

## Online Supplementary Materials

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**Table S1. Associations between urinary concentrations of three sweeteners and body composition (n = 455)**

Sweetener	Exposure amount*	BMI-z score				Fat mass %				Fat-free mass %				Waist-to-height ratio			
		$\beta$	95% CI		P value	$\beta$	95% CI		P value	$\beta$	95% CI		P value	$\beta$	95% CI		P value
<b>Acesulfame-K</b>	0	ref	-	-	-	ref	-	-	-	ref	-	-	-	ref	-	-	-
	T1	0.02	-0.44	0.47	0.95	0.05	-3.11	3.22	0.97	-0.02	-3.18	3.15	0.99	<0.01	-0.03	0.02	0.90
	T2	<0.01	-0.44	0.43	1.00	-0.29	-3.40	2.82	0.86	0.29	-2.82	3.40	0.85	<0.01	-0.02	0.03	0.79
	T3	0.17	-0.25	0.60	0.42	1.15	-1.88	4.17	0.46	-1.14	-4.17	1.88	0.46	0.01	-0.02	0.03	0.48
<b>Sucralose</b>	0	ref	-	-	-	ref	-	-	-	ref	-	-	-	ref	-	-	-
	T1	-0.30	-0.67	0.07	0.11	-3.00	-5.59	-0.41	<b>0.02</b>	3.02	0.43	5.61	<b>0.02</b>	-0.01	-0.03	0.01	0.42
	T2	-0.06	-0.40	0.28	0.74	-0.30	-2.71	2.11	0.81	0.32	-2.09	2.73	0.79	0.01	-0.01	0.03	0.22
	T3	-0.08	-0.42	0.25	0.62	-0.17	-2.47	2.13	0.88	0.19	-2.10	2.49	0.87	-0.01	-0.03	0.01	0.30
<b>Stevioside</b>	0	ref	-	-	-	ref	-	-	-	ref	-	-	-	ref	-	-	-
	T1	0.02	-0.38	0.42	0.91	0.22	-2.61	3.04	0.88	-0.23	-3.05	2.59	0.87	<0.01	-0.02	0.03	0.78
	T2	0.23	-0.12	0.58	0.19	1.14	-1.30	3.58	0.36	-1.13	-3.57	1.31	0.36	0.01	-0.01	0.03	0.44
	T3	-0.30	-0.66	0.05	0.10	-2.23	-4.76	0.29	0.08	2.23	-0.29	4.76	0.08	-0.01	-0.04	0.01	0.16

\*Exposure amount was estimated as the proportion of daily intake to ADI and was categorized into tertiles (T1–T3), with the no intake group as reference.

The models were adjusted for age, sex, amount of exercise, sleep quality, total energy intake, and parental education time.

**Table S2. Baseline characteristics of the sweetener consumption**

Sweetener	Exposure amount*	Girls		Boys		P value **
		Mean	SD	Mean	SD	
Acesulfame-K	T1	0.12	0.08	0.17	0.13	0.01
	T2	0.7	0.39	1.03	0.56	<0.01
	T3	4.47	5.39	9.06	12.14	0.01
Aspartame	T1	0.09	0.05	0.11	0.05	0.08
	T2	0.32	0.15	0.39	0.21	0.41
	T3	3.94	6.97	8.92	16.94	0.01
Sucralose	T1	0.18	0.1	0.18	0.12	0.12
	T2	0.8	0.51	1.06	0.68	0.03
	T3	7.36	8.98	12.95	13.84	0.01
Glycyrrhizin	T1	0.02	0.01	0.02	0.02	0.03
	T2	0.07	0.03	0.08	0.04	0.05
	T3	0.33	0.33	0.33	0.37	0.13
Stevioside	T1	0.08	0.03	0.09	0.04	0.05
	T2	0.18	0.09	0.25	0.1	0.02
	T3	1.09	1.36	2.61	3.18	0.06
Sorbitol	T1	17.46	12.61	21.2	12.14	0.09
	T2	121.61	59.5	161.11	80.95	0.04
	T3	615.7	544.74	1077.69	1744.98	0.04
Added sugar	T1	1.05	0.7	1.45	1.13	0.02
	T2	4.11	1.74	5.28	2.38	0.06
	T3	18.58	15.43	23.2	15.32	<0.01

