Tables in the project

Table 1: Means, percentages, and 95 percent CIs of the characteristics by latent class memberships in the UK adults (NDNS RP 2008/09-2015/16, sample size = 6155).

Variables	Latent class = 1	Latent class = 2	P value [*]
Total (%)	66.4 (64.8 , 68.1)	33.6 (31.9 , 35.2)	
Countries (%)			
England	83.1 (80.9 , 85.1)	85.4 (83.0 , 87.5)	0.203
Northern Ireland	3.0 (2.3 , 3.9)	2.3 (1.7 , 3.1)	
Scotland	8.9 (7.2 , 11.0)	7.7 (5.9 , 9.9)	
Wales	5.0 (4.1 , 6.0)	4.6 (3.6 , 6.0)	
Age (years)	47.3 (46.4, 48.2)	50.1 (49.1, 51.1)	< 0.001
Sex (%)			
Men	47.3 (45.2 , 49.5)	51.0 (48.1 , 53.9)	0.048
Women	52.7 (50.5 , 54.8)	49.0 (46.1 , 51.9)	
Survey years (%)			
1	13.1 (10.8, 15.8)	15.0 (12.1, 18.5)	0.365
2	12.3 (10.1, 14.9)	11.9 (9.4, 14.2)	
3	12.0 (9.8, 14.8)	10.4 (8.2, 13.1)	
4	13.2 (10.9, 16.0)	11.4 (9.0, 14.2)	
5	13.0 (10.8, 15.7)	13.9 (11.1, 17.3)	
6	12.0 (9.9, 14.4)	11.1 (8.8, 13.9)	
7	12.3 (10.1,14.9)	13.5 (10.9, 16.7)	
8	12.0 (9.9, 14.5)	12.8 (10.3, 15.8)	
BMI (kg/m^2)	27.2 (26.9, 27.5)	27.7 (27.5, 28.1)	0.007
WC (cm)	92.6 (91.9, 93.3)	94.2 (93.1, 95.2)	0.013
Smoking status (%)			
Current	19.8 (18.2 , 21.4)	23.8 (21.3 , 26.5)	< 0.001
Ex-smoker	22.5 (20.8 , 24.2)	28.0 (25.4 , 30.7)	
Never	57.8 (55.7 , 59.8)	48.2 (45.3 , 51.1)	
Current drinking status (%)			
Yes	23.1 (21.3 , 25.1)	11.1 (9.5 , 13.0)	< 0.001
Hypertension (%) [†]			
Yes	27.4 (25.0 , 29.9)	32.6 (29.3 , 36.1)	0.012
Total energy intake (KJ)	7425.7 (7323.7, 7527.8)	8149.9 (7997.3, 8302.7)	< 0.001
Carbohydrate intake (g)	226.0 (222.8, 229.3)	210 (206.1, 213.9)	< 0.001
Carbohydrate percent (%) [‡]	48.3 (48.0, 48.6)	40.9 (40.6, 41.3)	< 0.001
Glucose (mmol/l)	5.13 (5.09, 5.17)	5.17 (5.11, 5.22)	0.292
A1C (%)	5.49 (5.47, 5.52)	5.47 (5.44,5.51)	0.264
DM [§]	4.1 (3.1 , 5.3)	5.9 (4.3 , 8.0)	0.061
Physical activity (hours/day) [¶]	1.51 (1.39, 1.63)	1.64 (1.45, 1.82)	0.244

Note:

Abbreviations: CI, confidence intervals; NDNS RP, national dietary and nutrition survey rolling programme; BMI body mass index; WC, waist circumference; A1C, haemoglobin A1c; DM, diabetes mellitus.

Variables from the blood tests (glucose and A1C) are weighted by blood sample weights, the others are weighted by individual weights.

Glucose and A1C levels are estimated in subgroups of people without diabetes.

[*] For continuous variables, the F test was used to determine differences between latent classes. For categorical variables, differences between latent classes were assessed using the adjusted Pearson Chi-2 test for survey data.

[†] Hypertension was defined as either systolic blood pressure >= 140 mmHg or diastolic blood pressure >= 90 mmHg, or under treatment for hypertension.

[‡] Carbohydrate percent indicates the percentage of energy from carbohydrate in total energy intake

[§] DM was defined by A1C > 6.5%.

[¶] Physical activity was calculated as mean time spent at moderate or vigorous physical activity during the survey.

