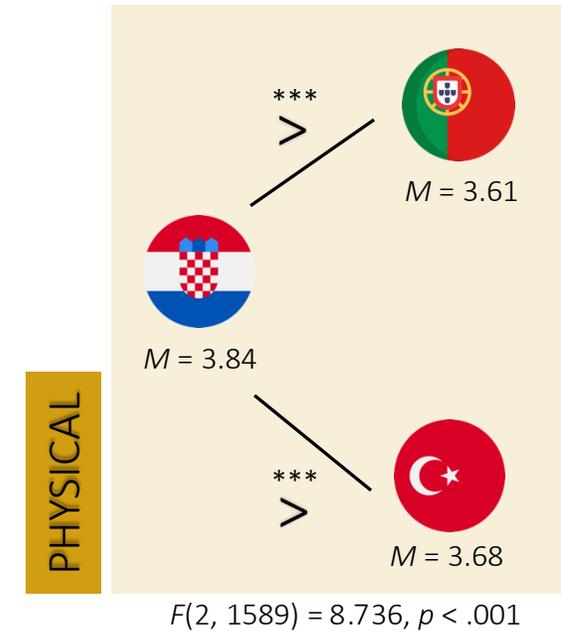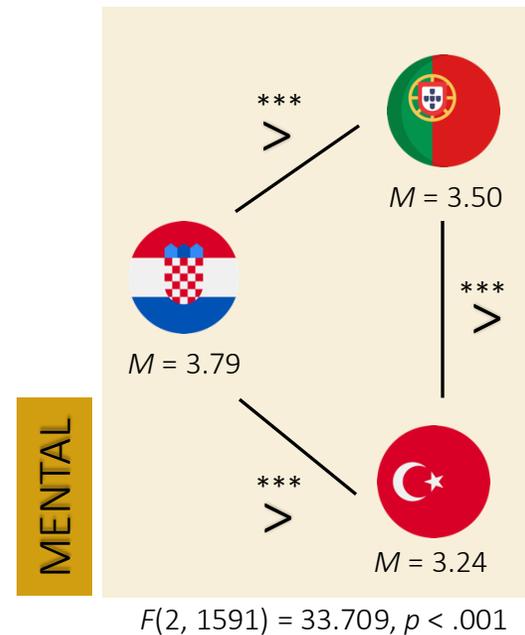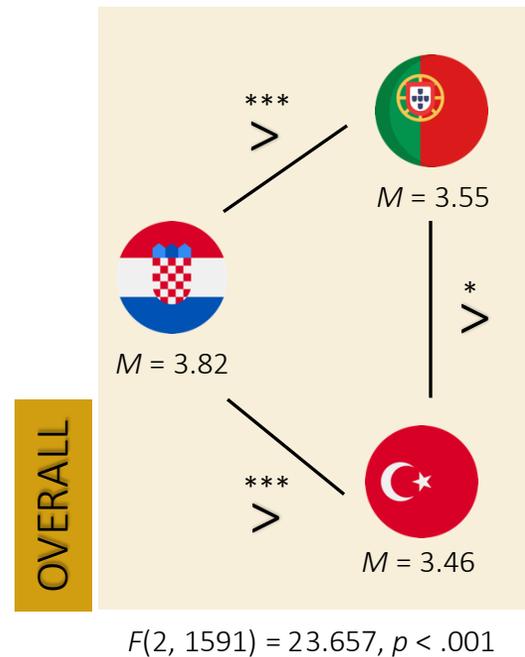
All countries presented moderate levels of PH status:
- Croatia presents the highest scores in all categories.
- Portugal showed better physical than mental health scores.
- Turkey referred to the lowest mental health scores.

MEDDiET
-MENUS 4 CAMPUS-

RESULTS – Health-Related Characteristics

HEALTH CONDITIONS

	🇭🇷	🇵🇹	🇹🇷	
Diabetes	1,18%	1,22 %	0,40%	0,95%
Cardiovascular	7,78%	10,16%	4,02%	7,34%
Food Intolerance	5,41%	4,67%	3,02%	4,43%
HTA	0,51%	1,42%	1,01%	0,95%

RESULTS – Diet-Related Characteristics

Following a specific diet?

