European Standardization Organizations

Webinar 'Anthropometric and strength data of children for use in standardization'

We start at 9:30 CET

Your webinar moderator

Els Somers

Project Manager

Public Relations

esomers@cencenelec.eu

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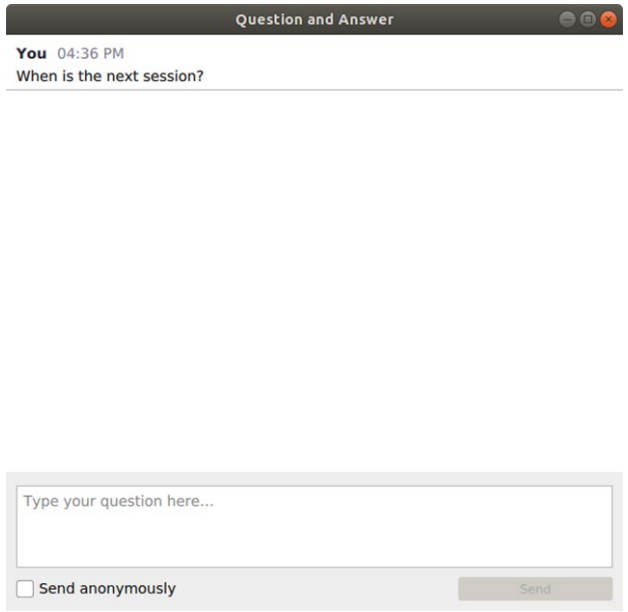

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Your speakers today

Ardit CAMI

Project Manager – Manufacturing

CEN and CENELEC

Enda FALLON

Associate Professor in Industrial Engineering at the University of Galway, Ireland

Convenor of CEN/TC 122/WG 1 “Anthropometry”

Your speakers today

Sandra ALEMANY

Head of the Anthropometry Research Group at the Instituto de Biomecánica de Valencia (IBV), Spain

Expert of CEN/TC 122/WG 1 and project leader of technical report on statistical summaries (CEN/TR 18296-1)

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Gerd KÜCHMEISTER

Lecturer in Ergonomics at Kiel University of Applied Sciences

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Toon Huysmans

Associate Professor in Digital Human Modeling, Delft University of Technology

Expert of CEN/TC 122/WG 1 and project manager of the survey in NL.

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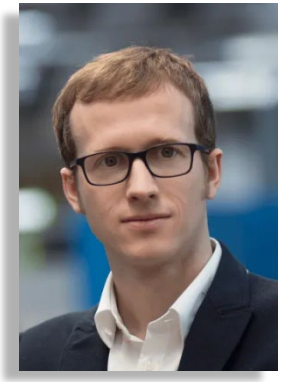


Agenda

- Introduction to CEN and CENELEC.
- Background of the project.
- Methodology of the anthropometric and strength study.
- Results:
  - **CEN/TR 18296-1:2026.** Ergonomics - Anthropometric and strength data of children in Europe — Part 1: Statistical summaries of the data

    CEN/TS 18296-2:2026. Ergonomics — Anthropometric and strength data of children in Europe — Part 2: Guidelines for the correct application of anthropometric and strength data
- Relevance for standardization community.

European Standardization Organizations

Introduction to CEN and CENELEC

Ardit Cami

Project Manager - Manufacturing - CEN and CENELEC

Who are CEN and CENELEC?

CEN and CENELEC, together with ETSI, are officially recognized as **European Standards Organizations** (Regulation EU 1025/2012)

Standardization in various business sectors

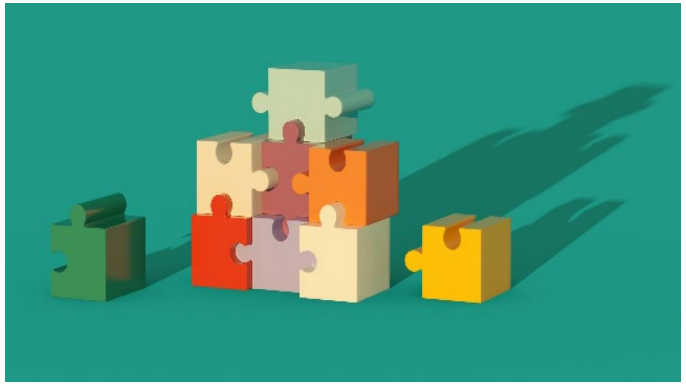
Standardization in the Electrotechnology sector

Standardization in Telecommunications, broadcasting and other electronic communications networks and services

A membership-based organization in line with the **WTO** principles

Transparency, Openness and **Inclusiveness**

Mechanism in place to involve stakeholders, not only at European but also at national level (industry, SMEs, societal stakeholders, etc.)



Coherence

Standards developed to support the market and EU legislation

Effectiveness and **relevance**

- Bottom-up + top-down approach
- Systematic review of Standards to maintain state of the art

Consensus at all levels, national and European, among different interested parties

CEN-CENELEC System

Interacting with national and international levels

34 national Member countries

National

National delegation principle

National implementations

European

Cooperation Agreements

International

Other actors in standardization

National Delegations

Industry, including SMEs
Professionals
Academia
Certification bodies
Laboratories
Public authorities
Consumers
etc.

NSBs send experts

TC - Standards development

European organizations

Partner Organization,
Liaison Organizations,
European stakeholder organizations,
etc.

Observers send experts

[CEN-CENELEC Guide 25]

