

Clinical assessment of pubertal progress

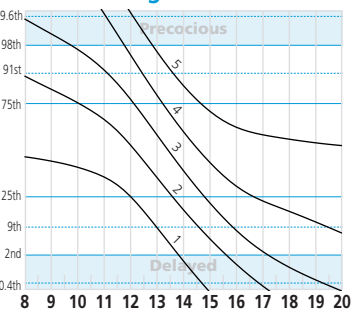
Tanner stage assessment requires considerable expertise; so unless you have been adequately trained you should use the "puberty phases" approach (see chart instructions over). For a detailed description of each stage consult a standard paediatric reference book (see www.growthcharts.rcpch.ac.uk for further information).

Assessment by clinical examination should be undertaken only with parental and child consent and with adequate privacy.

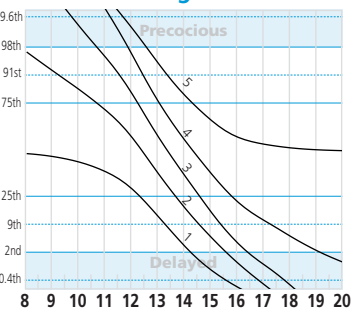
The charts below show the age ranges for each of the five Tanner stages of genital and pubic hair development, and mean testicular volumes using the Prader orchidometer.

Once the Tanner stage has been determined, make a small dot on the relevant stage line at the child's age. The horizontal dotted lines show the stage centiles for age. If the point is between the 2nd and 98th centiles then development is within normal limits. If the point is above the 98th centile development is precocious, and if below the 2nd centile it is delayed. In these cases further investigation may be required. Please note that unlike height and weight centiles, the stage centile position may change substantially from one age to the next.

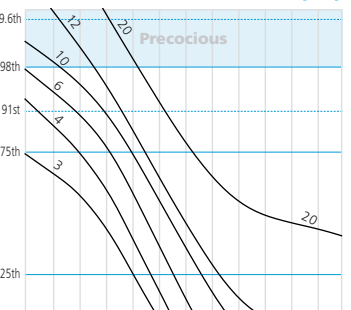
Genital stage



Pubic hair stage



Mean testicular volume (ml)



Van Buuren S. Growth charts of human development; Statistical Methods in Medical Research. DOI: 10.1177/0962280212473300

BOYS UK 2-20yr

Childhood and puberty close monitoring (CPCM) growth chart



This chart is mainly intended for use in children and young people whose growth requires close monitoring, or whose measurements are outside the usual centile range. It is based on the UK 1990 growth reference from 4-20 years and at birth, and the WHO growth standard from 2-4 years (as per the UK-WHO 0-4 years charts). For children aged under 2 years whose growth needs detailed assessment, the neonatal and infant close monitoring chart (NICM) is available. This 2-20 chart has a number of novel features including some puberty phase specific centile lines. For further information about the development of this chart and supporting references see www.growthcharts.rcpch.ac.uk.

Birth centile plotting scale

The chart starts at age 2 years, but there is a scale to the left of the chart where birth weight, length and head circumference for term infants can be plotted.

Children with extremes of height or weight

In addition to the usual nine centile lines, the height charts also show lines -4 and -5 SD below and +4 SD above the mean. The additional weight lines are -4, -5, and +3 SD respectively. Children whose growth lies on these outer lines are likely to have additional clinical problems, and if not already receiving medical attention should be referred. For exceptionally heavy or light children BMI should be calculated and plotted.

Parent height comparator (mid-parental centile)

The mid-parental centile is the average adult height centile to be expected for all children born of this child's parents. It incorporates a regression adjustment to allow for the tendency of very tall and short parents to have children with less extreme heights. Comparing the mid-parental centile with the child's current height centile can help assess whether the child's growth is proceeding as expected. The larger the discrepancy between the two, the more likely it is that the child has some sort of disordered growth. Most children's height centiles (nine out of ten) are within ± 2 centile spaces of the mid-parental centile, and only 1 percent will be discrepant by more than 3 centile spaces.

Mid-parental target height

The mid-parental target height is obtained by plotting the mid-parental centile on the height chart at age 20 and reading off the corresponding height. Four boys out of five will have an adult height within ± 7 cm of this target height. However predicted adult height (above) is usually closer to the child's final height.

