Supplementary material

1

Appendix 1: FSAm-NPS algorithm calculation

Points are allocated according to the nutrient content for 100g of foods or beverages.
Points are allocated for 'Negative' nutrients (A points) and can be balanced according to 'Positive' nutrients (C points).

A points

Total A points = (points for energy) + (points for saturated fat) + (points for total sugar) + (points for sodium)

Points	Energy (kJ)	Saturated Fat (g)	Total Sugars (g)	Sodium (mg)
0	≤ 335	≤ 1	≤ 4.5	≤ 90
1	> 335	> 1	> 4.5	> 90
2	> 670	> 2	> 9	> 180
3	> 1005	> 3	> 13.5	> 270
4	> 1340	> 4	> 18	> 360
5	> 1675	> 5	> 22.5	> 450
6	> 2010	> 6	> 27	> 540
7	> 2345	> 7	> 31	> 630
8	> 2680	> 8	> 36	> 720
9	> 3015	> 9	> 40	> 810
10	> 3350	> 10	> 45	> 900

C points

Total C points = (points for fruits/vegetables/legumes/nuts) + (points for fibres) + (points for proteins)

Points	Fruits/vegetables/legumes/nuts	Fibre (g) *	Protein (g)
0	≤ 40	≤ 0.7	≤ 1.6
1	> 40	> 0.7	> 1.6
2	> 60	> 1.4	> 3.2
3	-	> 2.1	> 4.8
4	-	> 2.8	> 6.4
5	> 80	> 3.5	> 8.0

* FSAm-NPS score allocates different thresholds for fibres, depending on the measurement method used. We used NSP cut-offs to compute fibres score.

For 100g of a given food, the percentage of fruits/vegetables/legumes/nuts is obtained by summing up the amount (in grams) of all fruits, legumes and vegetables (including oleaginous fruits, dried fruits and olives) contained in this food.

Overall score computation

- If Total A points <11, then FSAm-NPS score =Total A points – Total C points
- If Total A points ≥11,
  - If points for fruits/vegetables/legumes/nuts =5, then FSAm-NPS score =Total A points – Total C points
  - Else if points for fruits/vegetables/legumes/nuts <5, then FSAm-NPS score = Total A points – (points for fibre + points for fruits/vegetables/legumes/nuts).

Exceptions were made for cheese, added fat, and drinks to better rank them according to their nutrient profile, consistently with nutritional recommendations:

Score computation for cheese

For cheese, the score takes in account the protein content, whether the A score reaches 11 or not, i.e.: FSAm-NPS score =Total A points – Total C points

Score computation for added fat

2

For added fat, the grid for point attribution is based on the percentage of saturated fat among total lipids (instead of saturated fat (g)) and has a six-point homogenous ascending step, as shown thereafter:

Points	Saturated Fat/Lipids (%)
0	< 10
1	< 16
2	< 22
3	< 28
4	< 34
5	< 40
6	< 46
7	< 52
8	< 58
9	< 64
10	≥ 64

Points attribution for the other nutrients follows the grid displayed in "A points" and "C points" above.

Score computation for drinks

For drinks, the grids for point attribution regarding energy, sugars and fruits/vegetables/ legumes/nuts (%) were modified.

Points	Energy (kJ)	Sugars (g)	Fruits/vegetables/legumes/nuts (%)
0	≤ 0	≤ 0	< 40
1	≤ 30	≤ 1.5	
2	≤ 60	≤ 3	> 40
3	≤ 90	≤ 4.5	
4	≤ 120	≤ 6	> 60
5	≤ 150	≤ 7.5	
6	≤ 180	≤ 9	
7	≤ 210	≤ 10.5	
8	≤ 240	≤ 12	
9	≤ 270	≤ 13.5	
10	> 270	> 13.5	> 80

Points attribution for the other nutrients follows the grid displayed in "A points" and "C points" above.

Given the modification of the grid for fruit and vegetables for beverages, the threshold in the final computation to take into account protein content is set at 10 points:
- If Total A points <11, then FSAm-NPS score =Total A points – Total C points
  - If Total A points ≥11,
    - If points for fruits/vegetables/legumes/nuts =10, then FSAm-NPS score =Total A points – Total C points
    - Else if points for fruits/vegetables/legumes/nuts <10, then FSAm-NPS score = Total A points – (points for fibre + points for fruits/vegetables/legumes/nuts).