Policy needs

MARKET NEEDS

Single Standards Model

Unique system & best practice

1 European Standard (EN)

34 identical national standards

& all conflicting standards removed

Access to a market of
600 million consumers

CEN and CENELEC at a glance

450
Technical Committees

1.800
Working Groups

90.000
Experts

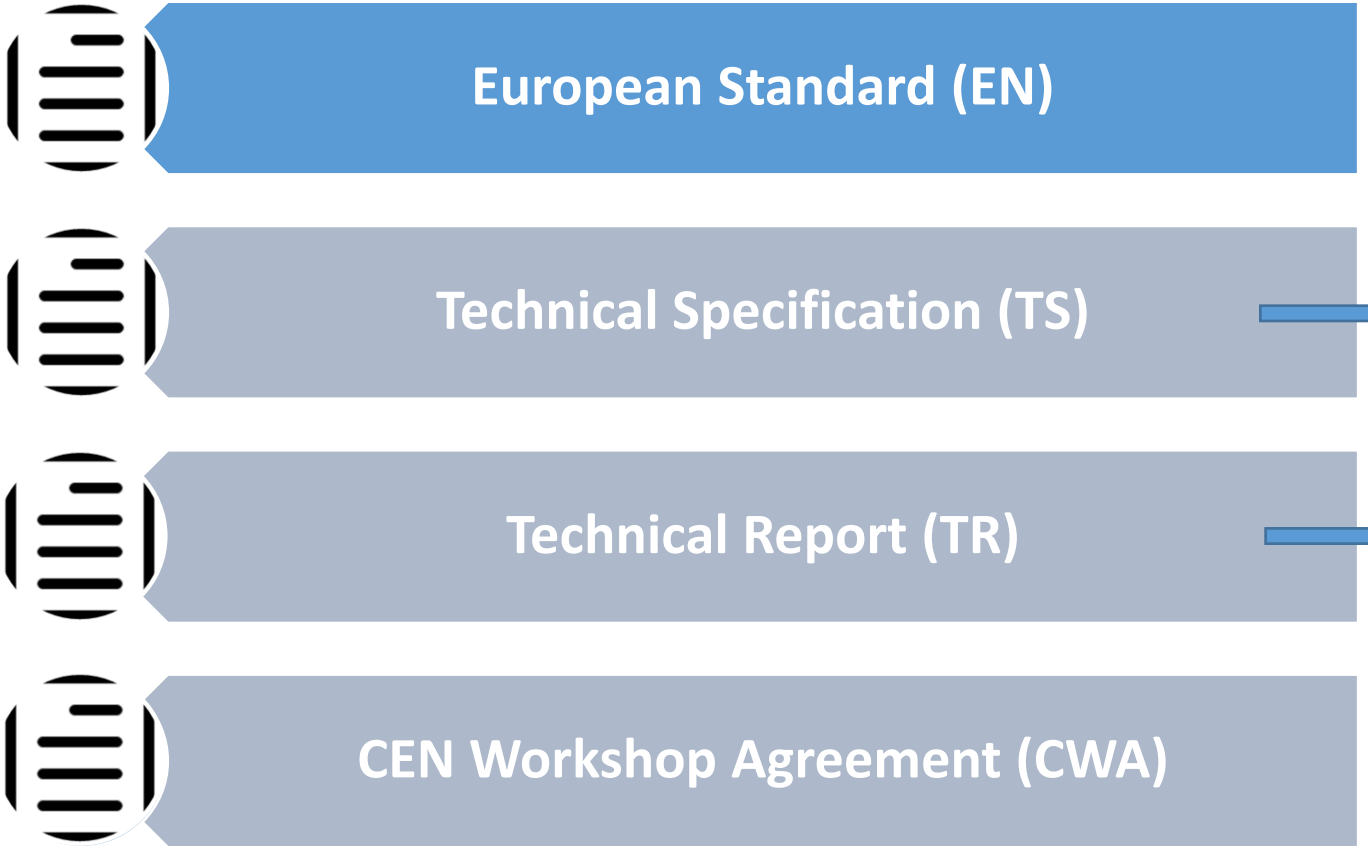
≈24.000
Standards

>700
Technical Specifications

≈900
Technical Reports

500
CWAs

CEN and CENELEC Deliverables



CEN/TS 18296-2:2026, *Ergonomics – Anthropometric and strength data of children in Europe –* ***Part 2: Guidelines for the correct application of anthropometric and strength data***

CEN/TR 18296-1:2026, *Ergonomics - Anthropometric and strength data of children in Europe -* ***Part 1: Statistical summaries of the data***

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Background of the project

Enda Fallon
Associate Professor in Industrial Engineering at the University of Galway, Ireland
Convenor of CEN/TC 122/WG 1 “Anthropometry”

Background

PHASE 1
Research on the demand and availability of anthropometric data of children

Objetives:

- Existence/availability of anthropometric data.
- Demands on anthropometric data.
- Gap Analysis.

Result:

CEN/TR 17698 Ergonomics - Demands and Availability of anthropometric and strength data of children in Europe

RELEVANCE OF THE ANTHROPOMETRIC AND STRENGTH MEASUREMENTS. EXAMPLE- HEAD

Head	Toys	Playground	Child use and care	Sport	Educational furniture	Clothing	Restraint transport	Construction	Global
1 Head breadth	R	HR	R	HR	HR	R	HR	HR	HR
2 Ear-to-ear (bitragion) breadth		R							R
3 Face breadth (bizygomatic or cheekbones)									
4 Face breadth (brow ridges)									
5 Jaw breadth									
6 Eye separation (Interpupilar distance)									
7 Neck breadth	R	HR	R		R	R	R	HR	HR
8 Bitragion arc of the head									
9 Neck circumference/Neck girth	R	HR	HR		HR	HR	R	R	HR
10 Neck-base girth	R		R			R		R	R
11 Head circumference/Head girth	R	HR	HR		HR	HR		R	HR
12 Sagittal arc of the head		R		R		R			R
13 Head length		HR	R		R	R	HR		HR
14 Maximum head diameter (chin to back of head)		HR	HR		HR				HR
15 Head height (7th Cervicale)			R			R	R	R	R
16 Head height (Vertex to chin)	R	HR	HR	HR		R	R	R	HR
17 Face height									
18 Face length (menton-sellion)									
19 Mouth breadth			HR						HR
20 Mouth opening (between incisors)	R		HR						HR

Background

PHASE 1
Research on the demand and availability of anthropometric data of children

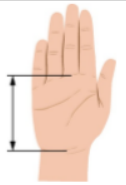
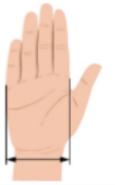
Objetives:

- Existence/availability of anthropometric data.
- Demands on anthropometric data.
- Gap Analysis.

Result:

CEN/TR 17698 Ergonomics - Demands and Availability of anthropometric and strength data of children in Europe

Anthropometry and strength dictionary

	Hand	
2	**Palm length (EN ISO 7250-1:2017,6.3.2 — ISO 8559-1:2017, 5.5.3)** The distance from the midpoint of the proximal crease at the base of the middle finger to the most distal wrist crease. Subject holds forearm horizontal with hand stretched out flat, palm up. *Instrument:* Sliding caliper.	
3	**Hand length (to thumb crotch) (Childata: 72)** The distance from the crotch of the thumb to the tip of the middle finger. The subject extends the right hand with the palm up and thumb away (abducted) from hand.	
4	**Hand breadth at metacarpals (EN ISO 7250-1:2017, 6.3.3)** Projected distance between radial and ulnar metacarpals at the level of the metacarpal heads from the second to the fifth metacarpal, measured perpendicular to the long axis of the middle finger. Subject holds forearm horizontal with hand stretched out flat, palm up. *Instrument:* Large sliding caliper	
5	**Hand breadth at thumb (Childata: 75)** The maximum distance across the hand and thumb at the level of the middle joint of the thumb. The subject extends the hand and the th... is held against the side of the palm.	

Definition of 218 anthropometric measurements 25 strengths

Background

PHASE 1
Research on the demand and availability of anthropometric data of children

Objetives:

- Existence/availability of anthropometric data.
- Demands on anthropometric data.
- Gap Analysis.

Result:

CEN/TR 17698 Ergonomics - Demands and Availability of anthropometric and strength data of children in Europe

Table B.1 — Description of the existing anthropometric and strength data sources

Code of database[a]	Study name (Title)	Name of the Database/ Study	Year of publication	Year of the survey	Author/Organization	Country	Area of Europe	Age range	Gender	Boys sample size	Girls sample size	Category	Measurement method	Part of the body
1 ALB-2009-A0-01	Blood pressure and anthropometric measurements in Albanian versus Turkish children and adolescents		2009	2007	Borici, S. (Department of Cardiology, Marmara University School of Medicine, Istambul)	Albania	Southern Europe	11-12 and 15-17 y.o.	M&F	82	109	Ant-Basic	Traditional	Full body
2 AUT-2010-A0-01	Körperbaulicher Status der 10- bis 12- jährigen Schüler und Schülerinnen der Sportmittelschulen Wien im Zeitraum von 2004–2006	SPORTMITTELSCHULEN WIEN 2004-2006	2010	2004-2006	Dr. Alena Kos (Institute of Medical and Sports Science Consulting)	Austria	Western Europe	10-12 y.o.	M&F	1652	566	Ant-Basic	Traditional	Full body

Table with the description of 159 European anthropometry and strength databases

Background

PHASE 1
Research on the demand and availability of anthropometric data of children

Objetives:
- Existence/availability of anthropometric data.
- Demands on anthropometric data.
- Gap Analysis.