Measurement 1	Measurement 2
Recording Date	Recording Date
Weight	Weight
Length/Height	Length/Height
BMI	BMI
Location	Location
Health worker name	Health worker name
Measurement 5	Measurement 6
Recording Date	Recording Date
Weight	Weight
Length/Height	Length/Height
BMI	BMI
Location	Location
Health worker name	Health worker name

Measurement 3	Measurement 4
Recording Date	Recording Date
Weight	Weight
Length/Height	Length/Height
BMI	BMI
Location	Location
Health worker name	Health worker name
Measurement 7	Measurement 8
Recording Date	Recording Date
Weight	Weight
Length/Height	Length/Height
BMI	BMI
Location	Location
Health worker name	Health worker name

Please place sticker (if available) otherwise write in space provided.

Name: _____

NHS/CHI No:

Hospital No:

Date of Birth: / /

Adult height predictor

This allows prediction of the child's adult height based on their current height, including a regression adjustment to allow for the tendency of very tall and short children to be less extreme in height as adults. Four boys out of five will have an adult height within ± 6 cm of this predicted height.

Body mass index (BMI) centile chart

Where over- or underweight is a concern BMI can be calculated and plotted on the BMI chart. BMI is calculated by dividing weight (in kg) by the square of height (in metres e.g. 1.32 m, not centimetres e.g. 132 cm). A simple way to do this on a calculator or mobile phone is:
1. Enter the weight; 2. Divide by height; 3. Divide the result by height.

The result should be plotted on the BMI chart provided. To allow the monitoring of severely obese children, the BMI chart displays high lines at +3, +3.33, +3.66 and +4 SD, and -4 and -5 SD for those severely underweight.

