The 97th Percentile of Weight on Growth Charts Lies 1.37–8.17 kg Above the Value Built from the Median and Spread Alone — Back-Calculating L, M, and S for Each Age from the 2025 LMS Table, the 7 Values Fit Three Numbers Within 0.058, and Weight's L Is −1.350 to −0.366, Stretching the Upper Side at Every Age (the Upper Width Is 1.576–2.273 Times the Lower). For Height, Replacing L with 1 Moves the 97th Percentile Only −0.88 to +1.34 cm [M107]

p-th percentile = M × (1 + L × S × z)^(1/L) ── What separates them is the part set by the middle and spread (M and S) or the part set by skewness (L)

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Abstract

The Ministry of Education, Culture, Sports, Science and Technology's School Health Statistics Survey (school year 2025) has two percentile tables built from the height and weight of the same children (one by the LMS method and one from the distribution chart). Using them and the distribution tables in steps of one unit, this paper checked how the 3rd to 97th percentiles of growth charts are made. No new mathematical theorem and no new law are claimed.

First, **the table from the distribution chart could be rebuilt by reading class "h" of the distribution table as the one unit from h−1 to h and spreading values linearly within the class, with differences of at most 0.057 cm for height and 0.146 kg for weight (reading it as h to h+1 is off by 1.055 cm or more for height)** (Section 4).

Second, **the LMS table was higher than the distribution-chart table by 0.381 cm on average for boys' height and 0.374 cm for girls' (differences 0.0–0.7 cm). For weight, the average was 0.458 kg for boys and 0.593 kg for girls** (Section 4).

Third, this is the core of the paper. **The 7 percentiles of the LMS table fit, for each age, a formula in three numbers L (skewness), M (median), and S (spread) within 0.058 cm for height and 0.053 kg for weight. Weight's L was negative for both sexes at every age (−1.350 to −0.366), and the upper width (97th − 50th percentile) was 1.576–2.273 times the lower width (50th − 3rd). Replacing L with 1 (symmetric) lowers weight's 97th percentile by 1.37–8.17 kg** (Section 5).

Fourth, **for height the upper width ÷ lower width is 0.868–1.200, and replacing L with 1 moves the 97th percentile only −0.88 to +1.34 cm. Height's L is smallest at 11 (−0.908) and largest at 13 (+2.654) for boys, and smallest at 9 (−0.590) and largest at 11 (+2.296) for girls, switching direction around pubertal ages** (Section 6).

Fifth, **for weight, replacing L with 1 also lowers the 3rd percentile by 0.85–4.33 kg. The difference at the 97th percentile is largest for boys aged 15 (+8.17 kg) and girls aged 10 (+5.71 kg)** (Section 5).

Sixth, what separates them is **the part set by the middle and spread (M and S) or the part set by skewness (L)**. The upper and lower lines of a growth chart are not necessarily the same distance from the middle.

Scope note: **This paper claims no new mathematical theorem and no new law** — the LMS method (Cole 1990) is a known method, and the percentile tables are public. This paper only rebuilt quantiles from the distribution tables and back-calculated L, M, and S from the table values. **This paper is a structural interpretation of the shape of numbers in public aggregate data; it is not medical advice, not a diagnosis, and not a treatment recommendation. The author is not a physician. Decisions about individual health should be discussed with a physician or a medical institution. This is a preprint that has not been peer reviewed. Where one child sits on a growth chart does not decide whether that child's growth or body shape is good or bad. These tables line up the distribution of children in 2025; they are neither a target nor a standard value. Ask a physician or school doctor how to read a growth chart.** How the published tables were made (the original records and the calculation steps) cannot be checked from these tables. What this paper checked is how well the published values agree with which reading and which formula. L, M, and S are not in the tables; they are numbers this paper back-calculated from the 7 values. Only the single year 2025 was examined. **About the data**: the School Health Statistics Survey (Ministry of Education, Culture, Sports, Science and Technology) was taken from e-Stat and used under the Government of Japan Standard Terms of Use (Version 2.0); the rebuilt quantiles, differences, back-calculated L, M, and S, values with L replaced by 1, and ratios in this paper were processed from it. What this paper adds: **checking the two published percentile tables against the distribution tables, and showing in numbers how much of the upper side of the weight growth chart is set by skewness**.

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1. Notation and question

- **p-th percentile**: the value at p% from the bottom when children of that age are lined up from smallest. The 7 are 3, 10, 25, 50 (median), 75, 90, and 97.
- **LMS formula**: p-th percentile = M × (1 + L × S × z)^(1/L) (M × exp(S × z) when L is 0). z is the position p% from the bottom of the standard normal distribution (−1.881 at 3%, 0 at 50%, +1.881 at

97%).