Result:
CEN/TR 17698 Ergonomics - Demands and Availability of anthropometric and strength data of children in Europe

PHASE2

Anthropometric and strength study of children in Europe

Objetives:
- Acquisition of available data.
- Development of the measurement programme (2 EU countries).
- Processing, integration and analysis od databases.

Guidelines for the application of anthropometry and strength data in Europe

Objetives:
- Guidelines on how to correctly apply anthropometric and strength data of children.

Results:
- **CEN/TR 18296-1:2026.** Ergonomics - Anthropometric and strength data of children in Europe — Part 1: Statistical summaries of the data
- **CEN/TS 122298-2:2026.** Ergonomics — Anthropometric and strength data of children in Europe — Part 2: Guidelines for the correct application of anthropometric and strength data

European Standardization Organizations

Methodology of the anthropometric and strength project

Toon Huysmans - Associate Professor in Digital Human Modeling, TU Delft
Sandra Alemany – Director Anthropometry Research Group, IBV

Key specifications of the measuring program

- Age range: 0-16 years old.
- Extended list of anthropometric measurements and strengths.
  - 0-3 yo: 93 anthropometry and 6 strengths.
  - 4-16 yo: 186 measurements and 14 strengths.
- Representative distribution of sample size.
- Two European countries.

Table 4 – Overview on list of measures

Age range *years*	Standing /supine *amount*	Sitting *amount*	Reaches *amount*	Head *Amount*	Hand *amount*	Foot *amount*	Strengths *amount*
0-3	13	11*	4	17	26	22	6
4-16	88	16	14	17	29	22	14

		Sample size of strength measures	
		BOYS	GIRLS
Sampling groups	≥ 2 year to < 3 years	60	60
	≥ 7 year to < 8 years	70	70
	≥ 11 year to < 12 years	70	70
	≥ 13 year to < 14 years	70	70

		Sample size of anthropometric measures							
		BODY MEASURES		HEAD MEASURES		FOOT MEASURES		HAND MEASURES	
		BOYS	GIRLS	BOYS	GIRLS	BOYS	GIRLS	BOYS	GIRLS
Sampling groups	≥ 3 months to < 6 months	60	60	40	40	40	40	45	45
	≥ 6 months to < 9 months	60	60	40	40	40	40	45	45
	≥ 9 months to < 12 months	60	60	40	40	40	40	45	45
	≥ 1 year to < 2 years	60	60	40	40	40	40	45	45
	≥ 3 year to < 4 years	75	75	40	40	40	40	45	45
	≥ 5 year to < 6 years	75	75	40	40	40	40	45	45
	≥ 7 year to < 8 years	75	75	40	40	40	40	45	45
	≥ 9 year to < 10 years	105	105	40	40	40	40	60	60
	≥ 11 year to < 12 years	105	105	40	40	40	40	60	60
	≥ 13 year to < 14 years	105	105	40	40	40	40	60	60
	≥ 15 year to < 16 years	105	105	40	40	40	40	60	60

From Protocol to Practice

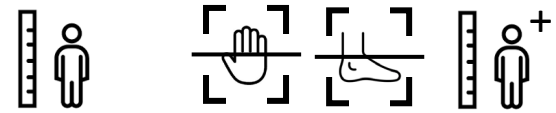
- Age-specific measurement protocol
  - Anthropometry
  - Child Strength
- Methodology harmonisation
- Recruitment strategy
- Digital workflow & quality control

Study Strata

Strengths, Spain:

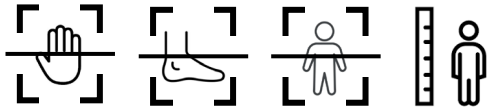
25 min

Anthropometrics, per Spain and Netherlands:



25 min

90 min



60 min

Study protocol: 0-1 year old

Traditional

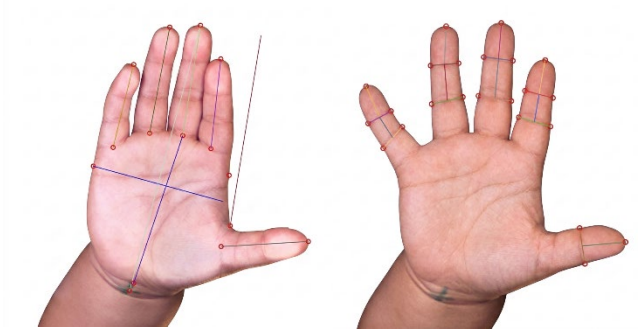
The anthropometric campaign employed more than **27 different traditional instruments and accessories** to measure body, head, foot, and hand measurements.

Photos courtesy of Dingena Mol

Study protocol: 1-3 year old

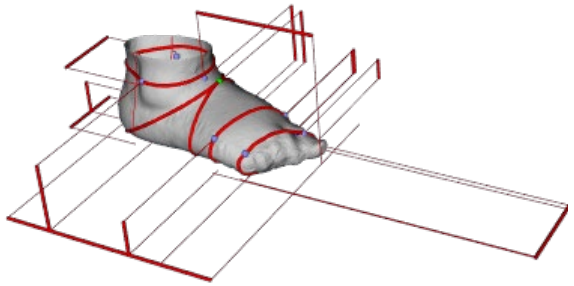
Body & head

Traditional Instruments was used in the anthropometric campaign, measuring 27 body and 20 head measurements.



Hand

2D Scanner was used in the anthropometric campaign to extract 25 hand measurements. Additional 10 measures measured with traditional equipment.



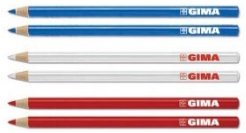
Foot

Infoot Scanner was used in the anthropometric campaign to extract 22 foot measurements.

Study protocol: 4-16 year old

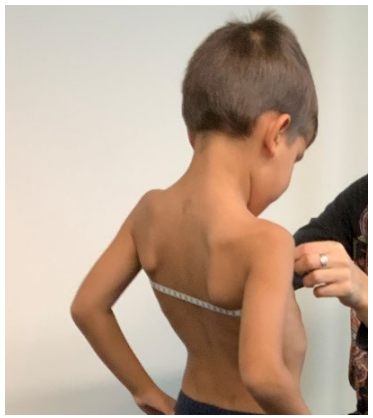
Traditional

The anthropometric campaign employed more than **30 different traditional instruments and accessories** to measure body, head, hand, and foot.