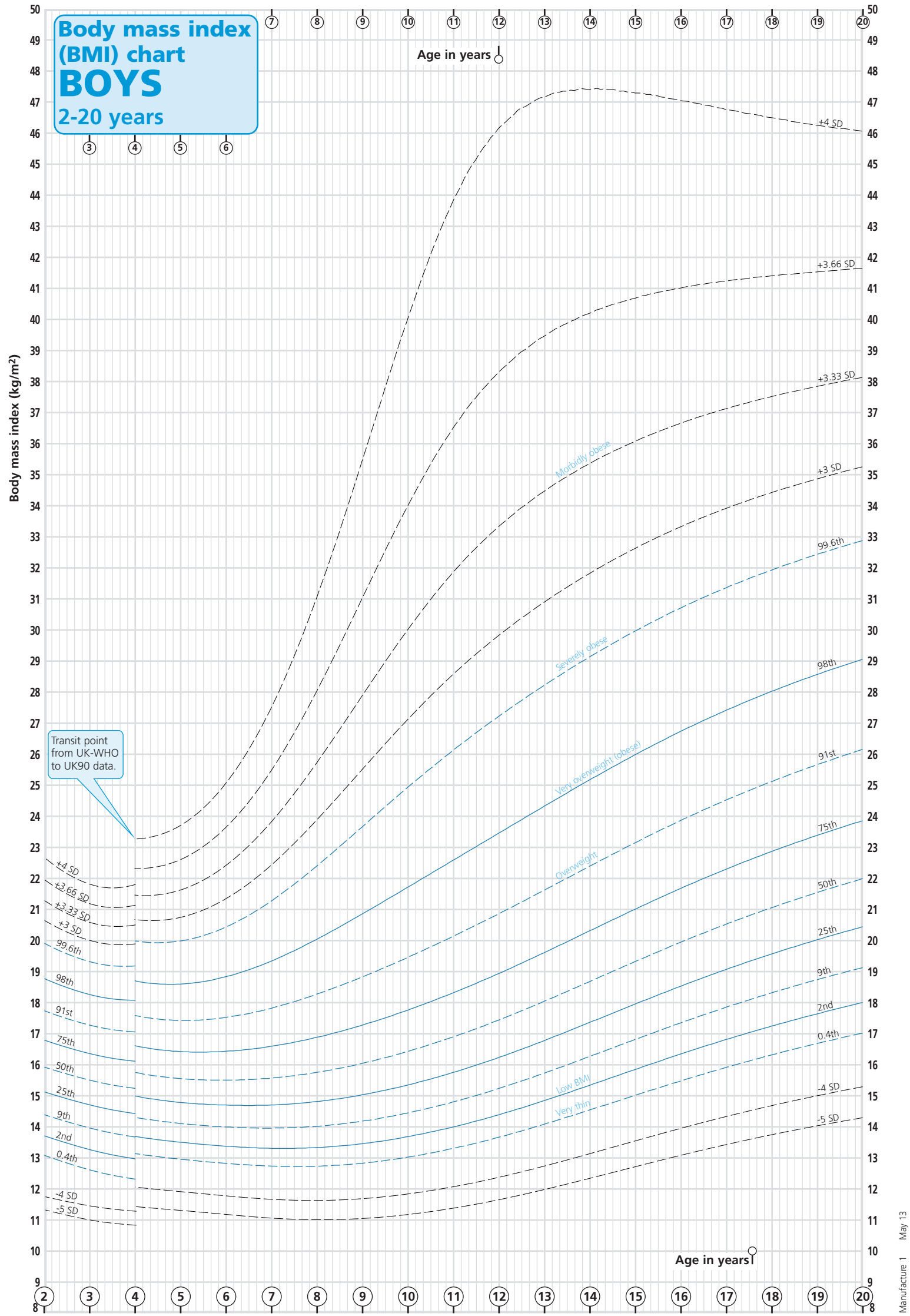
Pubertal assessment

For most purposes the puberty phase approach will be sufficient, based on the history and clinical examination as below. Where more detailed assessment of the progress of puberty is required see the chart flap for Tanner staging. The three vertical black lines (puberty lines) on the right hand side of the chart (9-20 years) indicate the normal age limits for the phases of puberty described below:

Pre-puberty (Tanner stage 1)	In Puberty (Tanner stages 2-3)	Completing Puberty (Tanner stages 4-5)
If both of the following:	If any of the following:	If any of the following:
No signs of pubertal development	Slight deepening of the voice Early pubic or armpit hair growth Enlargement of testes or penis	Voice full broken Moustache and early facial hair growth Adult size of penis with pubic and axillary hair

What does a measurement in a shaded area mean?

The chart provides extra guidance about the lower limit (0.4th centile) for late-maturing boys in pre-puberty and the upper limit (99.6th centile) for early-maturing boys completing puberty. If height and weight falls within a shaded area on the chart, pubertal assessment will be required. For boys in pre-puberty, height or weight within the lower shaded areas are likely to be normal, particularly if height is not markedly discrepant from the mid-parental centile and BMI is within normal limits. Similarly, boys completing puberty who have measurements in the upper shaded area are usually normal.



