

Title: Updates to Pediatric Hypertension Guidelines: Influence on Classification of High Blood Pressure in Children and Adolescents

Short title: Pediatric hypertension guideline

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Table S1. Demographic characteristics of Chinese children and adolescents by sex (n = 50,336)

Age, years	N	SBP, mmHg	DBP, mmHg	Height, cm	Weight, kg	BMI, kg/m ²	BMI group		
							Thinness	Overweight	Obesity
Boys									
6	2,277	96.0±10.3	61.1±8.4	121.4±5.4	24.5±5.4	16.5±2.8	254(11.2)	314(13.8)	223(9.8)
7	3,095	98.9±10.4	63.0±8.2	127.1±5.8	27.3±6.0	16.8±2.8	290(9.4)	465(15.0)	313(10.1)
8	3,216	101.2±10.7	65.0±8.2	132.5±6.0	31.0±7.7	17.5±3.3	254(7.9)	556(17.3)	371(11.5)
9	3,168	103.6±11.2	66.0±8.4	137.5±6.5	34.6±8.8	18.1±3.5	231(7.3)	629(19.9)	370(11.7)
10	2,877	105.6±11.3	67.2±8.7	142.8±7.1	38.9±10.3	18.9±3.7	203(7.1)	675(23.5)	294(10.2)
11	874	107.1±11.1	67.7±8.2	146.4±7.4	41.5±11.2	19.1±4.0	76(8.7)	184(21.1)	78(8.9)
12	2,405	107.8±12.1	67.9±8.9	156.6±8.6	49.4±13.2	20.0±4.1	163(6.8)	505(21.0)	233(9.7)
13	2,799	110.9±11.3	68.5±8.5	162.1±8.4	53.9±13.9	20.4±4.1	195(7.0)	531(19.0)	239(8.5)
14	879	112.5±11.5	69.4±8.5	165.2±7.4	54.9±12.0	20.7±3.7	76(8.6)	106(12.1)	45(5.1)
15	1,699	112.7±11.7	69.6±8.0	170.5±6.3	61.1±13.7	21.0±4.1	177(10.4)	258(15.2)	116(6.8)
16	1,709	114.5±11.6	71.7±7.9	172.2±6.2	63.8±13.3	21.5±4.1	212(12.4)	274(16.0)	104(6.1)
17	560	116.0±10.3	72.7±8.1	172.9±5.9	64.5±13.9	21.6±4.3	84(15.0)	73(13.0)	37(6.6)
Total	25,558	105.5±12.5	66.5±8.8	145.8±18.2	41.6±16.8	18.8±4.0	2215(8.7)	4570(17.9)	2423(9.5)
Girls									
6	2,154	94.6±10.1	60.4±8.3	120.3±5.2	22.8±4.4	15.7±2.4	299(13.9)	255(11.8)	110(5.1)
7	2,879	97.0±10.3	62.0±8.1	125.9±5.5	25.4±5.3	16.0±2.6	436(15.1)	314(10.9)	162(5.6)
8	2,876	99.0±10.4	63.8±8.2	131.8±6.2	28.8±6.2	16.5±2.6	367(12.8)	424(14.7)	143(5.0)
9	2,912	101.8±11.1	65.2±8.3	137.4±6.8	32.4±7.4	17.0±2.8	382(13.1)	463(15.9)	126(4.3)
10	2,417	104.7±10.9	66.2±8.6	144.0±7.4	37.2±8.9	17.8±3.1	271(11.2)	390(16.1)	109(4.5)
11	725	106.3±11.2	66.6±8.8	149.5±7.5	41.6±10.1	18.4±3.4	85(11.7)	109(15.0)	30(4.1)
12	2,587	106.6±11.3	66.7±8.2	155.6±6.4	46.7±10.3	19.2±3.5	287(11.1)	364(14.1)	111(4.3)
13	2,643	106.9±11.0	67.5±8.2	157.7±5.7	49.3±9.6	19.7±3.4	278(10.5)	373(14.1)	72(2.7)
14	829	107.3±10.7	67.7±8.1	158.1±5.8	50.4±9.2	20.1±3.3	90(10.9)	76(9.2)	26(3.1)
15	2,087	107.9±10.6	67.9±7.6	159.8±5.5	52.7±8.9	20.6±3.2	236(11.3)	203(9.7)	49(2.3)
16	2,089	108.2±10.9	68.1±7.7	160.1±5.6	53.9±9.9	21.0±3.5	321(15.4)	222(10.6)	70(3.4)
17	580	108.7±10.7	68.9±7.7	160.0±5.4	54.8±10.4	21.4±3.7	93(16.0)	68(11.7)	22(3.8)
Total	24,778	102.8±11.6	65.5±8.5	144.0±15.4	39.0±13.8	18.2±3.6	3145(12.7)	3261(13.2)	1030(4.2)