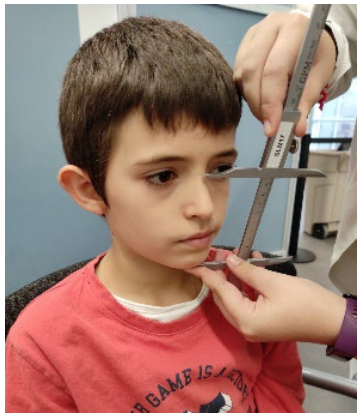
Body (22)

Span Segmometer



Tape Measure

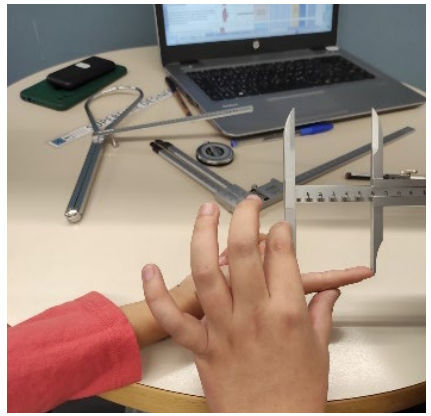
HEAD (9)



Sliding caliper (Martin type)

Tape Measure

HAND (14)



Sliding caliper (Martin type)

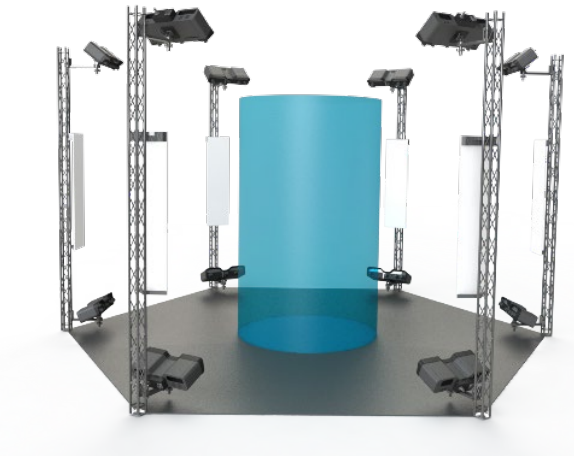
Sliding Caliper (Poech type)

FOOT (2)

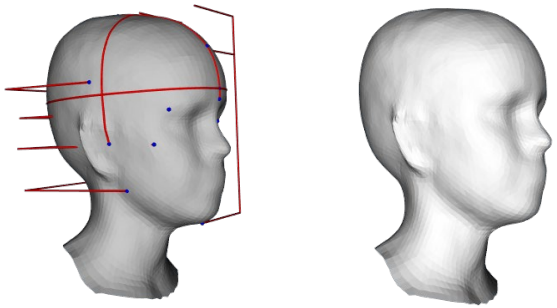
Sliding Caliper (Poech type)

Sliding Caliper (Poech type)

Study protocol: 4-16 year old



MOVE 4D

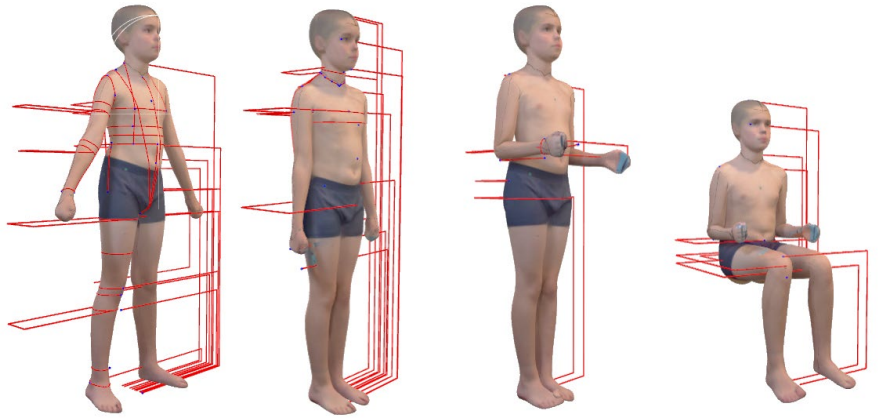


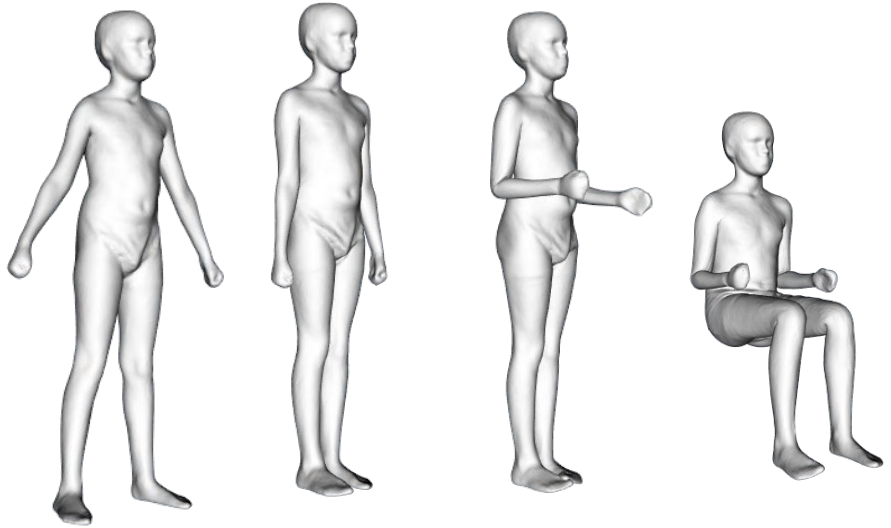
Body & head Scanner

Move4D & ScanLounge were used in the anthropometric campaign to extract both body and head measurements:

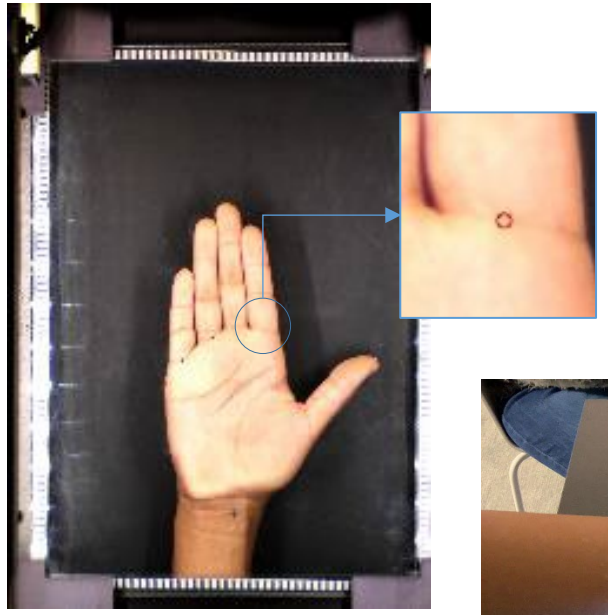
104 body measurements
14 head measurements

Scanologics ScanLounge





Study protocol: 4-16 year old

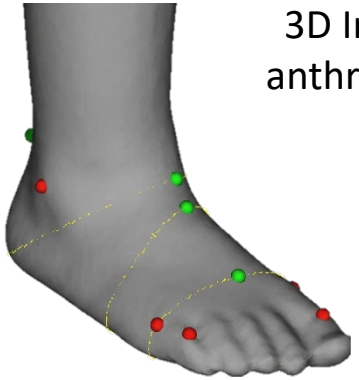


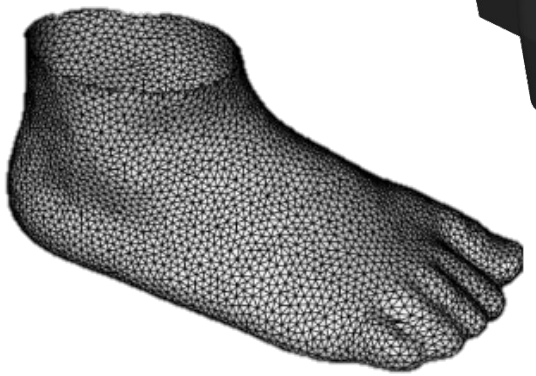
Hand scanner

2D scanner was used in the anthropometric campaign to extract **27 measurements.**