Table 2: Level 1 class selection. (All data, n = 6155, 24483 data points)

N of classes	N of free parameters	log-likelihood	AIC	BIC	aBIC	Entropy	Lo-Mendel-Rubin LRT
1	48	-372017.3	744130.6	744519.7	744367.1	–	–
2	97	-368913.7	738021.4	738807.7	738499.4	0.777	< 0.0001
3	146	-366665.0	733621.9	734805.4	734341.4	0.666	< 0.0001
4	195	-365528.6	731447.1	733027.7	732408.0	0.658	0.8478
5	244	-364901.2	730290.3	732268.1	731492.7	0.648	0.7602
6	293	-363641.8	727869.5	730244.5	729313.4	0.701	0.7632
7	342	-362789.9	726263.7	729035.9	727949.0	0.729	0.7702
8	391	-362047.9	724877.9	728047.2	726804.6	0.737	0.8261

Note:

Abbreviation: N, number; AIC, Akaike information criterion; BIC, Bayesian information criterion; aBIC, adjusted BIC;

Entropy, a pseudo-r-squared index; Lo-Mendel-Rubin LRT, likelihood ratio test comparing q classes models with

q-1 classes models.

Table 3: Means, percentages, and 95 percent CIs of the characteristics by latent class memberships in the UK adults (NDNS RP 2008/09-2015/16, sample size = 6155).

Variables	Latent class = 1	Latent class = 2	Latent class = 3	P value [*]
Total (%)	28.4 (26.8, 30.1)	7.0 (6.2, 7.9)	64.6 (62.9, 66.2)	
Countries (%)				
England	81.4 (78.5, 84.0)	87.5 (82.9, 91.0)	84.6 (82.5, 86.4)	0.004
Northern Ireland	3.9 (2.9, 5.1)	0.6 (0.3, 1.2)	2.5 (2.0, 3.2)	
Scotland	9.5 (7.4, 12.3)	6.2 (3.5, 10.6)	8.3 (6.7, 10.3)	
Wales	5.2 (4.1, 6.6)	5.7 (3.8, 8.5)	4.6 (3.8, 5.6)	
Age (years)	43.8 (42.4, 45.1)	49.1 (47.2, 50.9)	50.1 (49.3, 50.9)	< 0.001
Sex (%)				
Men	50.6 (47.3, 53.9)	49.6 (43.7, 55.4)	47.6 (45.4, 49.7)	0.273
Women	49.4 (46.1, 52.7)	50.4 (44.6, 56.3)	52.4 (50.3, 54.6)	
Survey years (%)				
1	11.4 (8.8, 14.7)	17.1 (12.4, 23.3)	14.4 (11.9, 17.4)	0.002
2	10.1 (7.8, 13.1)	18.3 (13.3, 24.7)	12.4 (10.2, 15.0)	
3	13.9 (10.8, 17.7)	9.1 (5.7, 14.1)	10.7 (8.6, 13.1)	
4	10.9 (8.5, 13.9)	13.8 (9.7, 19.4)	13.2 (10.9, 16.0)	
5	13.5 (10.6, 17.0)	12.8 (8.4, 19.1)	13.3 (11.0, 16.1)	
6	12.8 (10.1, 16.1)	8.7 (5.7, 12.9)	11.5 (9.5, 13.9)	
7	14.3 (11.5, 17.6)	9.5 (6.5, 13.8)	12.4 (10.2, 15.0)	
8	13.2 (10.5, 16.4)	10.5 (7.4, 14.8)	12.1 (9.9, 14.6)	
BMI (kg/m^2)	27.5 (27.1, 27.9)	27.0 (26.4, 27.6)	27.4 (27.2, 27.6)	0.433
WC (cm)	93.3 (92.1, 94.5)	92.9 (90.9, 95.0)	93.1 (92.3, 93.8)	0.928
Smoking status (%)				
Current	24.1 (21.5, 27.0)	30.0 (24.8, 35.8)	18.8 (17.2, 20.6)	< 0.001
Ex-smoker	20.0 (17.6, 22.6)	27.5 (22.4, 33.2)	25.9 (24.1, 27.7)	
Never	55.9 (52.7, 59.0)	42.5 (36.6, 48.7)	55.3 (53.2, 57.4)	
Current drinking status (%)				
Yes	24.6 (21.7, 27.7)	18.3 (14.0, 23.6)	16.8 (15.3, 18.4)	< 0.001
Hypertension (%) [†]				
Yes	25.9 (22.3, 29.9)	31.8 (25.3, 39.1)	30.4 (27.9 32.8)	0.111
Total energy intake (KJ)	6713.8 (6575.7, 6851.8)	9256.0 (8850.8, 9661.2)	7916.9 (7814.0, 8019.9)	< 0.001
Carbohydrate intake (g)	192.9 (188.5, 197.3)	275.6 (263.4, 287.8)	226.9 (223.9, 229.9)	< 0.001
Carbohydrate percent (%) [‡]	45.8 (45.3, 46.4)	47.4 (46.5, 48.3)	45.6 (45.3, 45.9)	0.001
Glucose (mmol/l)	5.16 (5.08, 5.23)	5.09 (5.00, 5.18)	5.14 (5.10, 5.19)	0.537
A1C (%)	5.47 (5.42, 5.51)	5.48 (5.42, 5.54)	5.49 (5.47. 5.52)	0.403
DM [§]	5.9 (4.2, 8.2)	1.1 (0.2, 5.2)	4.7 (3.6, 6.0)	0.053
Physical activity (hours/day) [¶]	1.31 (1.14, 1.49)	1.82 (1.44, 2.19)	1.62 (1.49, 1.76)	0.018

Note:

Abbreviations: CI, confidence intervals; NDNS RP, national dietary and nutrition survey rolling programme; BMI body mass index; WC, waist circumference; A1C, haemoglobin A1c; DM, diabetes mellitus.