Abbreviations: N, sample size; SBP, systolic blood pressure; DBP, diastolic blood pressure; BMI, body mass index.

Notes: Values are mean ± SD or n (%).

Table S2. Differences in HBP prevalence among children and adolescents using the Fourth Report and CPG definitions

Age	N	Fourth Report	CPG	Difference*	P*
Boys					
6	2,277	7.2(6.2,8.3)	11.0(9.8,12.4)	3.8(2.2,5.5)	<0.001
7	3,095	9.8(8.7,10.9)	13.3(12.2,14.6)	3.6(2.0,5.2)	<0.001
8	3,216	12.2(11.1,13.4)	18.5(17.2,19.9)	6.3(4.5,8.0)	<0.001
9	3,168	13.3(12.1,14.5)	20.9(19.4,22.3)	7.6(5.7,9.4)	<0.001
10	2,877	12.8(11.6,14.1)	23.4(21.8,25.0)	10.5(8.6,12.5)	<0.001
11	874	12.6(10.5,15.0)	23.3(20.5,26.2)	10.7(7.1,14.3)	<0.001
12	2,405	8.4(7.3,9.6)	18.6(17.0,20.2)	10.2(8.3,12.1)	<0.001
13	2,799	9.6(8.5,10.7)	9.5(8.4,10.7)	-0.1(-1.6,1.5)	0.926
14	879	10.4(8.4,12.6)	11.5(9.5,13.8)	1.2(-1.7,4.1)	0.430
15	1,699	5.9(4.8,7.1)	10.6(9.2,12.2)	4.7(2.9,6.6)	<0.001
16	1,709	6.8(5.7,8.1)	14.2(12.6,16.0)	7.4(5.3,9.4)	<0.001
17	560	6.3(4.4,8.6)	14.8(12.0,18.0)	8.6(5.0,12.1)	<0.001
Girls					
6	2,154	7.3(6.2,8.5)	9.2(8.0,10.5)	1.9(0.2,3.5)	0.025
7	2,879	8.3(7.4,9.4)	10.3(9.2,11.5)	2.0(0.5,3.5)	0.009
8	2,876	10.7(9.6,11.9)	13.5(12.3,14.8)	2.8(1.1,4.5)	0.001
9	2,912	13.0(11.8,14.3)	17.2(15.9,18.6)	4.2(2.4,6.0)	<0.001
10	2,417	15.7(14.3,17.2)	23.7(22.0,25.4)	8.0(5.8,10.2)	<0.001
11	725	13.8(11.4,16.5)	25.0(21.9,28.3)	11.2(7.1,15.2)	<0.001
12	2,587	8.1(7.1,9.2)	15.1(13.8,16.6)	7.0(5.3,8.8)	<0.001
13	2,643	7.8(6.8,8.9)	5.8(4.9,6.7)	-2.1(-3.4,-0.7)	0.003
14	829	6.9(5.2,8.8)	6.2(4.6,8.0)	-0.7(-3.1,1.7)	0.555
15	2,087	3.1(2.4,4.0)	3.5(2.8,4.4)	0.4(-0.7,1.5)	0.436
16	2,089	2.2(1.6,2.9)	3.8(3.0,4.7)	1.6(0.6,2.7)	0.002
17	580	3.3(2.0,5.1)	5.0(3.4,7.1)	1.7(-0.6,4.0)	0.140

Note: * indicate the HBP prevalence gap calculated by using CPG and Fourth Report and examined by Cochran's Q test.