- No diet
- Specific diet
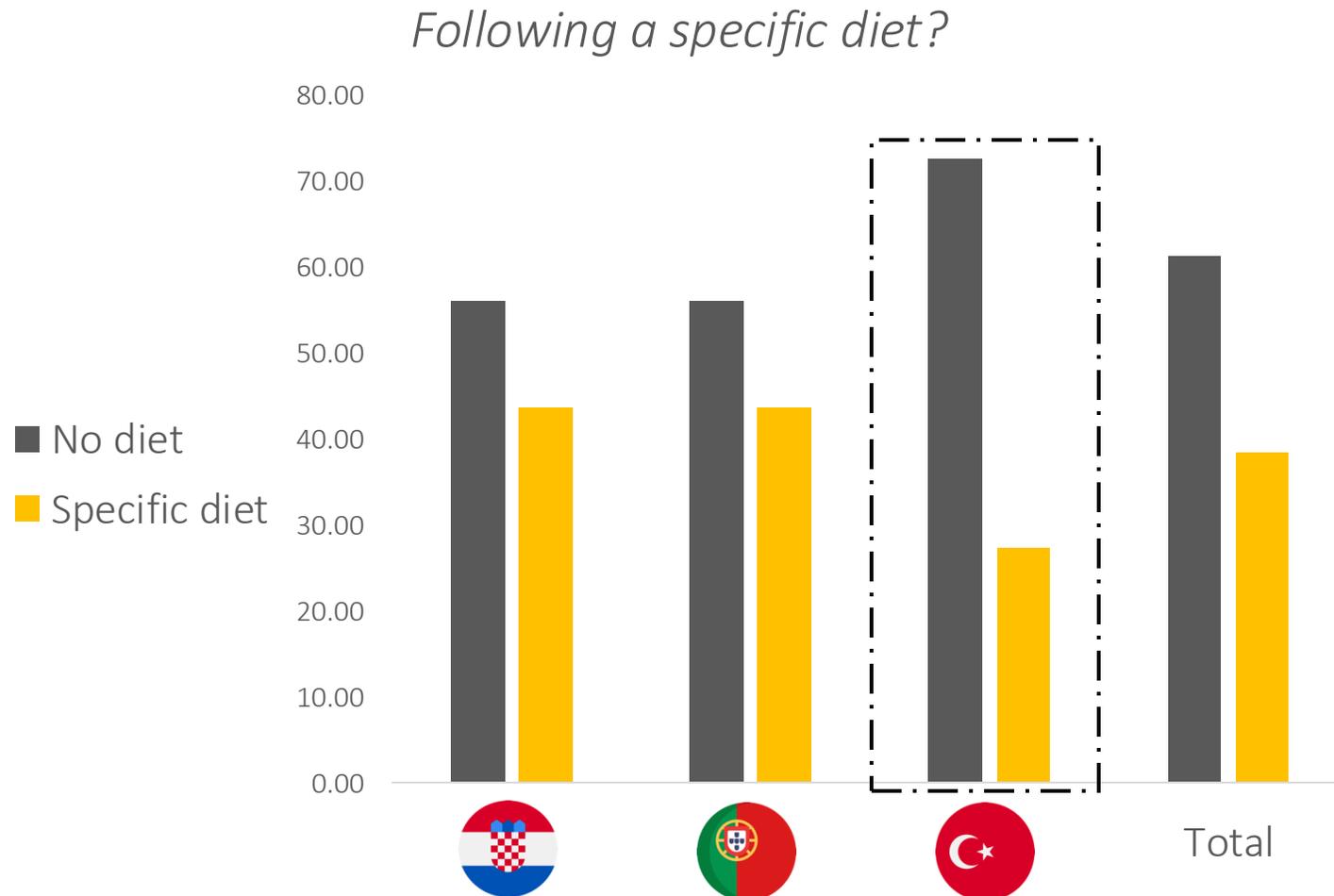
DIET RESTRICTIONS