- **L, M, S**: L is the skewness of the distribution (1 is symmetric), M the median, and S the spread (as explained in the table's note).
- **Value with L replaced by 1**: with the same M and S, L set to 1 = M × (1 + S × z). The value if the distribution were symmetric.
- **Upper width ÷ lower width**: (97th − 50th percentile) ÷ (50th − 3rd percentile). 1 means symmetric.

Question: Are the 3rd to 97th percentiles of growth charts set by the middle and spread alone? How much does skewness matter?

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2. Preview and design

Written honestly: the design was decided after looking at the tables.

	Content
Tables	Physical growth values and growth curves (by the LMS method), the same (from the distribution chart), and the distributions of height and weight by age (all for school year 2025)
Noticed in the preview	There are two tables for the same children, and the LMS one is slightly larger. The values of L, M, and S themselves are not in the tables
Noticed in the preview (2)	For weight, the distance from the median to the 97th percentile is much longer than from the median to the 3rd
Noticed in the preview (3)	Whether class "h" in the distribution tables runs from h to h+1 or from h − 1 to h is not stated in the tables
Comparison	Rebuilding from the distribution tables (three readings of the classes), the difference between the two tables, back-calculated L, M, and S, values with L replaced by 1, and upper width ÷ lower width

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3. Data and checks

Calculation 3.1 The 4 retrieved files were fixed by SHA-256, and the following were checked.

- Both percentile tables have the sheets height-1, height-2, weight-1, weight-2, and chart. The 7 values can be read for ages 5–17 × both sexes × height and weight, and every row increases from smallest.
- The note to the LMS table states that age is completed years as of 1 April, Reiwa 7; that no smoothing was applied; the meaning of L, M, and S; and the reference (Cole TJ 1990).
- In the distribution tables, each age column is "total 1000," and the sum of the entries agrees with 1000 within 0.7 (height has 111 classes from 90 to 200 cm, weight 115 classes from 11 to 125 kg).

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4. The two tables

Calculation 4.1 Largest difference when rebuilding the distribution-chart table from the distribution tables (ages 5–17 × 7 values)

Reading of class "h"	Height, boys	Height, girls	Weight, boys	Weight, girls
h − 1 to h	0.057	0.057	0.146	0.081
h − 0.5 to h+0.5	0.555	0.557	0.549	0.581
h to h+1	1.055	1.057	1.049	1.081

Observation 4.2: **Reading class "h" as the one unit from h−1 to h, the distribution-chart table could be rebuilt with differences of at most 0.057 cm for height and 0.146 kg for weight.** Shifting the reading by 0.5 at a time increases the difference by about 0.5 at a time.

Observation 4.3: **The LMS table − the distribution-chart table was 0.0–0.7 cm for boys' height (average 0.381) and 0.0–0.7 cm for girls' (average 0.374), and −1.3 to +1.4 kg for boys' weight (average 0.458) and +0.1 to +1.6 kg for girls' (average 0.593).** The average difference for height is of the same order as the difference from shifting the class reading by 0.5, but which values the LMS table was calculated from cannot be checked from these tables.

5. The core — the part set by the middle and spread, or by skewness

Calculation 5.1 L, M, and S back-calculated from the LMS table (weight, kg)

Sex, age	L	M	97th percentile	With L = 1	Difference	Upper ÷ lower
Boys, 6	−1.190	20.867	28.9	26.50	+2.40	1.818
Boys, 9	−1.181	29.911	47.4	40.53	+6.87	2.273
Boys, 12	−0.588	43.598	68.6	60.95	+7.65	1.908
Boys, 15	−0.938	57.403	83.9	75.73	+8.17	1.893
Girls, 6	−1.144	20.487	28.5	26.12	+2.38	1.818
Girls, 10	−0.704	33.681	52.0	46.29	+5.71	1.926
Girls, 12	−0.366	43.465	62.1	57.99	+4.11	1.576

Observation 5.2: **The 7 values of the LMS table fit, for each age, the formula in three numbers L, M, and S within 0.058 cm for height and 0.053 kg for weight (the tables have one decimal place, so rounding is ±0.05).**

Observation 5.3: **Weight's L was negative at all 26 sex-age combinations (−1.350 to −0.366), and the upper width was 1.576–2.273 times the lower width. Replacing L with 1 lowers the 97th percentile by 1.37–8.17 kg and the 3rd percentile by 0.85–4.33 kg.** The difference at the 97th percentile is largest for boys aged 15 (+8.17 kg) and girls aged 10 (+5.71 kg).

Observation 5.4: The upper line of the weight growth chart is not set by the middle (M) and spread (S) alone; skewness (L) pulls it several kg higher. The upper and lower lines are not the same distance from the middle.