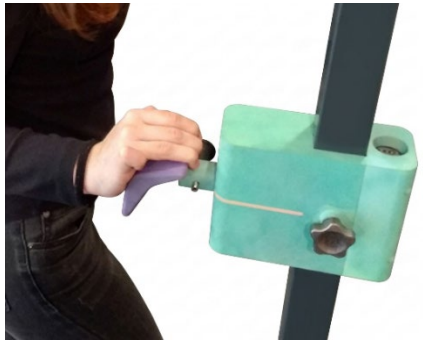
Foot scanner

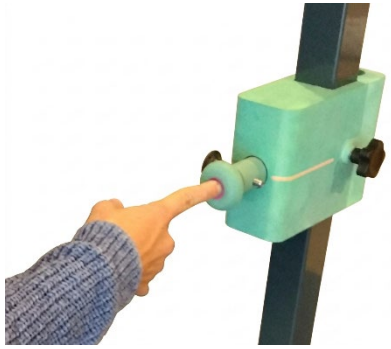
3D Infoot Scanner was used in the anthropometric campaign to extract **21 measurements**.

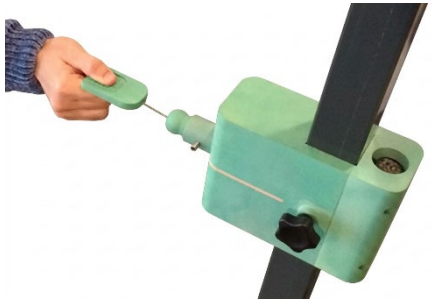




Strengths protocol





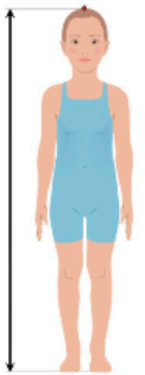


Strengths Device

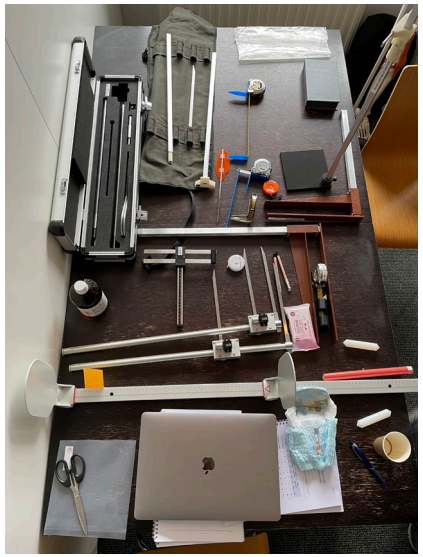
Strengths protocol was different for each age group. In the case of 1-3 years old only 5 **strengths** were registered, while for older children **14 strengths** were measured.

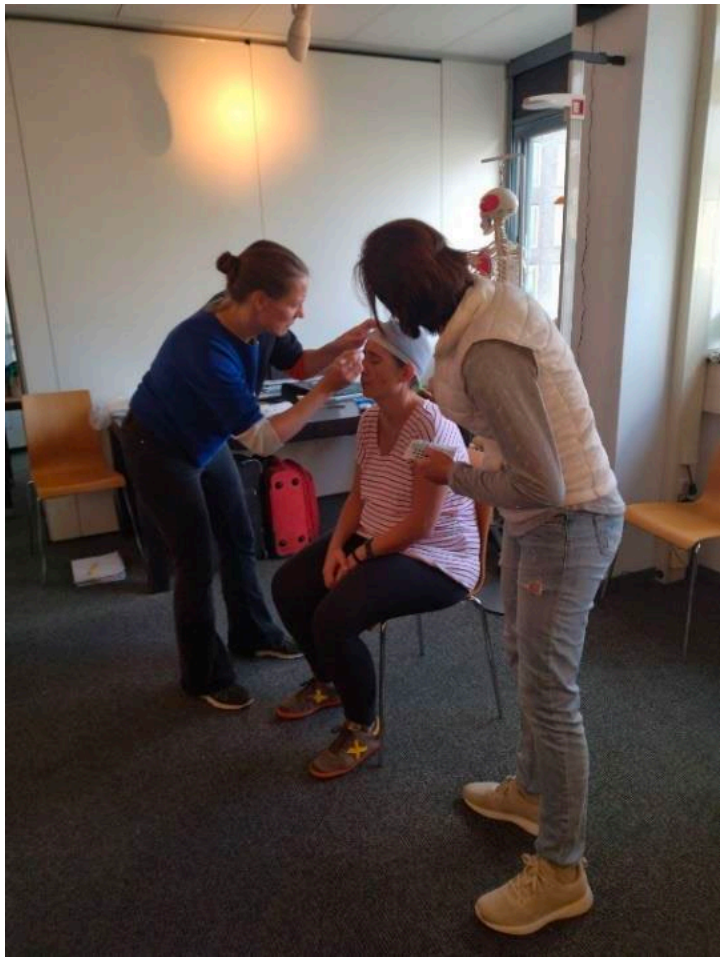
Methodology Harmonization

- Detailed shared protocols provided by lead partner
- Methodological alignment & training meetings
- Alignment of measurement instruments
- Joint pilot evaluation

Name	2. Stature
Source	ISO 7250-1:2017, 6.1.2 — ISO 8559:2017, 5.1.1
Definition	The vertical distance from the standing surface to the vertex (the top of the head).
Instrument	Stadiometer
Preliminary instructions	Place the stadiometer on a resistant, regular and flat surface against a wall. Whenever is possible, avoid placing it on walls with plinth.
Subject Posture	Look straight ahead, making sure that the child's line of sight is parallel to the floor. Child's legs have to be straight even heels and calves must be close to the bottom of the stadiometer. The head, shoulder blades and buttocks are in contact with the stadiometer.
Measurer task	The measurer holds the head of the subject placing his/her hands behind the mandibles (index and thumb are used to check the head orientation in the Frankfurt plane and corrects the head posture if it is wrong. Then asks the subject to breath and, at the same time, she/he pushes upwards the head to stretch the body in the vertical direction.
Assistant task	When the measurer gives the order, the assistant moves the sliding part of the stadiometer until it contacts with the vertex and compress the hair until the skull stops the sliding part.
Images	

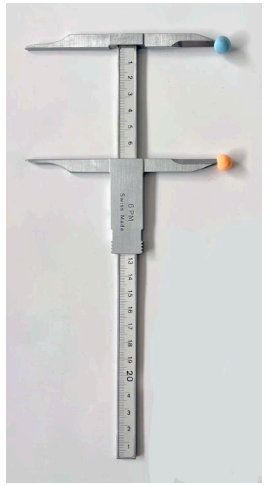
Methodology Harmonisation





Child-Friendly Approach (NL)

Adapted measurement equipment



Playful room decoration

Child-Friendly Approach (ES)