\*Exposure amount was estimated as the proportion of daily intake to ADI and was categorized into tertiles (T1–T3), with the no intake group as reference. The models were adjusted for age, amount of exercise, sleep quality, total energy intake, and parental education time. \*\*P value reflects the difference between the early and late stages of pubertal growth

**Table S3. Associations of sweetener consumption with fat mass and fat-free mass among girls, by Tanner stage (n = 1239)**

Sweetener	Tanner stage	Fat mass %								Fat-free mass %								P value **	
		I & II				III-V				I & II				III-V					
	Exposure amount*	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value			
Acesulfame-K	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.77	-0.60	2.14	0.27	-1.11	-4.23	2.01	0.49	0.46	-0.78	-2.16	0.59	0.26	1.11	-2.00	4.22	0.49	0.46
	T2	-0.51	-1.67	0.65	0.39	-3.10	-6.21	0.02	0.05	0.84	0.52	-0.65	1.68	0.39	3.09	-0.01	6.20	0.05	0.80
	T3	-0.76	-2.26	0.73	0.32	-3.13	-6.62	0.36	0.08	0.87	0.74	-0.76	2.24	0.33	3.08	-0.39	6.56	0.08	0.88
Aspartame	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.41	-1.37	0.55	0.40	-2.28	-4.21	-0.36	<b>0.02</b>	0.30	0.39	-0.57	1.35	0.43	2.23	0.31	4.14	<b>0.02</b>	0.32
	T2	-1.12	-2.22	-0.02	<b>0.05</b>	-3.15	-5.53	-0.77	<b>0.01</b>	0.84	1.15	0.05	2.25	<b>0.04</b>	3.17	0.80	5.54	<b>0.01</b>	0.83
	T3	-1.34	-2.39	-0.29	<b>0.01</b>	-2.99	-5.88	-0.11	<b>0.04</b>	0.93	1.32	0.27	2.38	<b>0.01</b>	2.98	0.10	5.86	<b>0.04</b>	0.90
Sucralose	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.73	-1.70	0.25	0.14	3.13	0.43	5.83	<b>0.02</b>	<b>0.02</b>	0.76	-0.22	1.73	0.13	-3.10	-5.80	-0.40	<b>0.03</b>	<b>0.02</b>
	T2	-0.21	-1.23	0.80	0.68	-2.28	-5.06	0.49	0.11	0.44	0.21	-0.81	1.23	0.68	2.26	-0.51	5.03	0.11	0.47
	T3	-0.63	-1.63	0.38	0.22	-0.84	-3.31	1.63	0.50	0.66	0.63	-0.38	1.64	0.22	0.85	-1.61	3.32	0.50	0.67
Glycyrrhizin	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.44	-1.31	0.43	0.32	-1.86	-3.91	0.19	0.08	0.59	0.47	-0.40	1.34	0.29	1.85	-0.20	3.89	0.08	0.58
	T2	-0.54	-1.35	0.28	0.20	-0.40	-2.79	2.00	0.75	0.34	0.57	-0.24	1.39	0.17	0.45	-1.94	2.85	0.71	0.34
	T3	-0.65	-1.56	0.27	0.17	-2.31	-4.78	0.16	0.07	<b>0.03</b>	0.68	-0.24	1.60	0.15	2.34	-0.12	4.81	0.06	<b>0.03</b>
Stevioside	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.09	-1.27	1.44	0.90	-1.09	-6.31	4.14	0.68	0.24	-0.12	-1.47	1.24	0.87	-1.09	-6.31	4.14	0.68	0.22
	T2	-1.23	-2.67	0.20	0.09	-2.30	-6.62	2.01	0.30	0.35	1.22	-0.22	2.66	0.10	-2.30	-6.62	2.01	0.30	0.35
	T3	-0.16	-1.90	1.57	0.85	0.17	-3.05	3.39	0.92	0.46	0.13	-1.61	1.87	0.88	0.17	-3.05	3.39	0.92	0.43
Sorbitol	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.82	-0.14	1.77	0.09	-0.44	-3.04	2.17	0.74	0.12	-0.82	-1.78	0.14	0.10	0.48	-2.12	3.08	0.72	0.12
	T2	0.20	-0.67	1.08	0.65	-0.38	-2.81	2.05	0.76	0.52	-0.19	-1.07	0.69	0.67	0.40	-2.02	2.82	0.74	0.51
	T3	-0.11	-0.98	0.75	0.80	-2.37	-4.84	0.10	0.06	0.35	0.13	-0.74	1.00	0.77	2.42	-0.04	4.88	0.06	0.31
Added sugar	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-