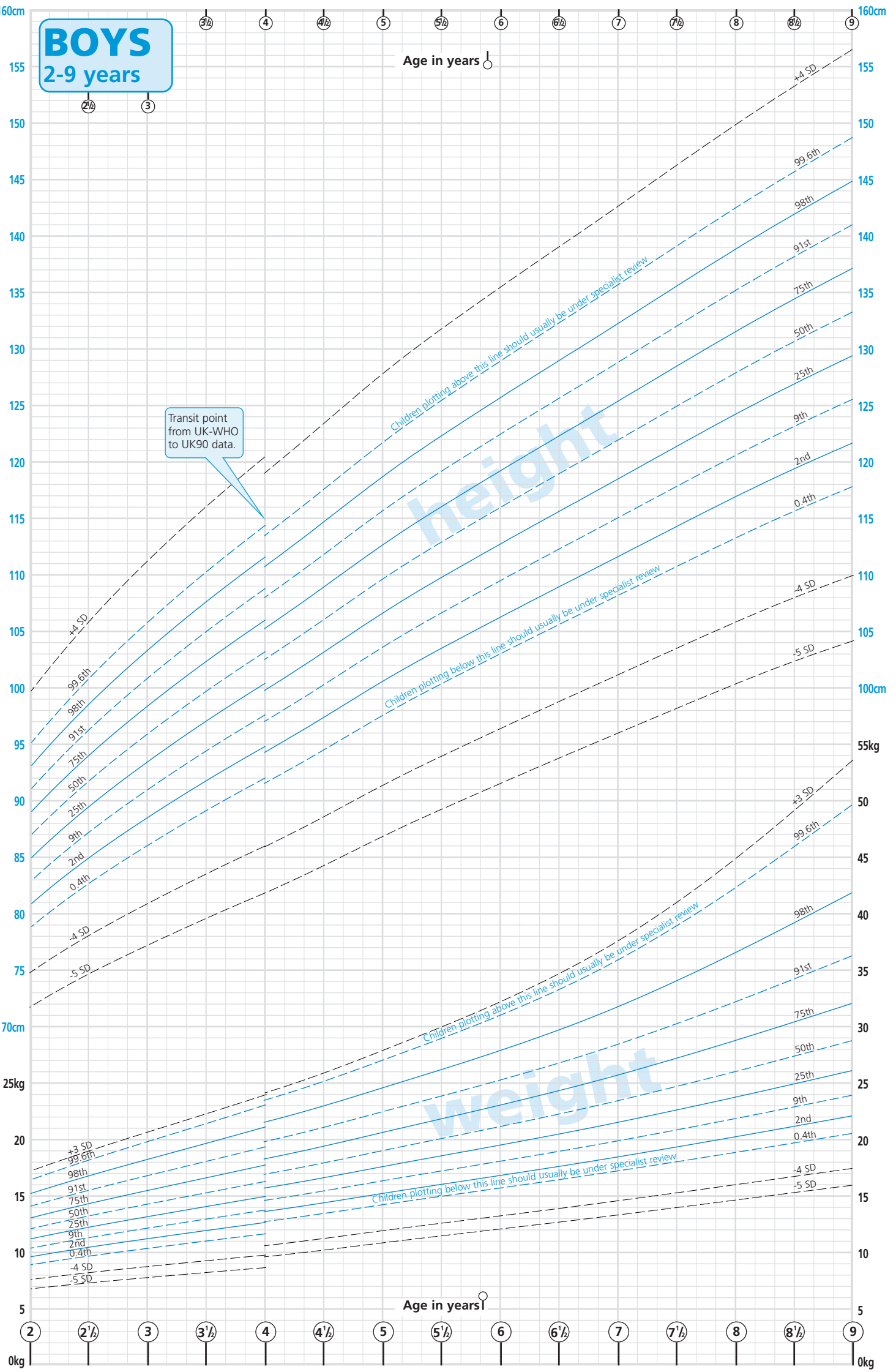
BOYS 2-9 years

Age in years

Transit point from UK-WHO to UK90 data.