+ students without specific diet guidelines, particularly in TURKEY

$X^2(2, 1612) = 39.92$, $p < .001$

RESULTS – Diet-Related Characteristics

MEDITERRANEAN DIET PERCEIVED ADHERENCE

■ Mediterranean Diet
■ Other

26%

74%

🇭🇷 *** > 🇹🇷 *** > 🇵🇹

38.0 %   23.8 %   22.0 %
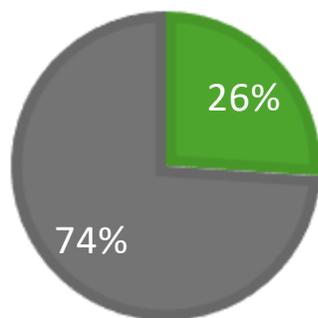
$X^2(4, 1612) = 146.76, p < .001$

	🇭🇷	🇵🇹	🇹🇷
Vegan	4,8%	9,0%	2,2%
No gluten	5,1%	2,4%	4,7%
Lactose free	7,3%	7,6%	4,5%
Lose weight	16,8%	9,2%	13,2%
Gain weight	8,6%	3,4%	2,0%

all *p* < .050

RESULTS – Diet-Related Characteristics

MD ADHERENCE: PREDIMED

OVERALL MODERATE LEVEL
M = 7.28(0.06)
95% CI [7.16,7.39]

	Missing	Mean Acc. Perc.	SE
Q1 (olive oil as main cooking fat)	5	65%	0.01
Q2 (olive oil per day)	8	23%	0.01
Q3 (cooked vegetables)	3	22%	0.01
Q4 (raw vegetables)	2	35%	0.01
Q5 (pieces of fruit)	6	25%	0.01
Q6 (servings of red meat/hamburguer/meat products)	3	46%	0.01
Q7 (serving of butter(margarine/cream)	4	76%	0.01
Q8 (sugary/carbonated drink)	5	78%	0.01
Q9 (glasses of wine)	100	97%	0.00
Q10 (serving of legumes)	7	30%	0.01
Q11(serving of fish/seafood)	14	16%	0.01
Q12 (week consumption of commercial pastries/sweets)	13	53%	0.01
Q13 (weekly consumption of nuts)	11	34%	0.01
Q14 (preference for substitute red meat)	13	67%	0.01
Q15 (weekly consumption of saut. based dishes)	9	70%	0.01

ENABLERS:
↑wine consumption
↓ intake of sugary drink
↓ butter consumption

CHALLENGES:
↓ fish/seafood intake
↓ use of vegetables
↓ use of olive oil/day
↓ fruits/day

M = 8.55 (0.10) M = 6.82 (0.09) M = 6.57 (0.10)
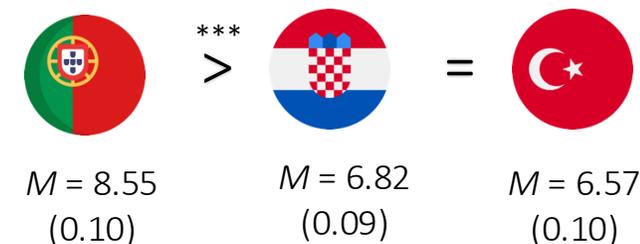
F(2, 1609)=117.15, p< .001

RESULTS – Diet-Related Characteristics

MD ADHERENCE: PREDIMED

$F(2, 1609)=117.15, p< .001$

M = 8.55
(0.10)

***
>

M = 6.82
(0.09)

=

M = 6.57
(0.10)

Differential Challenges

olive oil use/day	serving of fish/seafood	serving of fish/seafood
consumption of nuts	olive oil use/day	olive oil use
	cooked & raw vegetable intake	sugary drink consumption
	serving of legumes	cooked vegetables intake
	Pieces of fruit	substitution of red meat

RESULTS – Food Habits On Campus

FOOD HABITS ON CAMPUS

OVERALL
Diversity in using food services
M = 2.82 (0.02); 95% CI [2.79;2.86]
Canteen - most frequent

	Missing	Mean	SE
1.bring food from home	9	2.76	0.03
2.eat at the canteen	15	3.48	0.03
3.eat at the caffeteria	16	2.72	0.03
4.eat at neighborhood restaurants	26	2.42	0.03
5.use vending machines	17	2.33	0.03