Milk and vegetable milk are not concerned by this exception. Their scores are computed using the overall score computation system.

3

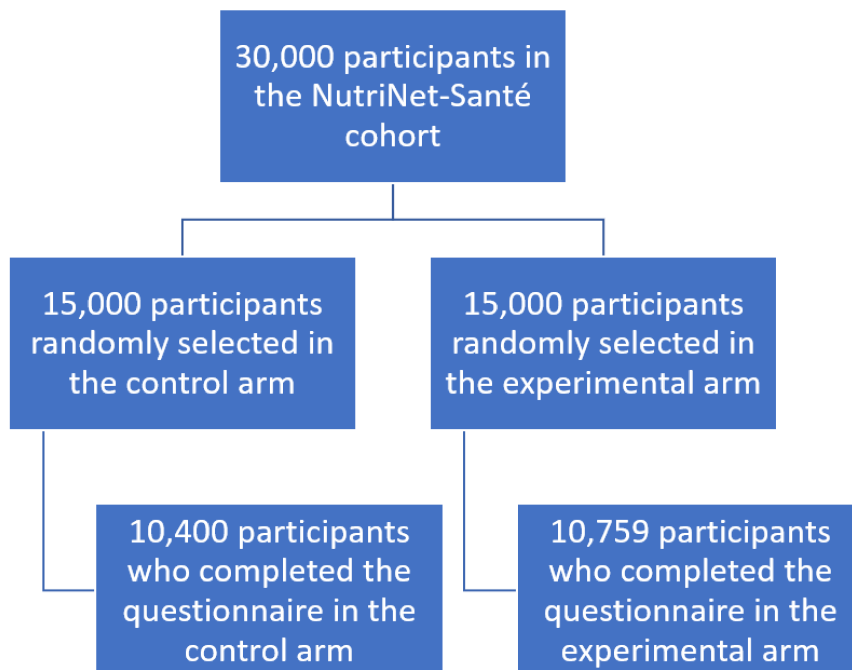### *FSAm-NPS score and Attribution of Nutri-Score colours*

Foods (points)	Beverages (points)	Colour	
Min to -1	Water	Dark green	*Highest nutritional quality*
0 to 2	Min to 1	Light green	
3 to 10	2 to 5	Yellow	
11 to 18	6 to 9	Light orange	
19 to max	10 to max	Dark orange	*Lowest nutritional quality*

Santé Publique France 2017, Nutri-Score Logo

eTable 1: Comparison of socio-demographic participants between participants who answered the questionnaire (included) and those who were selected but did not answer, NutriNet-Santé, 2022, n = 30,000

	Included		Non-included		
	n	%	n	%	*p -value*
	21159		7888		
Sex					
Women	15476	73.1	6191	78.5	
Men	5683	26.9	1697	21.5	<0.0001
Age category at date of questionnaire					
]18-25 years]	185	0.9	134	1.7	
]25-50 years]	5329	25.2	2787	35.3	
]50-65 years]	7062	33.4	2568	32.6	
>65 years	8583	40.6	2399	30.4	<0.0001
Educational level					
< High school degree	6284	29.7	1981	25.1	
<3 years after high school	6585	31.1	2538	32.2	
≥3 years after high school	8290	39.2	3369	42.7	<0.0001
Professional situation					
Unemployed	1328	6.3	585	7.4	
Student	155	0.7	121	1.5	
Retired	10627	50.2	2940	37.3	
Employees, agriculture professions, workers	2244	10.6	1085	13.8	
Intermediate and superior professions	6805	32.2	3157	40.0	<0.0001
Household monthly income					
Less than 1110 euros/month	526	2.5	191	2.4	
1110 - 2330 euros/month	3730	17.6	1258	16.0	
2330 - 3780 euros/month	5923	28.0	2123	26.9	
More than 3780 euros/month	7868	37.2	3012	38.2	
Do not wish to answer	3112	14.7	1304	16.5	<0.0001
Area of residence					
Unknown	4639	21.9	1745	22.1	
Rural	16175	76.5	6003	76.1	
Urban	345	1.6	140	1.8	0.6

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

bmjnph

Appendix 2: Flowchart for sample selection, NutriNet-Santé, 2022, n = 21,159

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

bmjnph

eTable 2: Participants' knowledge about nutrition, Nutri-Score and food ultra-processing, NutriNet-Santé, 2022, n = 21,159