T1	0.32	-0.43	1.07	0.40	0.31	-1.75	2.38	0.77	0.42	-0.32	-1.07	0.43	0.41	-0.29	-2.35	1.77	0.78	0.42
T2	-0.39	-1.29	0.51	0.40	-1.57	-3.79	0.65	0.17	0.31	0.39	-0.51	1.30	0.39	1.60	-0.62	3.81	0.16	0.32
T3	-0.50	-1.50	0.51	0.33	-0.38	-2.62	1.86	0.74	0.73	0.52	-0.49	1.53	0.31	0.38	-1.85	2.62	0.74	0.69

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\*Exposure amount was estimated as the proportion of daily intake to ADI and was categorized into tertiles (T1–T3), with the no intake group as reference. The models were adjusted for age, amount of exercise, sleep quality, total energy intake, and parental education time. \*\*P value reflects the difference between the early and late stages of pubertal growth.

**Table S4. Associations of sweetener consumption with fat mass and fat-free mass among boys, by Tanner stage (n = 654)**

Sweetener	Tanner stage	Fat mass %								Fat-free mass %								P value **	
		I & II				III–V				I & II				III–V					
		Exposure amount*	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value					
Acesulfame-K	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.32	-2.12	2.76	0.80	0.57	-3.92	5.06	0.80	0.84	-0.34	-2.79	2.11	0.79	-0.63	-5.10	3.85	0.78	0.83
	T2	-0.86	-2.29	0.58	0.24	0.77	-3.47	5.01	0.72	0.99	0.86	-0.58	2.30	0.24	-0.66	-4.89	3.58	0.76	0.99
	T3	1.01	-0.36	2.38	0.15	-1.73	-5.95	2.49	0.42	0.36	-1.02	-2.40	0.36	0.15	1.69	-2.52	5.89	0.44	0.37
Aspartame	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.84	-2.07	0.39	0.18	-1.89	-4.18	0.40	0.11	0.38	0.84	-0.39	2.08	0.18	1.79	-0.49	4.08	0.13	0.39
	T2	-1.88	-3.48	-0.28	<b>0.02</b>	-3.33	-5.99	-0.68	<b>0.02</b>	0.53	1.90	0.29	3.50	<b>0.02</b>	3.37	0.71	6.02	<b>0.02</b>	0.51
	T3	-1.19	-2.27	-0.11	<b>0.03</b>	-1.71	-5.55	2.13	0.39	0.93	1.19	0.11	2.27	<b>0.03</b>	1.67	-2.17	5.51	0.40	0.95
Sucralose	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-1.73	-3.17	-0.30	<b>0.02</b>	1.91	-1.30	5.13	0.25	0.59	1.73	0.29	3.18	<b>0.02</b>	-1.84	-5.04	1.36	0.26	0.58
	T2	-1.07	-2.26	0.12	0.08	-1.07	-4.93	2.79	0.59	0.07	1.04	-0.16	2.23	0.09	1.05	-2.80	4.90	0.59	0.07
	T3	0.02	-0.96	1.01	0.96	-1.63	-4.82	1.55	0.32	0.49	-0.01	-1.00	0.98	0.99	1.71	-1.46	4.89	0.29	0.48
Glycyrrhizin	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-1.62	-2.87	-0.36	<b>0.01</b>	-0.81	-4.52	2.91	0.67	<b>0.03</b>	1.65	0.39	2.90	<b>0.01</b>	0.77	-2.92	4.47	0.68	<b>0.03</b>
	T2	-0.69	-1.75	0.37	0.20	-0.26	-11.68	11.16	0.96	0.25	0.73	-0.34	1.80	0.18	0.26	-11.21	11.72	0.97	0.24
	T3	-0.37	-1.60	0.86	0.56	-5.42	-10.34	-0.50	<b>0.03</b>	0.40	0.39	-0.85	1.63	0.54	5.50	0.60	10.39	<b>0.03</b>	0.40
Stevioside	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.01	-1.46	1.45	0.99	12.38	1.46	23.30	<b>0.03</b>	0.99	-0.02	-1.48	1.43	0.98	12.38	1.46	23.30	<b>0.03</b>	0.98
	T2	-0.88	-2.42	0.66	0.26	-1.85	-6.11	2.42	0.40	0.10	0.93	-0.61	2.48	0.24	-1.85	-6.11	2.42	0.40	0.10
	T3	-1.13	-2.88	0.62	0.21	5.69	-13.83	25.21	0.57	0.99	1.11	-0.65	2.87	0.22	5.69	-13.83	25.21	0.57	0.99
Sorbitol	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.70	-0.64	2.04	0.31	-0.54	-5.34	4.26	0.83	0.18	-0.68	-2.03	0.67	0.33	0.54	-4.26	5.34	0.83	0.18
	T2	0.43	-0.69	1.54	0.46	1.83	-2.09	5.76	0.36	0.45	-0.38	-1.51	0.74	0.50	-1.75	-5.68	2.17	0.38	0.45
	T3	-1.58	-2.86	-0.30	<b>0.02</b>	-2.69	-6.60	1.21	0.18	0.43	1.59	0.30	2.87	<b>0.02</b>	2.65	-1.25	6.55	0.19	0.42