Table S3. The odds ratios of HBP with BMI groups and height groups in both sexes of two age groups using CPG and the Fourth Report definitions

Variables	6-12 years		13-17 years	
	CPG	Fourth Report	CPG	Fourth Report
Boys				
BMI groups				
Thinness	0.58(0.46,0.72)	0.55(0.42,0.73)	0.49(0.29,0.83)	0.46(0.24,0.88)
Normal	ref	ref	ref	ref
Overweight	2.08(1.86,2.33)	1.97(1.71,2.27)	2.76(2.24,3.39)	2.53(1.99,3.22)
Obesity	3.74(3.28,4.26)	3.84(3.29,4.48)	6.26(5.26,7.26)	6.48(5.48,7.48)
Height groups				
Low	1.10(0.61,2.01)	1.36(0.74,2.50)	0.56(0.17,1.85)	0.93(0.36,2.36)
Low-Medium	1.10(0.89,1.36)	1.25(0.99,1.59)	1.08(0.76,1.53)	1.14(0.78,1.67)
Medium	ref	ref	ref	ref
High-Medium	1.00(0.86,1.17)	0.89(0.73,1.08)	1.02(0.74,1.39)	1.19(0.84,1.71)
High	1.42(1.10,1.83)	1.32(0.96,1.81)	1.21(0.60,2.46)	1.07(0.46,2.48)
Girls				
BMI groups				
Thinness	0.63(0.52,0.77)	0.58(0.46,0.73)	0.49(0.26,0.94)	0.61(0.33,1.10)
Normal	ref	ref	ref	ref
Overweight	1.77(1.56,2.02)	1.79(1.55,2.07)	2.23(1.67,2.98)	2.29(1.71,3.07)
Obesity	3.01(2.51,3.61)	3.18(2.60,3.89)	7.62(6.62,8.62)	7.70(6.70,8.70)
Height groups				
Low	1.23(0.68,2.21)	1.35(0.73,2.48)	0.98(0.39,2.49)	0.99(0.42,2.34)
Low-Medium	1.16(0.92,1.47)	1.12(0.86,1.45)	0.78(0.51,1.19)	0.86(0.57,1.31)
Medium	ref	ref	ref	ref
High-Medium	1.27(1.08,1.51)	1.15(0.95,1.40)	0.98(0.57,1.71)	0.80(0.43,1.51)
High	1.45(1.07,1.97)	1.07(0.74,1.54)	3.07(2.07,4.07)	2.01(1.01,3.01)
Both Sexes				
BMI groups				
Thinness	0.60(0.52,0.69)	0.57(0.48,0.68)	0.49(0.32,0.73)	0.53(0.35,0.83)
Normal	ref	ref	ref	ref
Overweight	1.96(1.80,2.13)	1.87(1.69,2.07)	2.57(2.18,3.04)	2.44(2.03,2.93)
Obesity	3.53(3.18,3.92)	3.49(3.09,3.93)	6.46(5.25,7.95)	6.72(5.36,8.43)
Height groups				
Low	1.18(0.78,1.79)	1.38(0.90,2.11)	1.53(0.78,2.99)	1.71(0.95,3.06)
Low-Medium	1.13(0.97,1.32)	1.19(1.00,1.42)	1.33(1.04,1.71)	1.36(1.05,1.76)
Medium	ref	ref	ref	ref
High-Medium	1.12(1.00,1.26)	1.00(0.87,1.15)	0.73(0.58,0.93)	0.80(0.61,1.05)
High	1.46(1.20,1.78)	1.21(0.96,1.54)	0.84(0.48,1.50)	0.71(0.36,1.39)

Note: The ORs adjusting for age, regions, rural/urban areas, height (only in BMI groups), birth weight, breastfeeding, delivery ways, gestational age, family hypertension history and household economic level. The ORs in BMI groups and height groups were calculated based on the normal weight group and medium height group respectively after adjusting for the confounders above.