	Control arm		Experimental arm		
	n	**%**	**n**	**%**	*p-value*
	10400		10759		
How do you consider your diet?					
Very unhealthy	56	0.5	76	0.7	
Unhealthy	612	5.9	668	6.2	
Healthy	7980	76.7	8148	75.7	
Very healthy	1673	16.1	1767	16.4	
I do not know	79	0.8	100	0.9	0.2
How do you estimate your knowledge in nutrition?					
I do not know anything about nutrition	107	1.0	90	0.8	
I know few things about nutrition	2028	19.5	1988	18.5	
I am rather knowledgeable about nutrition	6608	63.5	6932	64.4	
I am very knowledgeable about nutrition	1484	14.3	1562	14.5	
I do not know	173	1.7	187	1.7	0.2
Prior to this questionnaire, had you heard about the Nutri-Score in the press or on the Internet?					
No	479	4.6	458	4.3	
Yes	9921	95.4	10301	95.7	0.2
From where had you heard about it?					
On television	6047	58.1	6321	58.8	0.4
On the radio	2955	28.4	3033	28.2	0.7
In written an electronic press	5265	50.6	5451	50.7	1.0
On an institutional or governmental website	3398	32.7	3502	32.6	0.9
On social media	1073	10.3	1134	10.5	0.6
On a blog	147	1.4	143	1.3	0.6
Word of mouth	1280	12.3	1473	13.7	0.003
Other	1505	14.5	1593	14.8	0.5
What you had heard about the Nutri-Score was:					
Very negative	38	0.4	33	0.3	
Rather negative	727	7.0	788	7.3	
Neutral	2067	19.9	2125	19.8	
Rather positive	6193	59.6	6479	60.2	
Very positive	896	8.6	876	8.1	
I do not know	479	4.6	458	4.3	0.5
Prior to this questionnaire, had you heard about the concept of ultra-processed foods?					
No	1502	14.4	1568	14.6	
Yes	8898	85.6	9191	85.4	0.8
From where had you heard about it?					

7

On television	5373	51.7	5458	50.7	0.2
On the radio	3289	31.6	3290	30.6	0.1
In written an electronic press	5424	52.2	5592	52.0	0.8
On an institutional or governmental website	2141	20.6	2204	20.5	0.9
On social media	1059	10.2	1203	11.2	0.02
On a blog	241	2.3	274	2.6	0.3
Word of mouth	1327	12.8	1507	14.0	0.008
Other	1254	12.1	1334	12.4	0.5
What you had heard about ultra-processed foods was:					
Very negative	6456	62.1	6641	61.7	
Rather negative	2107	20.3	2207	20.5	
Neutral	144	1.4	137	1.3	
Rather positive	164	1.6	170	1.6	
Very positive	27	0.3	36	0.3	
I do not know	1502	14.4	1568	14.6	0.9

8

eTable 3: Impact of the Nutri-Score 2.0 on primary outcomes (i.e., objective understanding of nutritional quality and food ultra-processing) in stratified analyses, NutriNet-Santé, 2022, France, n = 21,159

		OR* (95% CI) [experimental arm vs. control arm]		*P-trend*	*P-interaction*
In participants with a lower educational level (< high school)					
All products					
Number of correct answers	0 - 2	3 -6	7 - 9		
Understanding of nutritional quality	1	0.81 (0.71 - 0.94)	33.6 (15.7 - 71.8)	*<0.0001*	*<0.0001*
Number of correct answers	0 - 12	13 - 19	20 - 22		
Understanding of ultra-processing	1	2.06 (1.72 - 2.46)	102.5 (71.9 - 146.2)	*<0.0001*	*<0.0001*
In participants with a higher educational level (≥ high school)					
All products					
Number of correct answers	0 - 2	3 -6	7 - 9		
Understanding of nutritional quality	1	0.49 (0.46 - 0.52)	27.5 (22.0 - 34.4)	*<0.0001*	*<0.0001*
Number of correct answers	0 - 12	13 - 19	20 - 22		
Understanding of ultra-processing	1	1.91 (1.69 - 2.16)	176.5 (151.0 - 206.4)	*<0.0001*	*<0.0001*
In participants with a lower self-reported knowledge about nutrition					
All products					
Number of correct answers	0 - 2	3 -6	7 - 9		
Understanding of nutritional quality	1	0.70 (0.62 - 0.80)	60.7 (33.1 - 111.3)	*<0.0001*	*<0.0001*
Number of correct answers	0 - 12	13 - 19	20 - 22		
Understanding of ultra-processing	1	2.41 (1.97 - 2.93)	341.3 (239.1 - 487.2)	*<0.0001*	*<0.0001*
In participants with a higher self-reported knowledge about nutrition					
All products					
Number of correct answers	0 - 2	3 -6	7 - 9		
Understanding of nutritional quality	1	0.50 (0.47 - 0.53)	24.7 (19.6 - 31.1)	*<0.0001*	*<0.0001*
Number of correct answers	0 - 12	13 - 19	20 - 22		
Understanding of ultra-processing	1	1.82 (1.62 - 2.05)	153.2 (131.0 – 179.2)	*<0.0001*	*<0.0001*