*** > *

M = 3.76
(0.03)

M = 3.58
(0.05)

M = 3.08
(0.06)

$F(2, 1596)= 55.956, p < .001$

RESULTS – Food Habits On Campus

RATINGS OF FOOD OFFERED IN THE CANTEEN

		ALL	
	Missing	Mean	SE
1.tasty (PC2)	5	3.27	0.03
2.healthy (PC1)	5	3.05	0.03
3.varied (PC1)	6	2.98	0.03
4.hygienic and safe (PC2)	5	3.40	0.03
5.nutritionally balanced (PC1)	6	3.09	0.03
6.fresh (PC2)	6	3.21	0.03
7.low in fat (PC1)	5	2.62	0.03
8.low in sugar (PC1)	6	3.33	0.03
9.low in salt (PC1)	7	3.47	0.03
10.coherent with MD principles (PC1)	6	3.07	0.04
11.adequate for dietary restrictions (PC1)	6	2.92	0.04
12.sustainable (PC1)	6	3.36	0.03
13.fair in price (PC2)	4	3.88	0.03
14.served fast (PC2)	6	3.71	0.03
15.appropriate portion size (PC 2)	8	3.46	0.03

	ALL	🇭🇷	🇵🇹	🇹🇷
Food characteristics (PC1)	3.10 (0.02)	2.80 (0.03)	3.57 (0.04)	2.99 (0.05)
Service appraisal (PC2)	3.49 (0.02)	3.66 (0.03)	3.63 (0.04)	3.15 (0.04)

Portugal → better perception of food served in the canteen

Turkey → reduced assessment for services:
- hygienic and safe
- served fast
- fairly priced
- appropriate portion size

RESULTS – Food Habits On Campus

OVERALL
Knowledge of benefits are HIGH
Barriers of Knowledge are MODERATE
Interest is INCREASED