Adapted measurement equipment

Playful room decoration

Recruitment Strategy

- Age-specific approach to cover for varying parent & child availability
- Multi-channel approach to ensure momentum
- Lab & mobile sessions
- Representativeness check

Recruitment Strategy (Netherlands)

Youth Health Care

JGZ Zuid-Holland West
Consultatiebureau voor kind en jeugd

Sarphati amsterdam research for healthy living

Socio-Cultural

Het Sporthuis Abcoude

DE HILLEVLIET

Day Care Facilities

CompaNanny Kinderdagverblijf

partou

Dak kindercentra Opgroeien in de buurt

Kids and Carrots Kinderopvang

Primary Schools

Laurentius onderwijs en kinderopvang

Christelijke basisschool De Ark

MBS

Montessori Delft onderwijs & opvang

De Waterwilg

De Parel onderwijs met de Bijbel als basis

de Schatkaart

rk basisschool St. Jozef

het Mozaïek

LIDUINA BASISSCHOOL

Secondary Schools

LdV DA VINCI COLLEGE KAGERSTRAAT

rudolf steiner college

Stanislas college

General Media

NOS Jeugdjournaal

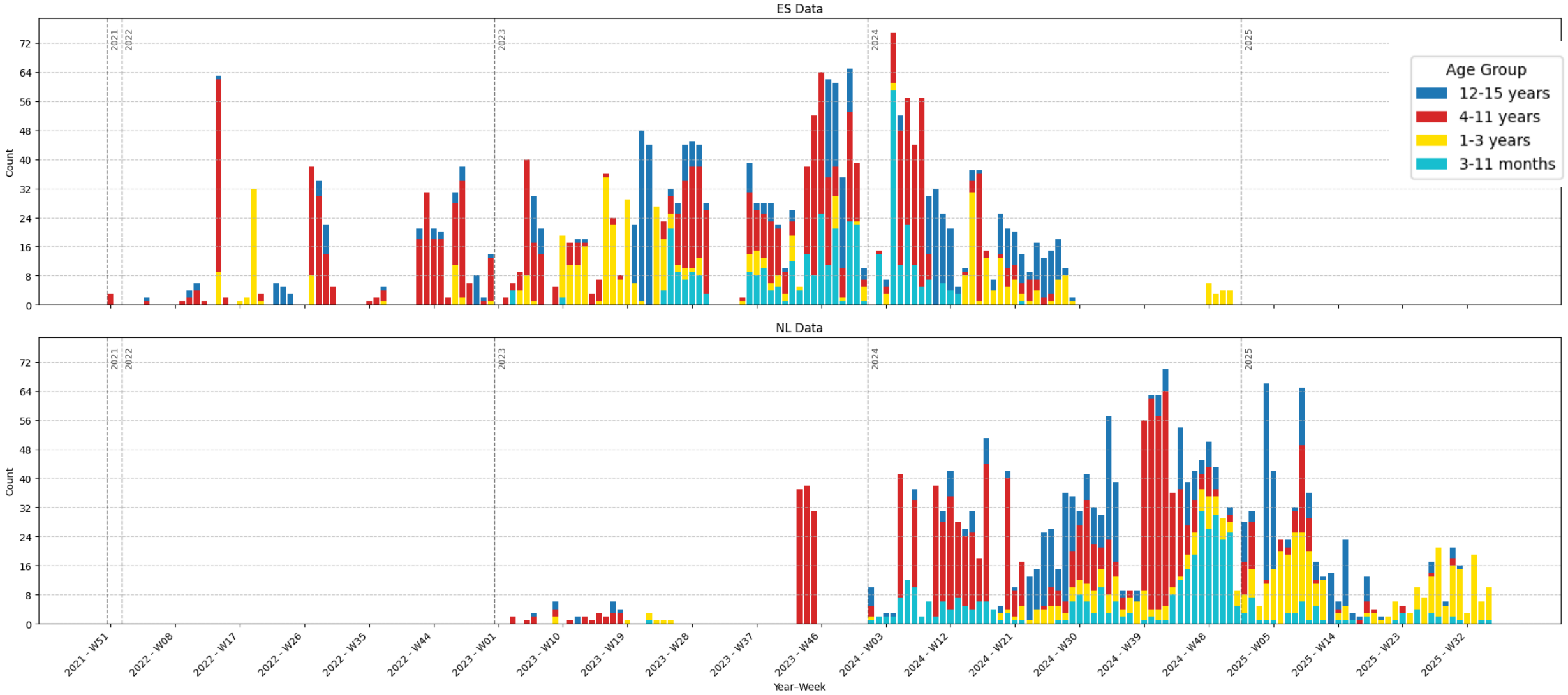
facebook

Instagram

SnapChat

TU Delft

Survey Progression (Anthropometrics)



Digital Workflow & Quality Control

PARTICIPATING COUNTRY TU Delft

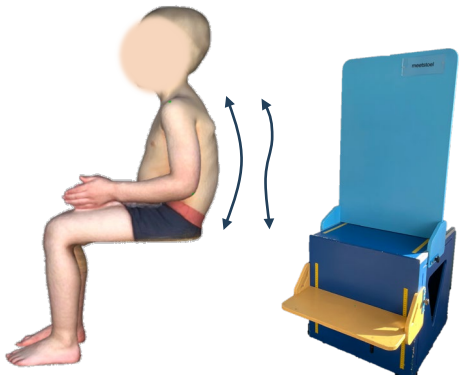
TECHNICAL PROJECT LEAD IBV

Measuring	Screening	Sharing	Processing	Storing
Data collection Measuring and 2D/3D scanning of the participants at the different locations	**Local data screening** Quality checks of measurements and scans performed on-site by the data screening team.	**Data sharing with lead partner** Screened data is transmitted, in structured format, to the lead partner for centralised processing.	**Data processing by lead partner** Measurement extraction from 2D/3D scans, followed by standardised screening, processing, and validation.	**Incorporation in dataset** Validated records are merged into the canonical dataset for sharing with CEN.