OR* = Odds Ratio

ORs derived from multinomial logistic regression models to predict the number of correct answers according to the experimentation arm, adjusted for age, sex, educational level, household monthly income, professional situation and area of residence

9

eTable 4: Secondary outcomes: comparison of the 2 arms in terms of purchasing intentions and the healthiest-perceived product, NutriNet-Santé, 2022, n = 21,159

	Control arm		Experimental arm		
	n	%	n	%	*p-value*
Look at these cookies					
Which product would you most frequently buy?					
Cocoa and hazelnut stuffed cookies (Nutri-Score D, ultra-processed)	421	4.1	233	2.2	
Butter shortbreads (Nutri-Score E, not ultra-processed)	1371	13.2	982	9.1	
Granola chocolate chips cookies (Nutri-Score E, ultra-processed)	808	7.8	423	3.9	
Chocolate chip oat bran cookies (Nutri-Score A, ultra-processed)	380	3.7	707	6.6	
Double chocolate cookies (glazed and stuffed) (Nutri-Score E, ultra-processed)	108	1.0	62	0.6	
Artisanal anise cookies (Nutri-Score C, not ultra-processed)	1160	11.2	3678	34.2	
Oat bran whole organice cookies (Nutri-Score B, ultra-processed)	2670	25.7	1300	12.1	
Organic hazelnut chocolate stuffed cookie (Nutri-Score D, not ultra-processed)	579	5.6	1019	9.5	
None of the above	2903	27.9	2355	21.9	<0.0001
Which product seems the healthiest to you?					
Cocoa and hazelnut stuffed cookies (Nutri-Score D, ultra-processed)	61	0.6	61	0.6	
Butter shortbreads (Nutri-Score E, not ultra-processed)	593	5.7	240	2.2	
Granola chocolate chips cookies (Nutri-Score E, ultra-processed)	42	0.4	50	0.5	
Chocolate chip oat bran cookies (Nutri-Score A, ultra-processed)	1178	11.3	1527	14.2	
Double chocolate cookies (glazed and stuffed) (Nutri-Score E, ultra-processed)	63	0.6	98	0.9	
Artisanal anise cookies (Nutri-Score C, not ultra-processed)	2262	21.8	6664	61.9	
Oat bran whole organice cookies (Nutri-Score B, ultra-processed)	4805	46.2	1069	9.9	
Organic hazelnut chocolate stuffed cookie (Nutri-Score D, not ultra-processed)	328	3.2	332	3.1	
None of the above	1068	10.3	718	6.7	<0.0001
Do you think that the Nutri-Score 2.0 helped differentiate the nutritional quality of these cookies? (experimental arm)					
Did you feel able to differentiate the nutritional quality of these cookies? (control arm)					
Yes, totally	1052	10.1	3194	29.7	
Somehow, yes	5074	48.8	5148	47.9	
No	2727	26.2	1324	12.3	
Not at all	1041	10.0	636	5.9	
I do not know	506	4.9	457	4.3	<0.0001