|	Missing	*M*	*SE*
1.I am aware of what a MD-based lifestyle is and how to implement it successfully. (PC1)	25	3.43	0.03
2.For me, MD's menu guidelines (i.e., portion size, food group substitutions, schedules, budgets) are complex to follow and understand. (PC2)	27	3.20	0.03
3I recognize the potential benefits of adopting a MD-based lifestyle for better nutrition.(PC1)	27	3.99	0.03
4.I recognize the potential benefits of adopting a MD-based lifestyle to reduce meat intake.(PC1)	28	3.61	0.03
5.I recognize the potential benefits of adopting a MD-based lifestyle in improving the social experience related to food.(PC1)	28	3.62	0.03
6.I am aware that MD helps prevent several physical and mental health problems.(PC1)	32	3.90	0.03
7.I have difficulty identifying and interpreting nutritional components and using labeling to select healthier food products. (PC2)	33	3.28	0.03
8.I often cook vegetables in a variety of ways and combine meals to reduce my protein and carb intake.(PC1)	33	3.03	0.03
9.I'm not sure it's worth it to maintain the MD lifestyle. (PC2)	34	2.99	0.03
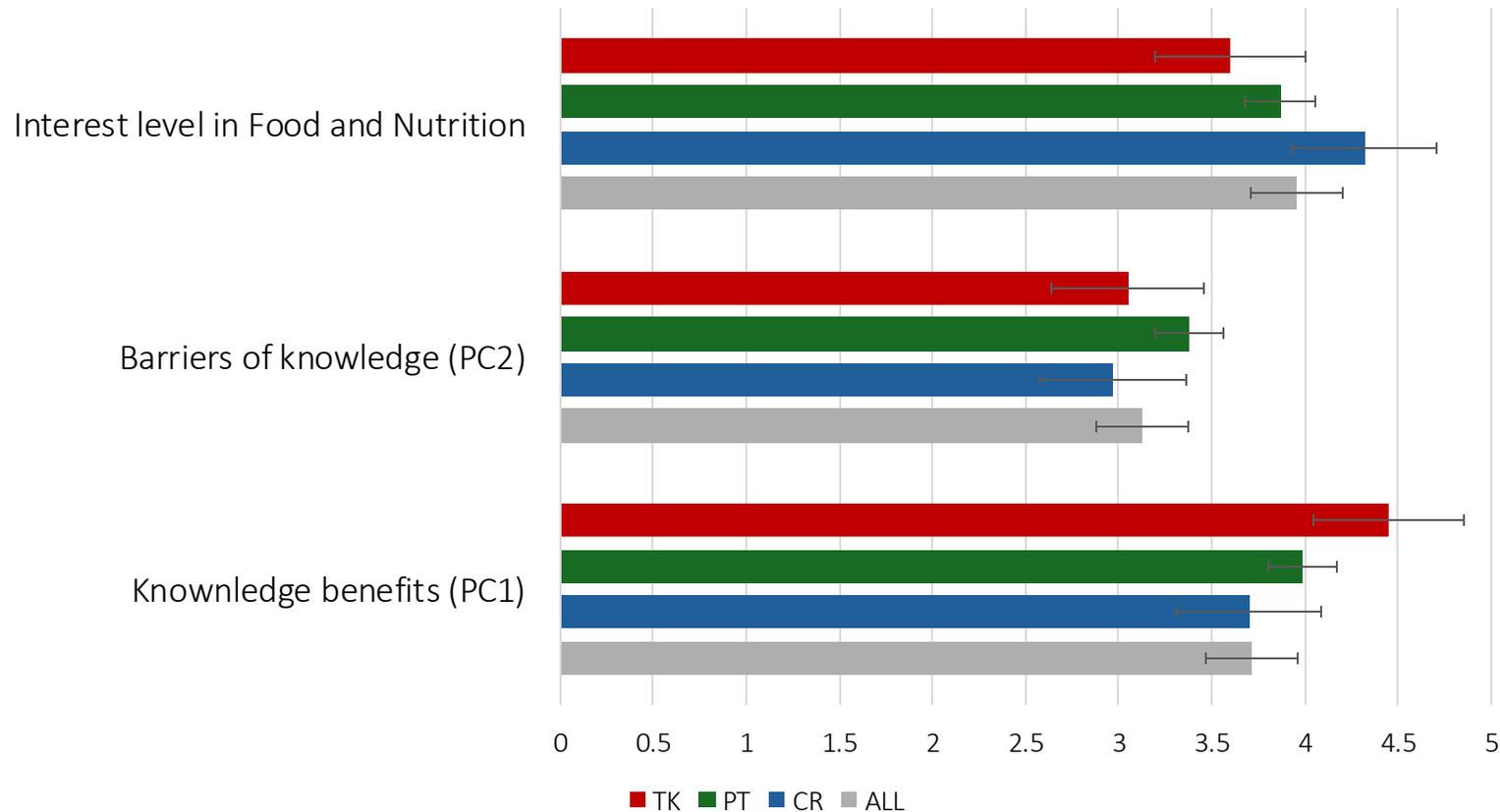
RESULTS – Food Habits On Campus