Table S4. The interaction of odds ratios of HBP with BMI and height in different height groups and BMI groups in both sexes of two age groups using the CPG and Fourth Report definitions

Variables	6-12 years		13-17 years	
	CPG	Fourth Report	CPG	Fourth Report
Boys				
HBP*Height(in BMI groups)				
Thinness	1.01(0.97,1.05)	1.05(0.95,1.14)	1.01(0.97,1.06)	1.08(0.91,1.21)
Normal	1.01(1.00,1.02)	1.20(1.14,1.27)	1.04(1.02,1.06)	1.26(1.16,1.37)
Overweight	1.02(1.01,1.04)	1.14(1.03,1.27)	1.04(1.02,1.07)	1.22(1.05,1.41)
Obesity	1.01(0.99,1.03)	1.05(1.01,1.10)	1.10(1.06,1.14)	1.15(1.05,1.25)
HBP*BMI(in Height groups)				
Low	1.26(1.02,1.54)	1.19(0.98,1.44)	1.30(1.05,1.55)	1.41(1.17,1.58)
Low-Medium	1.11(1.02,1.19)	1.14(1.04,1.25)	1.19(1.12,1.27)	1.20(1.13,1.29)
Medium	1.17(1.15,1.19)	1.17(1.15,1.20)	1.18(1.15,1.21)	1.17(1.14,1.20)
High-Medium	1.18(1.15,1.22)	1.16(1.13,1.20)	1.27(1.20,1.34)	1.26(1.19,1.34)
High	1.12(1.08,1.18)	1.13(1.07,1.19)	1.21(1.05,1.39)	1.16(1.02,1.32)
Girls				
HBP*Height(in BMI groups)				
Thinness	1.01(0.98,1.04)	1.05(0.93,1.16)	1.01(0.91,1.11)	0.91(0.77,1.11)
Normal	1.02(1.01,1.03)	1.11(1.05,1.17)	1.03(1.01,1.06)	1.20(1.09,1.31)
Overweight	1.03(1.01,1.04)	1.13(1.01,1.26)	1.03(0.99,1.08)	1.15(0.97,1.36)
Obesity	1.03(0.99,1.06)	0.96(0.91,1.02)	1.07(1.00,1.14)	1.17(1.00,1.37)
HBP*BMI(in Height groups)				
Low	1.57(1.32,1.82)	1.66(1.40,2.01)	1.35(1.10,1.65)	1.37(1.16,1.61)
Low-Medium	1.09(1.02,1.16)	1.07(1.00,1.14)	1.17(1.08,1.27)	1.19(1.10,1.28)
Medium	1.13(1.11,1.16)	1.13(1.11,1.16)	1.19(1.15,1.23)	1.20(1.16,1.24)
High-Medium	1.11(1.08,1.15)	1.12(1.08,1.16)	1.38(1.21,1.58)	1.34(1.17,1.53)
High	1.09(1.03,1.16)	1.15(1.07,1.23)	0.80(0.56,1.15)	0.90(0.66,1.25)
Total				
HBP*Height(in BMI groups)				
Thinness	1.01(0.99,1.04)	0.98(0.72,1.32)	1.05(1.01,1.09)	0.81(0.56,1.18)
Normal	1.02(1.01,1.02)	1.15(1.11,1.20)	1.06(1.05,1.07)	1.20(1.13,1.28)
Overweight	1.02(1.01,1.04)	1.14(1.05,1.23)	1.06(1.04,1.08)	1.16(1.04,1.29)
Obesity	1.01(1.00,1.03)	1.02(0.99,1.06)	1.09(1.06,1.11)	1.16(1.08,1.24)
HBP*BMI(in Height groups)				
Low	1.27(1.10,1.46)	1.24(1.08,1.43)	1.24(1.09,1.40)	1.27(1.12,1.43)
Low-Medium	1.09(1.04,1.15)	1.10(1.05,1.16)	1.18(1.12,1.23)	1.19(1.13,1.25)
Medium	1.16(1.14,1.17)	1.15(1.14,1.17)	1.18(1.16,1.20)	1.18(1.16,1.20)
High-Medium	1.15(1.13,1.18)	1.13(1.11,1.16)	1.29(1.23,1.35)	1.27(1.21,1.34)
High	1.12(1.08,1.16)	1.13(1.09,1.18)	1.11(0.99,1.26)	1.07(0.94,1.21)

Note: the ORs adjusting for age, regions, rural/urban areas, height (only in BMI groups), birth weight, breastfeeding, delivery ways, gestational age, family hypertension history and household economic level. The ORs of HBP with BMI and height in different height groups and BMI groups were calculated based on continuous variables of BMI and height, respectively.