<b>Added sugar</b>	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	0.66	-0.41	1.73	0.23	0.07	-3.52	3.67	0.97	0.06	-0.64	-1.72	0.44	0.24	-0.09	-3.68	3.49	0.96	0.06
	T2	-0.37	-1.48	0.74	0.52	-1.15	-5.17	2.87	0.58	0.24	0.39	-0.72	1.50	0.49	1.17	-2.84	5.19	0.57	0.25
	T3	-0.15	-1.16	0.87	0.78	1.65	-2.67	5.96	0.46	0.41	0.18	-0.83	1.20	0.72	-1.62	-5.92	2.68	0.46	0.41

\*Exposure amount was estimated as the proportion of daily intake to ADI and was categorized into tertiles (T1–T3), with the no intake group as reference. The models were adjusted for age, amount of exercise, sleep quality, total energy intake, and parental education time. \*\*P value reflects the difference between early and late Tanner stages.

**Table S5. Associations of sweetener consumption with fat mass and fat-free mass, by obesity group (n = 1893)**

Sweetener	Obesity group	Fat mass %								Fat-free mass %								P value**	
		Obesity				Normal				Obesity				Normal					
		Exposure amount*	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value	β	95% CI	P value					
Acesulfame-K	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-1.72	-5.98	2.54	0.43	0.60	-0.41	1.62	0.24	0.90	1.69	-2.57	5.95	0.44	-0.61	-1.62	0.41	0.24	0.90
	T2	1.36	-3.50	6.22	0.58	-0.95	-1.88	-0.02	<b>0.05</b>	0.24	-1.40	-6.26	3.47	0.57	0.96	0.03	1.89	<b>0.04</b>	0.24
	T3	0.33	-3.46	4.11	0.87	0.11	-0.86	1.08	0.82	0.96	-0.37	-4.15	3.42	0.85	-0.12	-1.09	0.85	0.81	0.94
Aspartame	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.26	-2.81	2.30	0.84	0.26	-0.51	1.03	0.50	0.74	0.26	-2.29	2.82	0.84	-0.28	-1.05	0.49	0.48	0.76
	T2	1.18	-2.03	4.40	0.47	-0.92	-1.72	-0.12	<b>0.02</b>	<b>&lt;0.01</b>	-1.16	-4.38	2.05	0.48	0.93	0.13	1.73	<b>0.02</b>	<b>&lt;0.01</b>
	T3	-2.14	-4.94	0.66	0.14	-0.90	-1.68	-0.11	<b>0.03</b>	0.08	2.14	-0.66	4.94	0.14	0.88	0.09	1.67	<b>0.03</b>	0.09
Sucralose	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	1.22	-1.36	3.80	0.35	0.20	-0.56	0.95	0.60	0.93	-1.23	-3.81	1.35	0.35	-0.18	-0.93	0.58	0.65	0.95
	T2	0.68	-2.53	3.88	0.68	-0.99	-1.75	-0.23	<b>0.01</b>	0.22	-0.72	-3.93	2.49	0.66	0.98	0.22	1.74	<b>0.01</b>	0.22