LIKELIHOOD TO PROMOTE CAMPUS CANTEEN
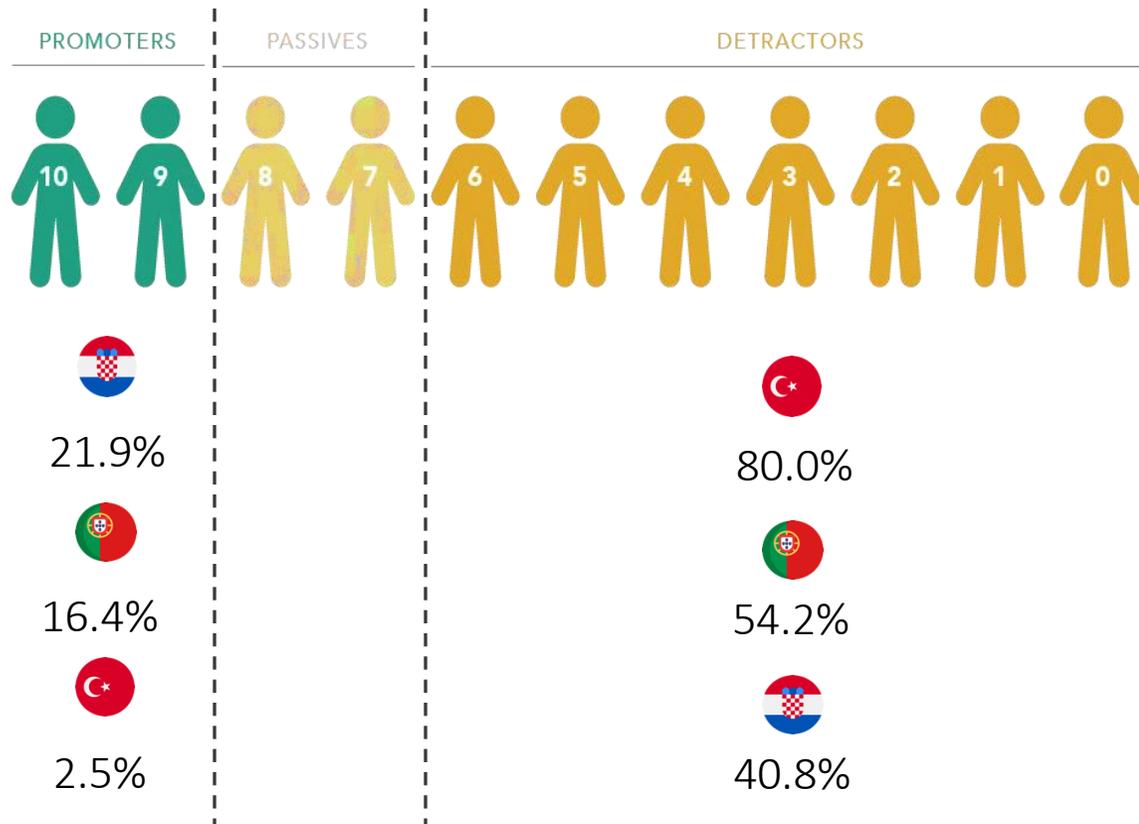
OVERALL
Canteen – **DETRACTORS TREND**
$M = 5.75(0.06)$; 95% CI[5.62; 5.88]

PROMOTERS | PASSIVES | DETRACTORS

10 9 | 8 7 | 6 5 4 3 2 1 0

21.9%

16.4%

2.5%

80.0%

54.2%

40.8%

*** > *** >

$M = 6.54$ (0.10)

$M = 5.94$ (0.12)

$M = 4.61$ (0.09)

$F(2, 1604)= 85.790, p < .001$
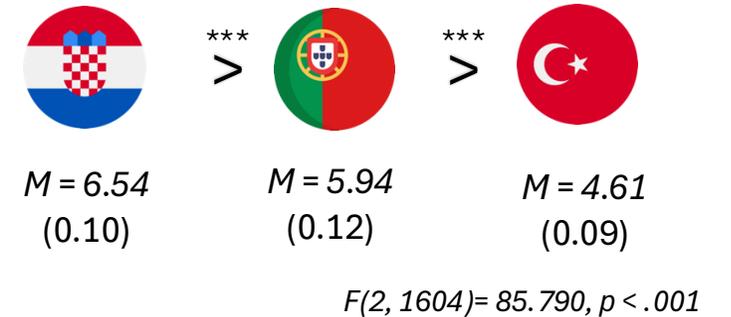
How student habits and canteens´ perceptions relate with MD compliance and knowledge, perceived health & potential to indicate those food services?

Factors association: The main psychological and environmental barriers to adhering to MD.

|	1	2	3	4	5	6	7	8	9
1.Food habits - Eat at the Canteen	—								
2.Canteen assessment- Food appreciation	-.050	—							
3.Canteen assessment - Service appraisal	-.018	.602	—						
4.Compliance with PREDIMED (score)	-.168	-.051	.032	—					
5. NET promotion score (NPS)	-.140	.120	.133	.126	—				
6.Known Benefits	-.076	-.139	.055	.367	.127	—			
7.Known Barriers	-.111	-.040	.022	.407	.051	.281	—		
8. MD perceived adherence	-.065	-.073	.021	.128	.022	.032	.105	—	
9. Overall perceived health	-.015	-.009	.128	.118	.056	.107	.119	.020	—
10. Interest in Food and Nutrition	.003	-.165	.078	.249	.061	.375	.265	.199	.169