Table S5. The prevalence of HBP in different height and BMI groups in both sexes of two age groups using the CPG and Fourth Report definitions, %

BMI Groups	Height Groups	6-12 years		13-17 years		Total	
		CPG	Fourth Report	CPG	Fourth Report	CPG	Fourth Report
Boys							
Normal	Low	13.3	9.5	5.3	4.3	10.1	7.4
	Medium	13.1	6.0	7.6	5.2	11.4	5.8
	High	14.8	5.4	10.4	9.4	13.8	6.3
OW&OB	Low	24.5	15.0	19.6	20.1	21.5	18.1
	Medium	28.9	15.4	23.4	17.8	27.2	16.2
	High	32.7	15.3	31.5	25.5	32.5	16.7
Girls							
Normal	Low	13.3	7.4	2.8	2.9	7.5	4.9
	Medium	11.9	6.6	3.7	3.4	9.2	5.5
	High	15.4	7.2	4.4	3.3	13.8	6.6
OW&OB	Low	18.4	10.5	9.2	14.1	14.1	13.3
	Medium	25.3	15.6	11.8	13.3	20.8	14.8
	High	27.4	15.9	16.5	18.3	26.5	16.1
Total							
Normal	Low	13.3	8.5	3.7	3.4	8.6	6.0
	Medium	12.5	6.3	5.6	4.3	10.2	5.6
	High	15.1	6.3	8.1	7.0	13.8	6.5
OW&OB	Low	22.0	13.1	14.8	16.4	17.1	15.4
	Medium	27.4	15.5	18.5	15.9	24.6	15.6
	High	30.7	15.5	27.9	23.8	30.3	16.5

Note: OW&OB, overweight and obesity. Height Groups were classified as a sex-and age-specific height z-score of -1.0 and 1.0 of z-scores into three groups (Low, Medium and High), respectively.

Table S6. Height Z-Score of children and adolescents aged 6-17 years

Age, years	Boys	Girls	Total
6	0.25	0.26	0.25
7	0.35	0.35	0.35
8	0.41	0.32	0.37
9	0.27	0.27	0.27
10	0.25	0.38	0.31
11	0.10	0.19	0.14
12	0.39	0.07	0.23
13	0.28	-0.19	0.05
14	-0.22	-0.45	-0.33
15	-0.15	-0.51	-0.35
16	-0.32	-0.39	-0.36
17	-0.38	-0.46	-0.42
Total	0.22	0.07	0.15

Note: the sex- and age-specific height Z-Scores were calculated based on the references in the CDC Growth Charts (www.cdc.gov/growthcharts).