TRAINING OF MEASUREMENT TEAM
INSIGHTS FROM DATA SCREENING

TRAINING OF MEASUREMENT TEAM
INSIGHTS FROM DATA PROCESSING

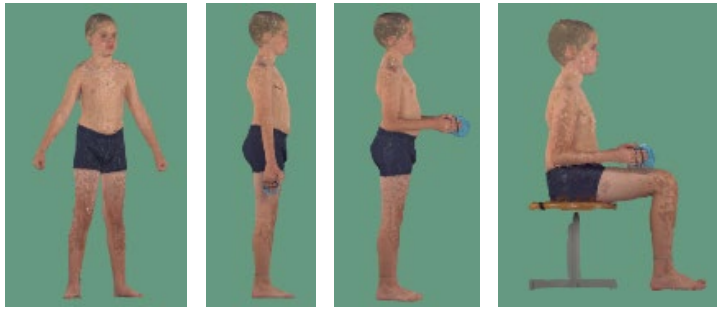
Example issue: posture not fully erect



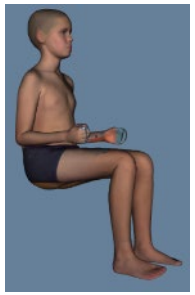
Harmonized Data Processing

Capture → Back-up → Data Export → Processing → Data analysis → BD creation

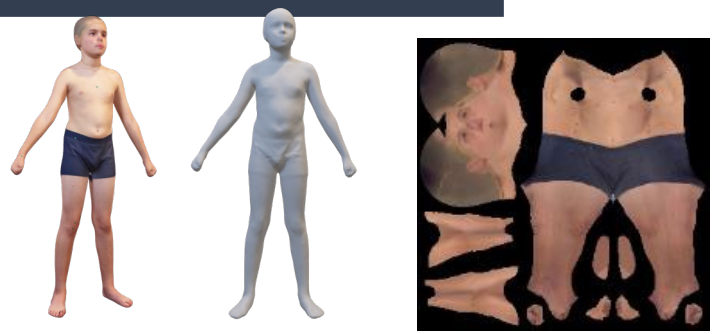
1. 3D Capture



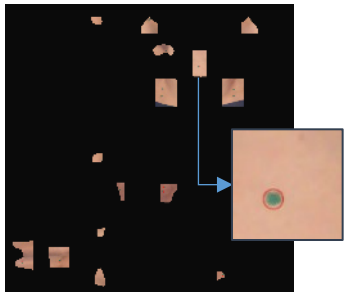
2. Stool removal



3. Processing and export Data



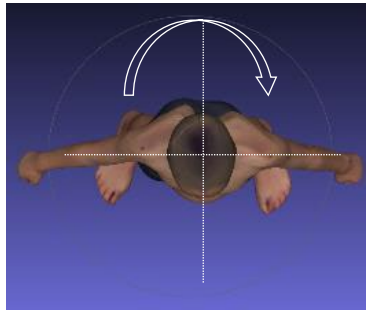
4. Landmark detection



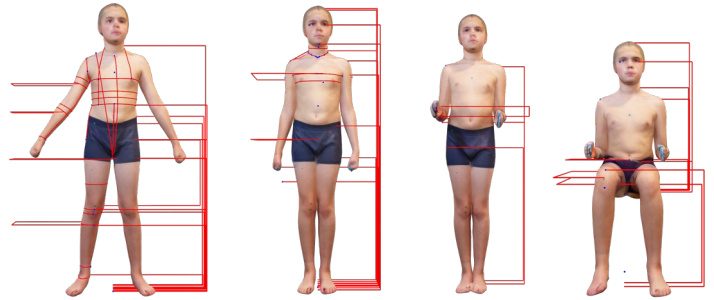
Total Processed Scans
17,712
(2D + 3D scans)

5. Landmarks Check

6. Orientation

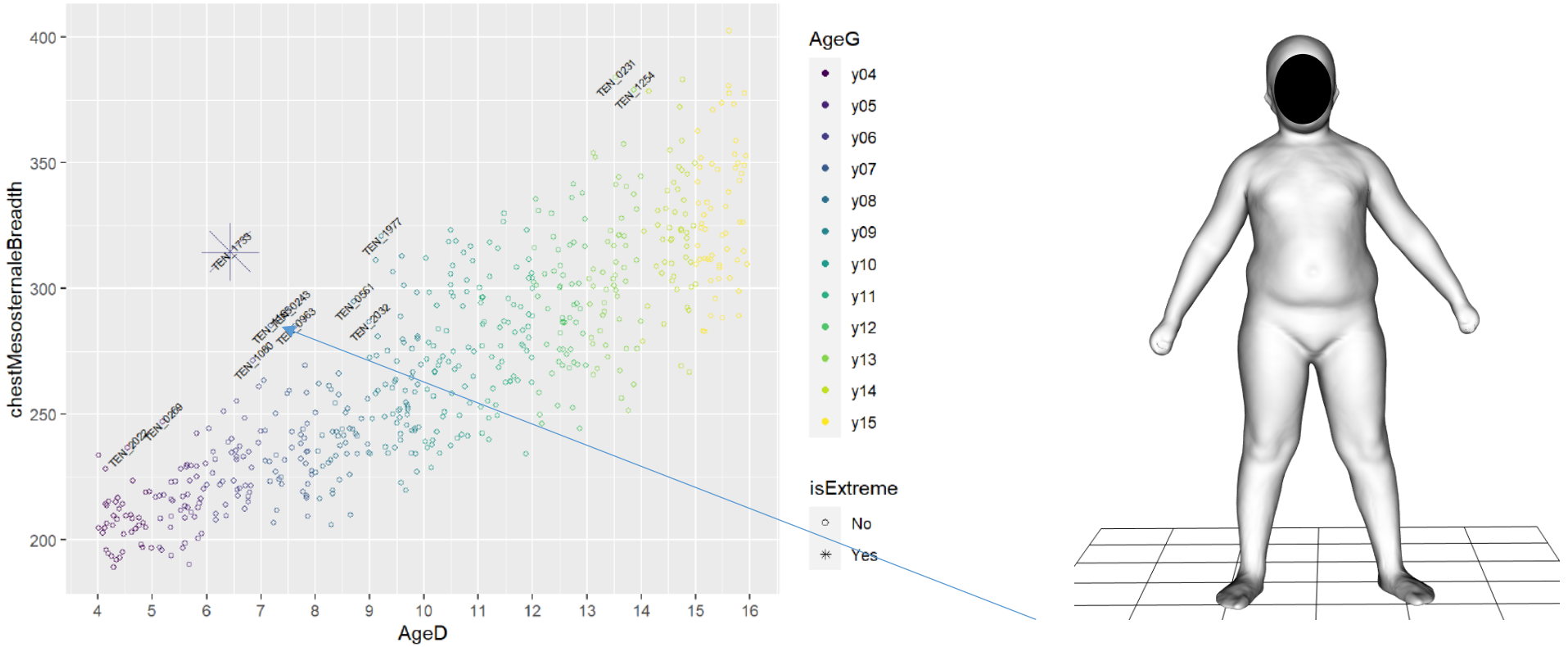


7. Measuring



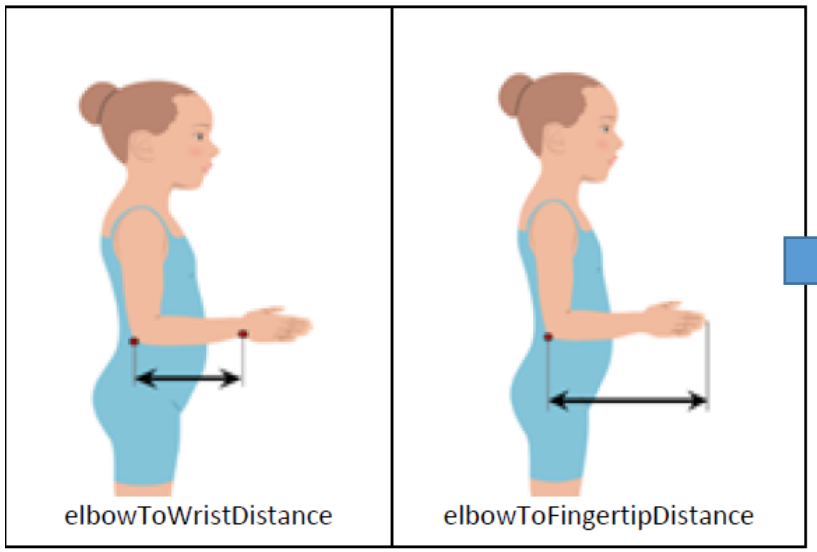
Data Analysis

Capture | Back-up | Data Export | Processing | Data analysis | BD creation



Data Analysis

Capture | Back-up | Data Export | Processing | Data analysis | BD creation



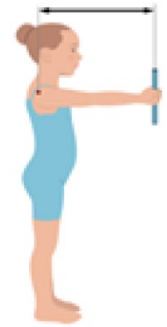


Figure 27: armToGripLength

Current armToGripLength and armToGripLength2 are highly correlated ($R^2 = 0.96$)