Do you think that the Nutri-Score 2.0 helped you identify among these cookies, those that are ultra-processed? (experimental arm)					
Did you feel able to identify among these cookies, those that are ultra-processed? (control arm)					
Yes, totally	931	9.0	7675	71.3	
Somehow, yes	4477	43.1	2208	20.5	
No	2694	25.9	338	3.1	
Not at all	1698	16.3	281	2.6	
I do not know	600	5.8	257	2.4	<0.0001
Look at these breakfast cereals					
Which product would you most frequently buy?					
Classical corn flakes (Nutri-Score D, ultra-processed)	309	3.0	283	2.6	
Crispy chocolate muesli (Nutri-Score C, not ultra-processed)	1027	9.9	1203	11.2	
Chocolate stuffed pillow-shaped cereals (Nutri-Score D, ultra-processed)	205	2.0	198	1.8	
Chocolate flavoured corn flakes (Nutri-Score B, ultra-processed)	271	2.6	356	3.3	
Sugar free fruit muesli (Nutri-Score A, not ultra-processed)	3487	33.5	5964	55.4	
Chocolat oat crispy muesli (Nutri-Score D, ultra-processed)	487	4.7	235	2.2	
Organic crispy muesli with red fruits (Nutri-Score D, not ulra-processed)	956	9.2	345	3.2	
None of the above	3658	35.2	2175	20.2	<0.0001
Which product seems the healthiest to you?					
Classical corn flakes (Nutri-Score D, ultra-processed)	233	2.2	311	2.9	
Crispy chocolate muesli (Nutri-Score C, not ultra-processed)	819	7.9	460	4.3	
Chocolate stuffed pillow-shaped cereals (Nutri-Score D, ultra-processed)	94	0.9	74	0.7	
Chocolate flavoured corn flakes (Nutri-Score B, ultra-processed)	53	0.5	86	0.8	
Sugar free fruit muesli (Nutri-Score A, not ultra-processed)	6515	62.6	9226	85.8	
Chocolat oat crispy muesli (Nutri-Score D, ultra-processed)	72	0.7	38	0.4	
Organic crispy muesli with red fruits (Nutri-Score D, not ulra-processed)	1339	12.9	147	1.4	
None of the above	1275	12.3	417	3.9	<0.0001
Do you think that the Nutri-Score 2.0 helped differentiate the nutritional quality of these cereals? (experimental arm)					
Did you feel able to differentiate the nutritional quality of these cereals? (control arm)					
Yes, totally	776	7.5	4827	44.9	
Somehow, yes	4458	42.9	4283	39.8	
No	2882	27.7	798	7.4	
Not at all	1613	15.5	406	3.8	

11

I do not know	671	6.5	445	4.1	<0.0001
Do you think that the Nutri-Score 2.0 helped you identify among these cereals, those that are ultra-processed? (experimental arm)					
Did you feel able to identify among these cereals, those that are ultra-processed? (control arm)					
Yes, totally	894	8.6	7452	69.3	
Somehow, yes	4301	41.4	2440	22.7	
No	2785	26.8	337	3.1	
Not at all	1783	17.1	234	2.2	
I do not know	637	6.1	296	2.8	<0.0001
Look at these ready-to-eat meals					
Which product would you most frequently buy?					
Artisanal duck parmentier (Nutri-Score C, not ultra-processed)	1324	12.7	1220	11.3	
Pasta box with bolognese sauce (Nutri-Score A, ultra-processed)	164	1.6	437	4.1	
Pork sauté with mashed potatoes (Nutri-Score B, not ultra-processed)	521	5.0	3429	31.9	
Gratinated endives with ham and emmental cheese (Nutri-Score B, ultra-processed)	576	5.5	369	3.4	
Tartiflette (French traditional dish with Reblochon cheese and oven cooked potatoes) (Nutri-Score C, ultra-processed)	163	1.6	80	0.7	
Salmon with butter, shallots and mashed potatoes (Nutri-Score C, not ultra-processed)	1533	14.7	1609	15.0	
Gratinated raviolis with scallops (Nutri-Score D, ultra-processed)	776	7.5	230	2.1	
None of the above	5343	51.4	3385	31.5	<0.0001
Which product seems the healthiest to you?					
Artisanal duck parmentier (Nutri-Score C, not ultra-processed)	1131	10.9	446	4.2	
Pasta box with bolognese sauce (Nutri-Score A, ultra-processed)	183	1.8	899	8.4	
Pork sauté with mashed potatoes (Nutri-Score B, not ultra-processed)	1323	12.7	7009	65.2	
Gratinated endives with ham and emmental cheese (Nutri-Score B, ultra-processed)	1608	15.5	403	3.8	
Tartiflette (French traditional dish with Reblochon cheese and oven cooked potatoes) (Nutri-Score C, ultra-processed)	287	2.8	31	0.3	
Salmon with butter, shallots and mashed potatoes (Nutri-Score C, not ultra-processed)	2650	25.5	1086	10.1	
Gratinated raviolis with scallops (Nutri-Score D, ultra-processed)	563	5.4	48	0.5	
None of the above	2655	25.5	837	7.8	<0.0001
Do you think that the Nutri-Score 2.0 helped differentiate the nutritional quality of these meals? (experimental arm)					
Did you feel able to differentiate the nutritional quality of these meals? (control arm)					
Yes, totally	553	5.3	4322	40.2	
Somehow, yes	3467	33.3	4327	40.2	
No	3438	33.1	1083	10.1	