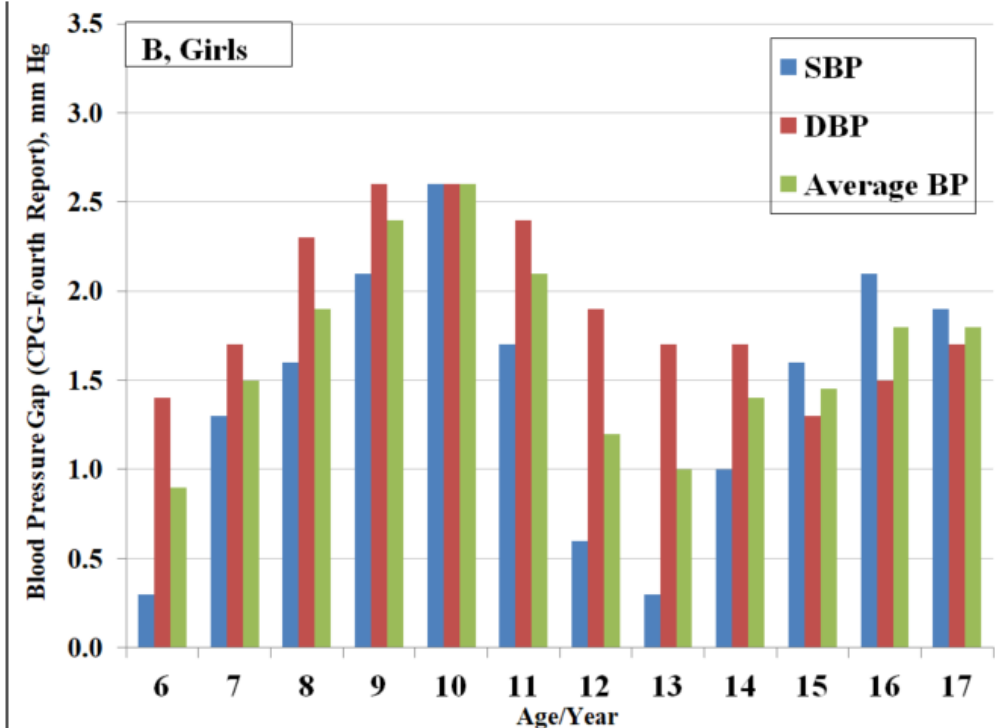
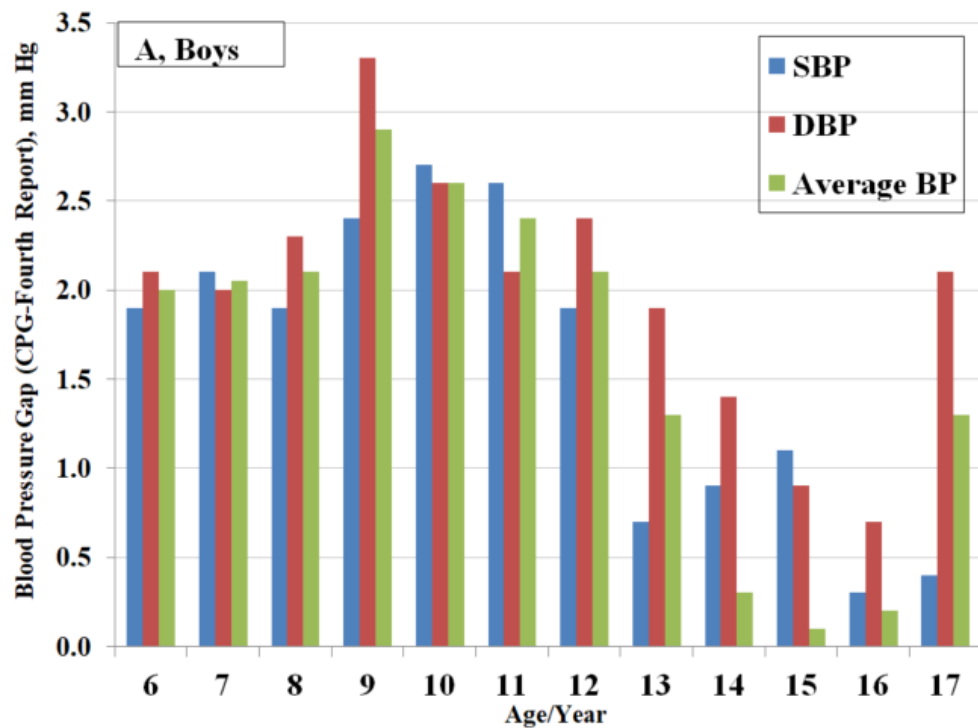


Figure S1. The differences of systolic BP and diastolic BP reference values (P95) between CPG and the Fourth Report across age groups in boys and girls

Note: The age-, sex- and height-specific reference values (P95) of systolic BP (SBP), diastolic BP (DBP) were compared between CPG and the Fourth Report based on the definition tables in two guidelines. The average sex- and age-specific BP reference difference values (Blue bars for SBP; red bars for DBP; green bars for average difference values of SBP and DBP) were presented in the figure.