C1: moderate habits & canteen assess.& recommend
low MD know & compliance
good perceived health

C2: high habits & low canteen assess.
low likelihood to recommend
Low MD know & compliance
poor Perceived Health

C3: low habits & canteen assess
High MD know & interest & compliance
Moderate Perceived health
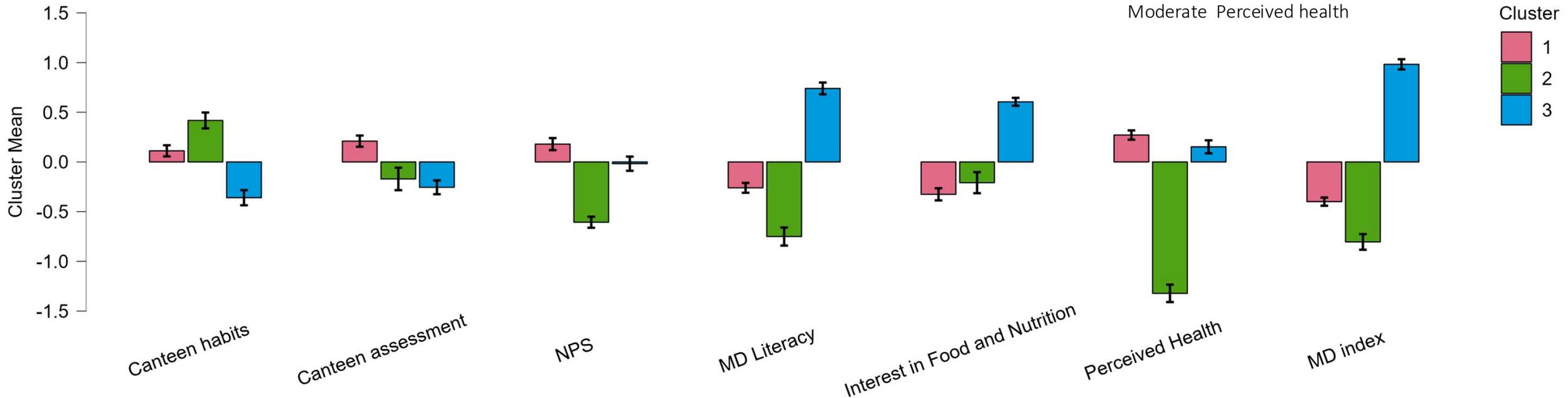
Cluster-based analysis: Profiling choices

3 clusters
N= 1541
R2= 0.437
Silhuete= 0.100

Final Considerations

MD compliance was low to moderate across the samples

The mapping of perceptions and attitudes regarding food offers in university canteens showed:

- The canteen is not the prevalent choice, with students showing a diversity of habits
- Canteen food obtained lower ratings than canteen services, particularly in Turkey
- Reduced butter and the use of wine are enabling MD adherence
- The daily use of olive oil remains a challenge.

The changeability of the factors according to person-based characteristics showed…

- The use of canteen services is negatively related with MD compliance & knowledge, canteen food appraisal, and the likelihood of recommending food canteen services.
- The main psychological barrier is the MD knowledge, low interest, and bad perception of own health
- The environmental barriers to adhering MD are the food and services themselves.
- The individual profile of perceived health, MD compliance and knowledge are likely modulating canteen perceptions, habits and likelihood to recommend.

Advancing data about modifiable factors associated with better adherence to healthy dietary habits in the university context informs the development of actions/interventions to prevent unhealthy food choices and overcome limited and unhealthy food offers in canteen campuses.

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- The canteen is not the main choice, with students showing a diversity of habits
- Canteen food obtained lower ratings than canteen services
- Reduced butter and sugary drink consumption and the use of wine are enabling MD adherence
- The daily use of olive oil remains a challenge for all countries

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Advancing data about modifiable factors associated with better adherence to healthy dietary habits in the university context informs the development of actions/interventions to prevent unhealthy food choices and overcome limited and unhealthy food offers in canteen campuses.

Thank You for Your Attention!

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