

1 **Table legends**

2 **Table 1. Trends in childhood obesity rate in Japan by sex, 2012–2021**

Sex	Age (years)	Period 1			Period 2			Average APC (%) (95% CI)	
		Years	APC (%)		Years	APC (%)			
Boy	6	2012-2021	3.4	*				3.4 (1.3 to 5.6)	*
	7	2012-2021	4.6	*				4.6 (1.9 to 7.3)	*
	8	2012-2021	4.3	*				4.3 (1.2 to 7.4)	*
	9	2012-2021	4.0	*				4.0 (1.7 to 6.3)	*
	10	2012-2021	2.8	*				2.8 (0.3 to 5.5)	*
	11	2012-2017	-0.8		2017-2021	7.6	*	2.9 (0.2 to 5.6)	*
	12	2012-2017	-1.5		2017-2021	6.7	*	2.1 (0.2 to 4.0)	*
	13	2012-2017	-1.5		2017-2021	8.9	*	3.0 (-0.6 to 6.7)	
	14	2012-2017	-1.1		2017-2021	8.0	*	2.8 (0.2 to 5.6)	*
Girl	6	2012-2021	2.5	*				2.5 (0.9 to 4.2)	*
	7	2012-2017	-0.8		2017-2021	8.6	*	3.3 (0.0 to 6.7)	
	8	2012-2018	1.1		2018-2021	10.3		4.0 (0.6 to 7.6)	*
	9	2012-2021	2.0	*				2.0 (0.5 to 3.6)	*
	10	2012-2018	-0.1		2018-2021	7.0		2.2 (-0.4 to 4.9)	
	11	2012-2015	-2.5		2015-2021	2.6	*	0.9 (0.1 to 1.6)	*
	12	2012-2017	-0.9		2017-2021	2.8		0.7 (-0.8 to 2.3)	
	13	2012-2018	-1.1		2018-2021	5.0	*	0.9 (-0.3 to 2.1)	
	14	2012-2021	0.6					0.6 (-0.6 to 1.9)	

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4 * Significantly different from zero ($p<0.05$).

5 APC, annual percentage change; CI, confidential.

6 The study period was separated into Periods 1 and 2 when the trend changes were statistically
7 detected in the joinpoint regression analysis during the study period.

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Table 2. Trends in the total score of national physical fitness test and exercise time per week by sex, 2012–2021

Sex	Age (years)	Period 1			Period 2			Average APC (%) (95% CI)	
		Years	APC (%)		Years	APC (%)			
Fitness score test									
Boy	10	2012-2018	0.1		2018-2021	-1.0	*	-0.3 (-0.4 to -0.1)	*
	13	2012-2018	0.1		2018-2021	-0.8		-0.2 (-0.5 to 0.1)	
Girl	10	2012-2018	0.4	*	2018-2021	-0.7	*	0.0 (-0.1 to 0.2)	
	13	2012-2018	0.7	*	2018-2021	-1.2	*	0.1 (-0.2 to 0.4)	
Exercise test									
Boy	10	2013-2017	0.3		2017-2021	-3.9	*	-1.9 (-2.4 to -1.3)	*
	13	2013-2017	1.6		2017-2021	-6.9	*	-2.8 (-3.7 to -1.8)	*
Girl	10	2013-2016	5.8		2016-2021	-2.4		0.6 (-1.3 to 2.4)	
	13	2013-2017	3.4	*	2017-2021	-7.5	*	-2.2 (-3.1 to -1.3)	*

* Significantly different from zero ($p < 0.05$).