	T3	-0.26	-3.25	2.73	0.87	-0.56	-1.31	0.20	0.15	0.06	0.23	-2.76	3.22	0.88	0.56	-0.19	1.32	0.14	0.06
Glycyrrhizin	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-2.78	-5.31	-0.24	<b>0.03</b>	-0.22	-1.01	0.56	0.58	<b>&lt;0.01</b>	2.78	0.25	5.31	<b>0.03</b>	0.23	-0.56	1.01	0.57	<b>&lt;0.01</b>
	T2	1.70	-1.21	4.61	0.25	-0.17	-0.91	0.58	0.66	0.09	-1.69	-4.60	1.22	0.26	0.19	-0.56	0.93	0.63	0.09
	T3	-0.61	-3.95	2.73	0.72	-1.18	-1.91	-0.45	<b>&lt;0.01</b>	<b>&lt;0.01</b>	0.60	-2.74	3.94	0.73	1.18	0.46	1.91	<b>&lt;0.01</b>	<b>&lt;0.01</b>
Stevioside	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	-0.19	-4.27	3.88	0.93	0.53	-0.58	1.64	0.35	0.28	0.25	-3.83	4.33	0.90	0.53	-0.58	1.64	0.35	0.26
	T2	-0.08	-4.64	4.48	0.97	-0.94	-2.12	0.24	0.12	0.54	0.04	-4.52	4.60	0.99	-0.94	-2.12	0.24	0.12	0.55
	T3	-4.43	-11.43	2.56	0.22	-0.48	-1.70	0.75	0.44	0.19	4.42	-2.58	11.42	0.22	-0.48	-1.70	0.75	0.44	0.20
Sorbitol	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-



Added sugar	T1	2.35	-0.14	4.83	0.07	0.05	-0.81	0.91	0.91	0.28	-2.36	-4.84	0.13	0.06	-0.05	-0.91	0.81	0.91	0.28
	T2	1.42	-1.35	4.20	0.32	-0.18	-0.90	0.54	0.62	0.37	-1.45	-4.23	1.32	0.31	0.20	-0.52	0.91	0.59	0.35
	T3	0.22	-2.62	3.06	0.88	-0.88	-1.61	-0.15	<b>0.02</b>	<b>&lt;0.01</b>	-0.22	-3.06	2.62	0.88	0.88	0.15	1.61	<b>0.02</b>	<b>&lt;0.01</b>
	0	ref	-	-	-	ref	-	-	-	-	ref	-	-	-	ref	-	-	-	-
	T1	1.40	-1.05	3.84	0.26	0.51	-0.14	1.16	0.13	0.10	-1.43	-3.88	1.01	0.25	-0.50	-1.15	0.15	0.14	0.09
	T2	0.50	-2.31	3.31	0.73	-0.29	-0.95	0.37	0.38	0.85	-0.52	-3.33	2.29	0.72	0.31	-0.35	0.97	0.36	0.87
	T3	-0.84	-3.60	1.93	0.55	-0.51	-1.20	0.17	0.14	0.55	0.81	-1.96	3.58	0.57	0.53	-0.16	1.21	0.13	0.55

\*Exposure amount was estimated as the proportion of daily intake to ADI and was categorized into tertiles (T1–T3), with the no intake group as reference. The models were adjusted for age, amount of exercise, sleep quality, total energy intake, and parental education time. \*\*P value reflects the difference between obesity and nonobesity.