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

bmjnph

Not at all	2191	21.1	513	4.8	
I do not know	751	7.2	514	4.8	<0.0001
Do you think that the Nutri-Score 2.0 helped you identify among these meals, those that are ultra-processed? (experimental arm)					
Did you feel able to identify among these meals, those that are ultra-processed? (control arm)					
Yes, totally	737	7.1	6968	64.8	
Somehow, yes	3715	35.7	2743	25.5	
No	3113	29.9	441	4.1	
Not at all	2125	20.4	295	2.7	
I do not know	710	6.8	312	2.9	<0.0001

13

eTable 5: Perception of the Nutri-Score 2.0 by the experimental arm participants, NutriNet-Santé, 2022, n = 10,759

	n	%
The Nutri-Score 2.0 would help in my food purchases		
I do not agree at all	400	3.7
I somehow do not agree	964	9.0
I somhow agree	5209	48.4
I completely agree	3833	35.6
I do not know	353	3.3
The Nutri-Score 2.0 gives me useful information for my food purchases		
I do not agree at all	345	3.2
I somehow do not agree	924	8.6
I somhow agree	5005	46.5
I completely agree	4188	38.9
I do not know	297	2.8
The Nutri-Score is a misleading tool in food purchases		
I do not agree at all	4377	40.7
I somehow do not agree	4175	38.8
I somhow agree	1241	11.5
I completely agree	408	3.8
I do not know	558	5.2
The Nutri-Score 2.0 is credible and trustworthy		
I do not agree at all	289	2.7
I somehow do not agree	763	7.1
I somhow agree	5125	47.6
I completely agree	3353	31.2
I do not know	1229	11.4
The Nutri-Score 2.0 is easy to understand		
I do not agree at all	265	2.5
I somehow do not agree	1018	9.5
I somhow agree	4961	46.1
I completely agree	4257	39.6
I do not know	258	2.4
I would like to see the Nutri-Score 2.0 displayed on food products		
I do not agree at all	208	1.9
I somehow do not agree	342	3.2
I somhow agree	3205	29.8
I completely agree	6267	58.3
I do not know	737	6.9
The Nutri-Score 2.0 would be useful to inform me about the nutritional quality of food products		
I do not agree at all	365	3.4
I somehow do not agree	970	9.0
I somhow agree	4698	43.7
I completely agree	4177	38.8
I do not know	549	5.1
The Nutri-Score 2.0 would be useful to help me identify ultra-processed foods		
I do not agree at all	189	1.8
I somehow do not agree	241	2.2

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

bmjnph

I somhow agree	2172	20.2
I completely agree	7932	73.7
I do not know	225	2.1
I can rely on the Nutri-Score 2.0 to be informed on the nutritional quality of food products		
I do not agree at all	401	3.7
I somehow do not agree	1093	10.2
I somhow agree	5029	46.7
I completely agree	3449	32.1
I do not know	787	7.3
I can rely on the Nutri-Score 2.0 to identify ultra-processed foods		
I do not agree at all	208	1.9
I somehow do not agree	298	2.8
I somhow agree	2786	25.9
I completely agree	7113	66.1
I do not know	354	3.3
If I am not familiar with the product, I can rely on the Nutri-Score 2.0 to be informed on its nutritional quality		
I do not agree at all	349	3.2
I somehow do not agree	1042	9.7
I somhow agree	5179	48.1
I completely agree	3586	33.3
I do not know	603	5.6
If I am not familiar with the product, I can rely on the Nutri-Score 2.0 to identify if it is ultra-processed		
I do not agree at all	209	1.9
I somehow do not agree	262	2.4
I somhow agree	2759	25.6
I completely agree	7207	67.0
I do not know	322	3.0

15