APC, annual percentage change; CI, confidential

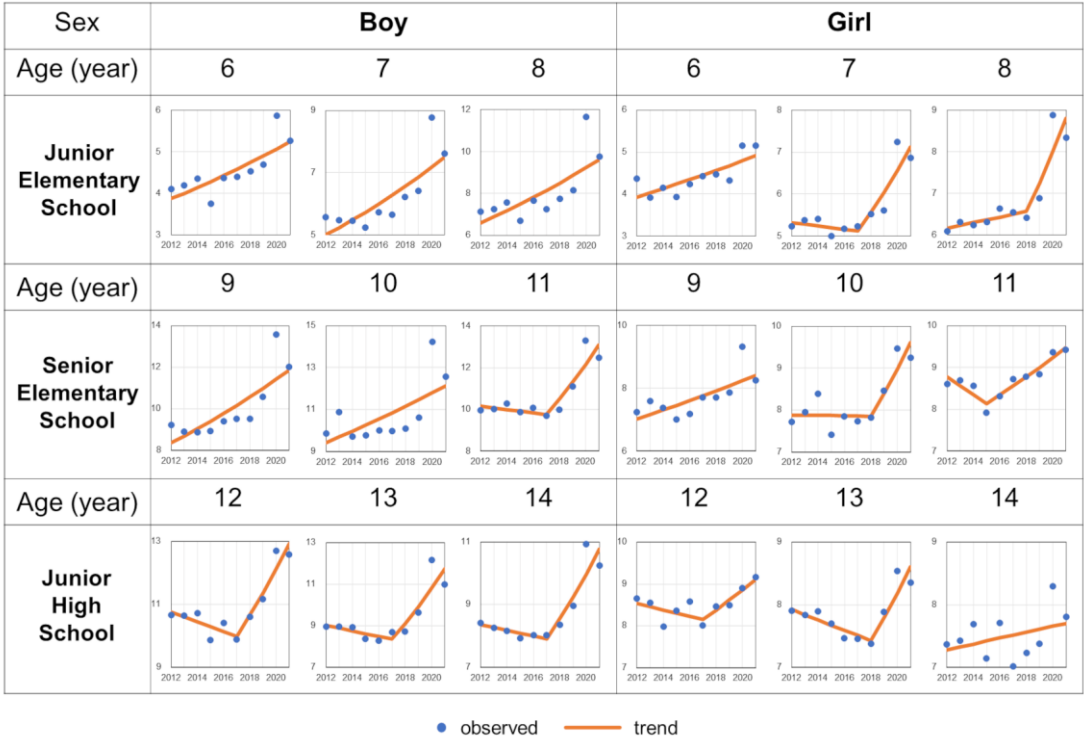
Physical fitness test data were covered from 2012 to 2021, whereas exercise time data were available from 2013 to 2021.

The study period was separated into Periods 1 and 2 when the trend changes were statistically detected in the joinpoint regression analysis during the study period.

Figure legends

Figure 1. Trends in childhood obesity rates in Japan by sex, 2012–2021

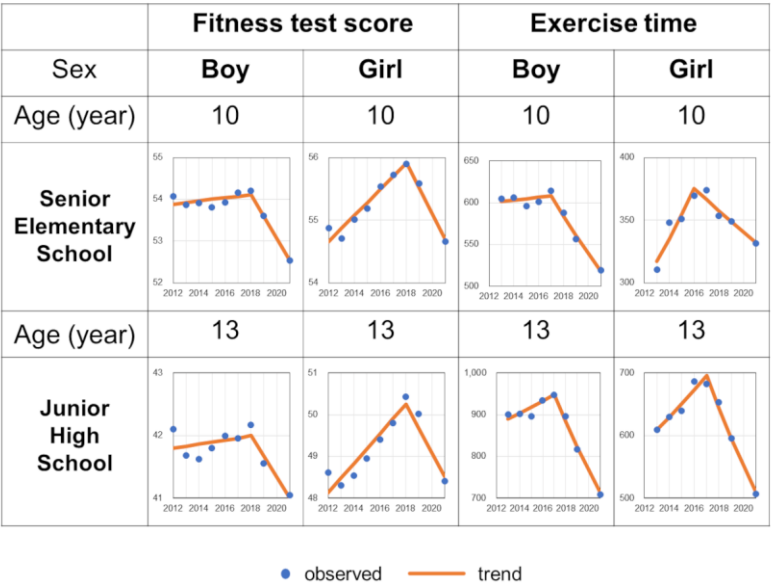
Figure 1. Trends in childhood obesity rate in Japan by sex, 2012-2021



Regarding the 10-year trend for boys, almost all groups demonstrated statistical increases in AAPCs. In the late 2010s, while JE and SE boys had monotonically increasing APCs (2.8–4.3%), JH boys showed a significant increase, with APCs ranging from 6.7–8.9%. Significant increases in AAPCs were observed in JE (2.5–4.0%) and SE (0.9–2.2%) girls, but not in JH girls. In the late 2010s, increases in APC trends were also detected in girls, with APCs ranging from 2.6–8.6%.

Figure 2. Trends in the score of physical fitness test from 2012 to 2021, and the exercise time per week from 2013 to 2021 in Japan by sex

Figure 2. Trends in the score of physical fitness test from 2012 to 2021, and the exercise time per week from 2013 to 2021 in Japan by sex



After 2018, the APCs of the total score on the national physical fitness test decreased significantly among 10-year-old boys, 10-year-old girls, and 13-year-old girls. The length of exercise time per week, excluding physical educational time, in 2021 compared to that in 2013 decreased in all groups except the 10-year-old girls. The AAPCs of exercise time exhibited decreasing trends for all girls, except 10-year-old girls.