Variables from the blood tests (glucose and A1C) are weighted by blood sample weights, the others are weighted by individual weights.

Glucose and A1C levels are estimated in subgroups of people without diabetes.

[*] For continuous variables, the F test was used to determine differences between latent classes with Bonferroni correction to account for multiple testing across >2 classes. For categorical variables, differences between latent classes were assessed using the adjusted Pearson Chi-2 test for survey data.

[†] Hypertension was defined as either systolic blood pressure >= 140 mmHg or diastolic blood pressure >= 90 mmHg, or under treatment for hypertension.

[‡] Carbohydrate percent indicates the percentage of energy from carbohydrate in total energy intake

[§] DM was defined by A1C > 6.5%.

[¶] Physical activity was calculated as mean time spent at moderate or vigorous physical activity during the survey.

Table 4: Fit Criteria for Each Model Specification

			Number of level 1 classes			
Model	1 class	2 classes	3 classes	4 classes	5 classes
Fixed effects model					
No. of free parameters	14	29	44	59	74
Log-likelihood	-173793.306	-172669.771	-172039.204	-171633.941	-171377.292
BIC	347728.092	345632.608	344523.06	343864.121	343502.409
Lo-Mendell-Rubun LRT	–	< 0.0001	1e-04	< 0.0001	< 0.0001
Entropy	1	0.31	0.392	0.51	0.481
Random effects model					
2 between classes					
No. of free parameters		59	89	119	
Log-likelihood		-169331.132	-168700.96	-168366.193	
BIC		339258.502	338301.338	337934.968	
Entropy		0.581	0.569	0.555	
3 between classes					
No. of free parameters		89	134	179	
Log-likelihood		-166936.279	-166348.815	-166062.761	
BIC		334771.968	334051.799	333934.448	
Entropy		0.677	0.63	0.644	
4 between classes					
No. of free parameters		119	179		
Log-likelihood		-165441.731	-164845.696		
BIC		332086.045	331500.318		
Entropy		0.729	0.659		

Note:

Abbreviation: No, number; BIC, Bayesian information criterion; Entropy, a pseudo-r-squared index; Lo-Mendel-Rubin LRT, likelihood ratio test comparing q classes

Table 5: Day Level Latent Class Solution for Three-Class Model (No Individual level Model)

Time slots of the day	Responses of carbohydrate intake	Frequency	Precentages (%)	High carbohydrate day Class 1 (30.8%)	Lower carbohydrate day Class 2 (39.8%)	Regular Class 3 (2
6 am – 9 am						
	Not eating	7655	31.2	0.129	0.45	0.32
	Eating, Carbohydrate < 50%	4500	18.4	0.13	0.267	0.128
	Eating, Carbohydrate >= 50%	12328	50.4	0.741	0.283	0.552
9 am – 12 am						
	Not eating	5447	22.2	0.237	0.079	0.401
	Eating, Carbohydrate < 50%	7227	29.5	0.158	0.492	0.173
	Eating, Carbohydrate >= 50%	11809	48.2	0.605	0.429	0.426
12 noon – 2 pm						
	Not eating	4783	19.5	0.156	0.356	0.019
	Eating, Carbohydrate < 50%	11112	45.4	0.405	0.413	0.56
	Eating, Carbohydrate >= 50%	8588	35.1	0.439	0.231	0.421
2 pm – 5 pm						
	Not eating	6926	28.3	0.13	0.123	0.659
	Eating, Carbohydrate < 50%	8277	33.8	0.249	0.602	0.076
	Eating, Carbohydrate >= 50%	9280	37.9	0.621	0.276	0.266
5 pm – 8 pm						
	Not eating	3043	12.4	0.114	0.199	0.034
	Eating, Carbohydrate < 50%	14240	58.2	0.516	0.59	0.639
	Eating, Carbohydrate >= 50%	7200	29.4	0.37	0.211	0.328
8 pm – 10 pm						
	Not eating	8722	35.6	0.322	0.291	0.48
	Eating, Carbohydrate < 50%	8898	36.3	0.266	0.551	0.212
	Eating, Carbohydrate >= 50%	6863	28.0	0.412	0.158	0.308
10 pm – 6 am						
	Not eating	16295	66.6	0.68	0.59	0.751
	Eating, Carbohydrate < 50%	4144	16.9	0.074	0.294	0.101
	Eating, Carbohydrate >= 50%	4044	16.5	0.246	0.115	0.148