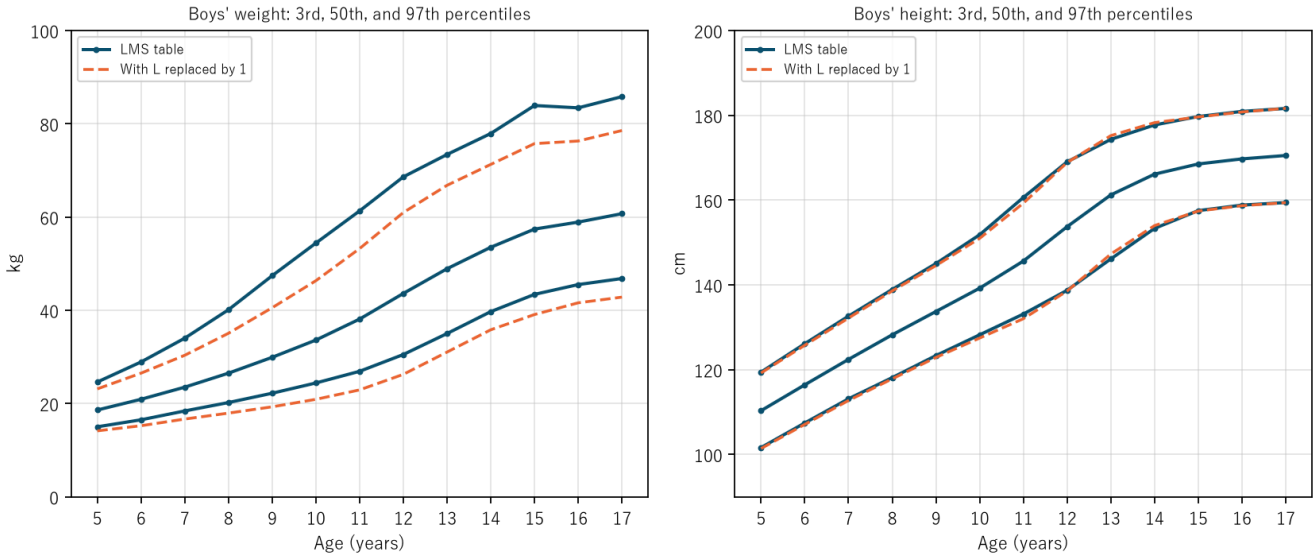


Figure 1: 3rd, 50th, and 97th percentiles of boys' weight (left) and height (right). Navy is the LMS table; orange dashed lines are the values with L replaced by 1 (3rd and 97th percentiles).

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6. The skewness of height switches direction with age

Calculation 6.1 L back-calculated from the LMS table, and upper width ÷ lower width (height)

Sex, age	L	Upper ÷ lower	97th percentile	With L = 1	Difference
Boys, 6	+0.073	1.078	126.1	125.73	+0.37
Boys, 11	−0.908	1.200	160.6	159.26	+1.34
Boys, 13	+2.654	0.868	174.3	175.18	−0.88
Boys, 17	+0.999	1.000	181.6	181.62	−0.02
Girls, 9	−0.590	1.144	146.3	145.39	+0.91
Girls, 11	+2.296	0.894	159.3	159.94	−0.64
Girls, 17	+0.574	1.020	168.0	167.86	+0.14

Observation 6.2: **For height, the upper width ÷ lower width is 0.868–1.200, and replacing L with 1 moves the 97th percentile only −0.88 to +1.34 cm. L is smallest at 11 (−0.908) and largest at 13**

(+2.654) for boys, and smallest at 9 (−0.590) and largest at 11 (+2.296) for girls. Before the pubertal ages the upper side is longer, after them the lower side is longer, and at 17 the distribution is nearly symmetric. The reason cannot be known from these tables.