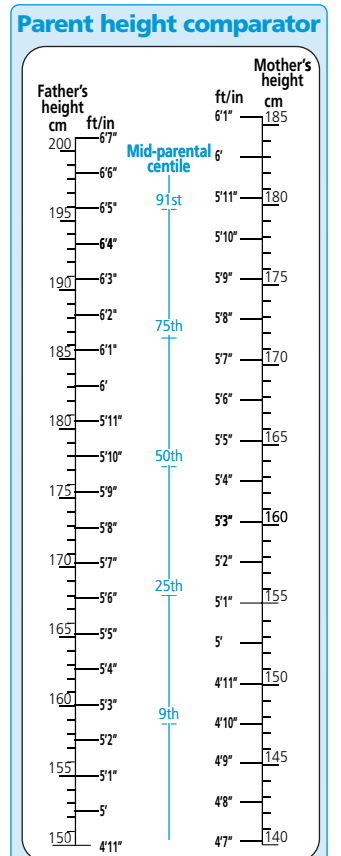
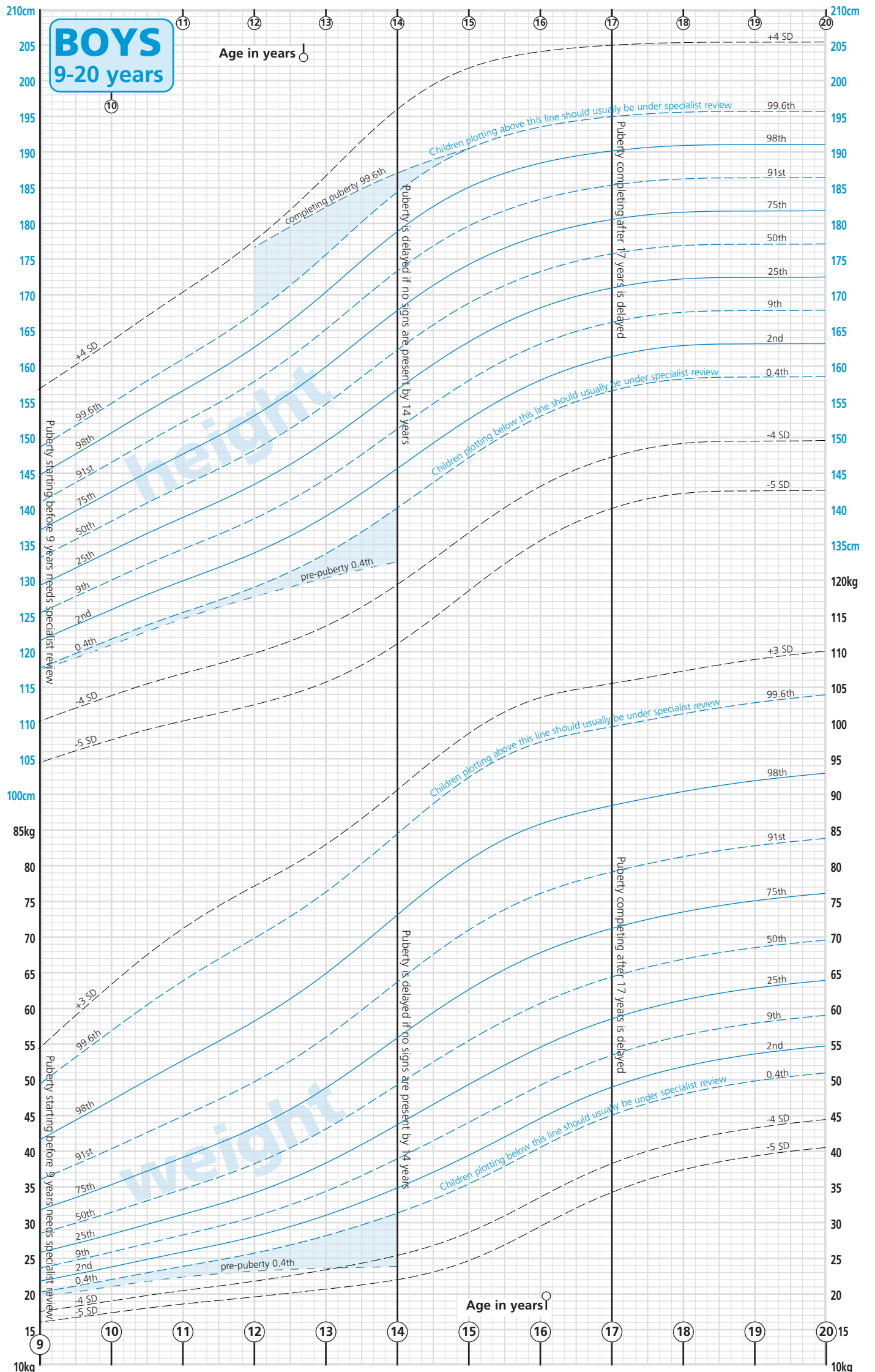
Birth centiles

Length	Weight
99.6th → 58	99.6th → 5
98th → 56	98th → 4.5
91st → 54	91st → 4
75th → 52	75th → 3.5
50th → 50	50th → 3
25th → 48	25th → 2.5
9th → 46	9th → 2
0.4th → 44cm	0.4th → 1.5



BOYS 9-20 years

Age in years



Father's height: _____

Mother's height: _____

- Mid-parental centile**
- Plot the mother's and father's heights on their respective scales and join the two points with a line. The mid-parental centile is where this line crosses the centile line in the middle.
 - Compare the mid-parental centile to the child's current height centile, plotted on the adult height predictor centile scale.
 - Nine out of ten children's height centiles are within ± 2 centile spaces of the mid-parental centile.

Adult height predictor

ft/in	cm
6'3"	192
6'2"	190
6'1"	185
6'0"	180
5'11"	180
5'10"	175
5'9"	175
5'8"	170
5'7"	170
5'6"	165
5'5"	165
5'4"	160
5'3"	160

- Predicted adult height**
- Plot the most recent height centile on the relevant centile line.
 - Read off the predicted adult height for this centile.
 - Four out of five children will be within ± 6 cm of this value.

Cole TJ, Wright CM. 2011. A chart to predict adult height from a child's current height. Ann Hum Biol. 2011;38:662-8.
Wright C, Cheetham T. The strengths and limitations of parental heights as a predictor of attained height. Arch Dis Child 1999; 81(2):257-60