Support Information

Title: Trends in childhood obesity in Japan: A nationwide observational study from 2012 to 2021

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Table S1

The formula for calculating standard weight is as follows:

Standard weight (kg) = A × Height (cm) - B

Boy			Girl		
age	A	B	age	A	B
6	0.461	32.382	6	0.458	32.079
7	0.513	38.878	7	0.508	38.367
8	0.592	48.804	8	0.561	45.006
9	0.687	61.39	9	0.652	56.992
10	0.752	70.461	10	0.730	68.091
11	0.782	75.106	11	0.803	78.846
12	0.783	75.642	12	0.796	76.934
13	0.815	81.348	13	0.655	54.234
14	0.832	83.695	14	0.594	43.264
15	0.766	70.989	15	0.560	37.002
16	0.656	51.822	16	0.578	39.057

Table S3

Score table for 10 year old boys								
Points	Grip strength (kg)	Sit-ups (per min)	Anteflexion in sitting (cm)	Side-to-side jump (per min)	Twenty-meter shuttle run	Fifty-meter dash (sec)	Standing broad jump (cm)	Softball throw (m)
10	26 ≥	26 ≥	49 ≥	50 ≥	80 ≥	8.0 ≥	192 ≥	40 ≥
9	23-25	23-25	43-38	46-49	69-79	8.1-8.4	180-191	35-39
8	20-22	20-22	38-42	42-45	57-68	8.5-8.8	168-179	30-34
7	17-19	18-19	34-37	38-41	45-56	8.9-9.3	156-167	24-29
6	14-16	15-17	30-33	34-37	33-44	9.4-9.9	143-155	18-23
5	11-13	12-14	27-29	30-33	23-32	10.0-10.6	130-142	13-17
4	9-10	9-11	23-26	26-29	15-22	10.7-11.4	117-129	10-12
3	7-8	6-8	19-22	22-25	10-14	11.5-12.2	105-116	7-9
2	5-6	3-5	15-18	18-21	8-9	12.2-13.0	93-104	5-6
1	≤ 4	≤ 2	≤ 14	≤ 17	≤ 7	13.1 ≤	≤ 92	≤ 4

Score table for 10 year old girls								
Points	Grip strength (kg)	Sit-ups (per min)	Anteflexion in sitting (cm)	Side-to-side jump (per min)	Twenty-meter shuttle run	Fifty-meter dash (sec)	Standing broad jump (cm)	Softball throw (m)
10	25 ≥	23 ≥	52 ≥	64 ≥	64 ≥	8.3 ≥	181 ≥	25 ≥
9	22-24	20-22	46-51	54-63	54-63	8.4-8.7	170-180	21-24
8	19-21	18-19	41-45	44-53	44-53	8.8-9.1	160-169	17-20
7	16-18	16-17	37-40	35-43	35-43	9.2-9.6	147-159	14-16
6	13-15	14-15	33-36	32-35	26-34	9.7-10.2	134-146	11-113
5	11-12	12-13	29-32	28-31	19-25	10.3-10.9	121-133	8-10
4	9-10	9-11	25-28	25-27	14-18	11.0-11.6	109-120	6-7
3	7-8	6-8	21-24	21-24	10-13	11.7-12.4	98-108	5
2	4-6	3-5	18-20	17-20	8-9	12.5-13.2	85-97	4
1	≤ 3	≤ 2	≤ 17	≤ 16	≤ 7	13.3 ≤	≤ 84	≤ 3

Evaluation	A	B	C	D	E
Total score	65 ≧	58-64	50-57	42-49	≧ 41

* Either long-distance run or 20-meter shuttle run is performed. Long-distance run is 1500 meter run for boys and 1000 meter run for girls.

Score table for 13 year old boys

Points	Grip strength (kg)	Sit-ups (per min)	Anteflexion in sitting (cm)	Side-to-side jump (per min)	Twenty-meter shuttle run	Fifty-meter dash (sec)	Standing broad jump (cm)	Softball throw (m)	Handball throw(m)
10	56 ≧	35 ≧	64 ≧	63 ≧	≧ 459"	125 ≧	6.6 ≧	265 ≧	37 ≧
9	51-55	33-34	58-63	60-62	5'00"-5'16"	113-124	6.7-6.8	254-264	34-36
8	47-50	30-32	53-57	56-59	5'17"-5'33"	102-112	6.9-7.0	242-253	31-33
7	43-46	27-29	49-52	53-55	5'34"-5'55"	90-101	7.1-7.2	230-241	28-30
6	38-42	25-26	44-48	49-52	5'16"-6'22"	76-89	7.3-7.5	219-229	25-27
5	33-37	22-24	39-43	45-48	6'23"-6'50"	63-75	7.6-7.9	203-217	22-24
4	28-32	19-21	33-38	41-44	6'51"-7'30"	51-62	8.0-8.4	188-202	19-21
3	23-27	16-18	28-32	37-40	7'31"-8'19"	37-50	8.5-9.0	170-187	16-18
2	18-22	13-15	21-27	30-36	8'20"-9'20"	26-36	9.1-9.7	150-169	13-15
1	≧ 17	12	≧ 20	≧ 29	9'21" ≧	≧ 25	9.8 ≧	≧ 149	≧ 12