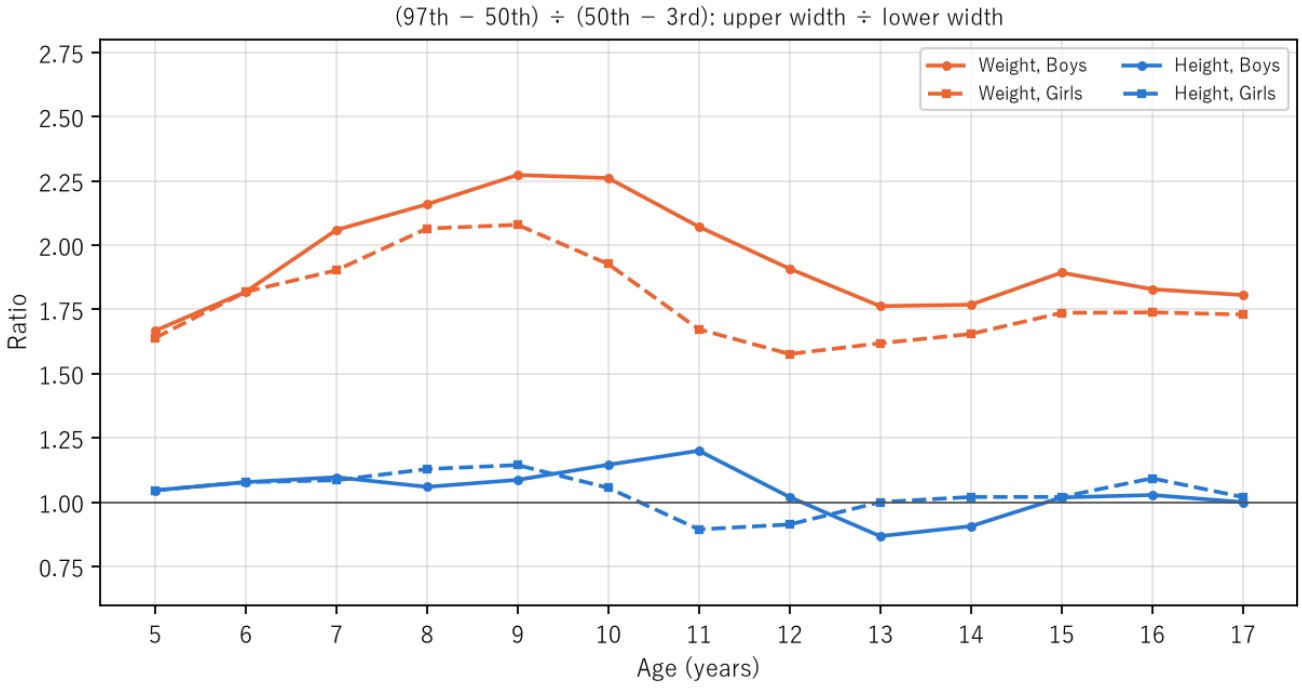


Figure 2: (97th − 50th percentile) ÷ (50th − 3rd percentile). Orange is weight, blue is height (solid for boys, dashed for girls). The line at 1 is symmetric.

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7. Limitations

1. **Where one child sits on a growth chart does not decide whether that child's growth or body shape is good or bad. The tables show the distribution of children in 2025 and are neither a target nor a standard value.**
2. How the published tables were made (the original records and calculation steps) cannot be checked. This paper shows only how well the published values agree with which reading and which formula.
3. L, M, and S are not in the tables; they are numbers back-calculated from the 7 values and include the tables' rounding (±0.05).
4. Only the single year 2025 was examined. Differences between years were not.
5. The tables measure different children each year, not the growth path of the same children.

Conclusion

In the 2025 LMS table, the 3rd to 97th percentiles of growth charts could be written almost exactly for each age with three numbers (skewness, median, and spread). For weight, the skewness points the same way at every age, and the upper line lies 1.37–8.17 kg above the value built from the middle and spread alone. For height, the effect of skewness was within ±1.34 cm.

What separates them is one thing — the part set by the middle and spread (M and S) or the part set by skewness (L).

When you look at a growth chart, **also note that the upper and lower lines are not necessarily the same distance from the middle.**

Data and reproduction

Data	School Health Statistics Survey, school year 2025, reference tables: physical growth values and growth curves (by the LMS method) and (from the distribution chart); national tables: distribution of height by age and distribution of weight by age (Ministry of Education, Culture, Sports, Science and Technology, e-Stat) (retrieved 27 September 2026)
Terms of use	e-Stat follows the Government of Japan Standard Terms of Use (Version 2.0). The rebuilt quantiles, differences, back-calculated L, M, and S, values with L replaced by 1, and ratios in this paper were processed from it and are not numbers produced by the government
Coverage	Japan; school year 2025; ages 5–17; boys and girls; height and weight
Verification	`検算/M107.py` (`--zu` also draws the figures). Every number in the text is taken from `検算/M107_output.txt`
Raw data	`data/` holds the retrieved files and `SOURCES.md` (URLs, retrieval date, SHA-256, terms of use, definitions and how the calculations were set up, and the record of checking the reference's bibliographic details)
Figures	`図/M107_zu1` and `図/M107_zu2` (png, svg, English versions)

References

- Ministry of Education, Culture, Sports, Science and Technology. School Health Statistics Survey, school year 2025, national tables Table 2 (distribution of height by age) and Table 3 (distribution of weight by age), and reference tables: physical growth values and growth curves (by the LMS method) and (from the distribution chart) (in Japanese). e-Stat (accessed 27 September 2026). https://www.e-stat.go.jp/
- Cole, T. J. (1990). The LMS method for constructing normalized growth standards. European Journal of Clinical Nutrition. https://pubmed.ncbi.nlm.nih.gov/2354692/