Score table for 13 year old girls

Points	Grip strength (kg)	Sit-ups (per min)	Anteflexion in sitting (cm)	Side-to-side jump (per min)	Twenty-meter shuttle run	Fifty-meter dash (sec)	Standing broad jump (cm)	Softball throw (m)	Handball throw(m)
10	36 ≧	29 ≧	63 ≧	53 ≧	≧ 349"	88 ≧	7.7 ≧	210 ≧	23 ≧
9	33-35	26-28	58-62	50-52	3'50"-4'02"	76-87	7.8-8.0	200-209	20-22
8	30-32	23-25	54-57	48-49	4'03"-4'19"	64-75	8.1-8.3	190-199	18-19
7	28-29	20-22	50-53	45-47	4'20"-4'37"	54-63	8.4-8.6	179-189	16-17
6	25-27	18-19	45-49	42-44	4'38"-4'56"	44-53	8.7-8.9	168-178	14-15
5	23-24	15-17	40-44	39-41	4'57"-5'18"	35-43	9.0-9.3	157-167	12-13
4	20-22	13-14	35-39	36-38	5'19"-5'42"	37-34	9.4-9.8	145-156	11
3	17-19	11-12	30-34	32-35	5'43"-6'14"	21-26	9.9-10.3	132-144	10
2	14-16	8-10	23-29	27-31	6'15"-6'57"	15-20	10.4-11.2	118-131	8-9
1	≧ 13	≧ 7	≧ 22	≧ 26	6'58" ≧	≧ 14	11.3 ≧	≧ 117	≧ 7

Evaluation	A	B	C	D	E
Total score	57 ≧	47-56	37-46	27-36	≧ 26

Table S4 Detailed values for the obesity rate according to age and sex from 2012 to 2021

(%)

Boy		age								
		6	7	8	9	10	11	12	13	14
year	2012	4.09	5.58	7.13	9.24	9.86	9.98	10.67	8.96	8.43
	2013	4.18	5.47	7.26	8.90	10.90	10.02	10.65	8.97	8.27
	2014	4.34	5.45	7.57	8.89	9.72	10.28	10.72	8.94	8.16
	2015	3.74	5.24	6.70	8.93	9.77	9.87	9.87	8.37	7.94
	2016	4.35	5.74	7.65	9.41	10.01	10.08	10.42	8.28	8.04
	2017	4.39	5.65	7.24	9.52	9.99	9.69	9.89	8.69	8.03
	2018	4.51	6.23	7.76	9.53	10.11	10.01	10.60	8.73	8.36
	2019	4.68	6.41	8.16	10.57	10.63	11.11	11.18	9.63	8.96
	2020	5.85	8.77	11.67	13.58	14.24	13.31	12.71	12.18	10.94
	2021	5.25	7.61	9.75	12.03	12.58	12.48	12.58	10.99	10.25

(%)

Girl		age								
		6	7	8	9	10	11	12	13	14
year	2012	4.37	5.23	6.09	7.23	7.73	8.61	8.64	7.90	7.36
	2013	3.91	5.38	6.31	7.58	7.96	8.69	8.54	7.83	7.42
	2014	4.15	5.41	6.24	7.36	8.40	8.56	7.97	7.89	7.68
	2015	3.93	5.00	6.31	6.99	7.42	7.92	8.36	7.69	7.14
	2016	4.24	5.18	6.63	7.17	7.86	8.31	8.57	7.46	7.70
	2017	4.42	5.24	6.55	7.70	7.74	8.72	8.01	7.45	7.01
	2018	4.47	5.53	6.41	7.69	7.82	8.79	8.45	7.37	7.22
	2019	4.33	5.61	6.88	7.85	8.46	8.84	8.48	7.88	7.37
	2020	5.16	7.25	8.89	9.32	9.47	9.36	8.89	8.53	8.29
	2021	5.15	6.87	8.34	8.24	9.26	9.42	9.15	8.35	7.80