Table 14 Arm length to grip model

```
Residuals:
    Min      1Q  Median      3Q     Max
-50.474 -10.818   0.797  10.940  50.350

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     27.91611    8.14310   3.428 0.000757 ***
armToGripLength2  0.89447    0.01456  61.446  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 17.21 on 176 degrees of freedom
Multiple R-squared:  0.9555,  Adjusted R-squared:  0.9552
F-statistic:  3776 on 1 and 176 DF,  p-value: < 2.2e-16
```

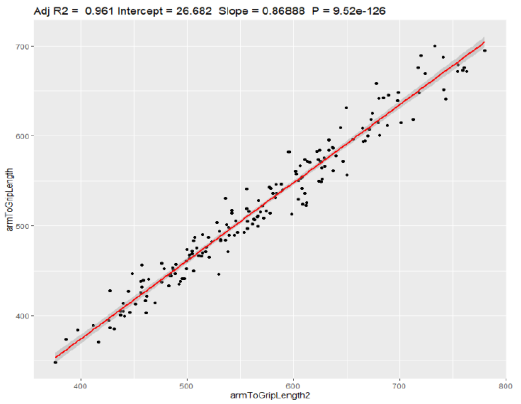


Figure 30: Regression model

The table below shows the percentiles of the actual measurement versus the predicted:

Variable	P05	P25	P50	P75	P95
armToGripLength	400.78	457.33	514.75	577.38	672.1
predicted	405.73	460.76	518.96	575.7	664.54
difference	-4.96	-3.42	-4.21	1.68	7.56

European Standardization Organizations

Results

CEN/TR 18296-1:2026. Ergonomics - Anthropometric and strength data of children in Europe — Part 1: Statistical summaries of the data

CEN/TS 122298-2:2026. Ergonomics — Anthropometric and strength data of children in Europe — Part 2: Guidelines for the correct application of anthropometric and strength data

Results

CEN/TR 18296-1:2026

Ergonomics - Anthropometric and strength data of children in Europe. Part 1: Statistical summaries of the data

5.9 Twisting (With hand)

Description: The maximum static force that can be exerted on an object by turning it (circular knob) with one hand in any direction. It is usually measured as the force with which a circular knob can be turned. See Figure 9.

Units: Newtons per meter (Nm)

Figure 9 — Twisting (With hand)

Method: The twist is performed from a standing position with the shoulder slightly adducted and neutrally rotated, the elbow flexed at 90°, the forearm in a neutral position and the wrist with functionally extended. The subject performs the twist in the opening direction. No slipping between the fingers and the object during measurement.

The knob is available in two diameters to ensure a comfortable and secure grip. Its dimensions are designed to remain within, and closely match, the subject's hand breadth and approximately half the length of the dorsum of the hand plus the proximal phalanx of the middle finger.

— Small: 50 mm

— Large: 65 mm

Table 8 — Twisting (With hand)

Age	Sex	N	P01	P05	P10	P25	P50	P75	P90	P95	P99
y02	U	80	0.06	0.14	0.18	0.28	0.40	0.53	0.65	0.74	0.89
y02	F	41	0.05	0.13	0.18	0.28	0.40	0.52	0.64	0.72	0.87
y02	M	39	0.06	0.14	0.18	0.28	0.40	0.53	0.67	0.75	0.93
y07	U	146	0.67	0.88	1.00	1.23	1.52	1.86	2.19	2.41	2.86
y07	F	73	0.69	0.87	0.98	1.18	1.46	1.79	2.14	2.38	2.88
y07	M	73	0.65	0.89	1.03	1.28	1.59	1.92	2.24	2.43	2.82
y11	U	142	1.21	1.59	1.82	2.24	2.76	3.35	3.94	4.32	5.09
y11	F	70	1.18	1.59	1.84	2.29	2.84	3.45	4.04	4.42	5.18
y11	M	72	1.21	1.57	1.78	2.19	2.70	3.27	3.85	4.22	4.98
y13	U	146	1.63	2.14	2.45	3.02	3.75	4.57	5.39	5.92	
y13	F	74	1.52	1.97	2.24	2.75	3.39	4.13			
y13	M	72	1.92	2.47	2.80	3.40					

14 strengths

Results

CEN/TR 18296-1:2026

Ergonomics - Anthropometric and strength data of children in Europe. Part 1: Statistical summaries of the data

9.2.57 Waist girth

Reference: EN ISO 7250-1:2017, 6.4.11
ISO 8559-1:2017, 5.3.10

Landmarks: Lowest rib point, Highest point of the hip bone

Units: mm

Description: Horizontal circumference of the trunk at a level midway between the lowest ribs and the highest point of the hip bone.

Posture: A-POSE

Group y4–16: Scan

Group y1–4: Traditional

Group y0–1: Not measured

Figure 122 — Waist girth

Table 71 — Table of percentiles 1 to 99: Waist girth (mm)

Age	Sex	N	P01	P05	P10	P25	P50	P75	P90	P95	P99
y01	U	380	396	419	431	452	474	496	516	528	551
y01	M	200	402	424	436	455	477	498	517	528	549
y01	F	180	391	414	426	447	471	495	516	529	553
y02	U	188	435	449	458	473	493	516	541	557	595
y02	M	96	440	453	460	475	494	517	544	563	611
y02	F	92	430	446	455	471	491	514	538	553	586
y03	U	160	449	465	475	492	514	539	564	581	617
y03	M	80	442	463	474	494	515	537	556	568	
y03	F	80	450	466	475	492	514	541			
y04	U	172	462	483	494	511					
y04	M	86	457	484	496						
y04	F	86	466	482	491						
y05	U	166	474	490	499						
y05	M	86	474	491	501	5					
y05	F	80	472	488	498	51					
y06	U	160	469	490	502	525					
y06	M	82	476	497	509	532					
y06	F	78	464	484	496	518					
y07	U	160	486	506	517	540					
y07	M	80	486	505	517	538	5				

198 Anthropometric measurements:
Body 89
Foot 22
Hand 38
Head 22
Reach 12
Sitting 15

CEN/TS 18296-2:2026 Ergonomics — Anthropometric and strength data of children in Europe — Part 2: Guidelines for the correct application of anthropometric and strength data

Responsible scientists:
Prof. Dr. Christiane Scheffler, University of Potsdam
Dr. Gerd Küchmeister, Kiel University of Applied Sciences

APPLICATION: DESIGN AND PRODUCTION OF CHILD PRODUCTS

Anthropometric data for safe, functional and child-centered products

1. UNDERSTAND
Define target group and research anthropometric data

2. DESIGN
Develop product concept and ergonomics based on anthropometric data

3. EVALUATE
Test with children for fit, comfort, usability and function

4. PRODUCE
Implement production with focus on safety and quality

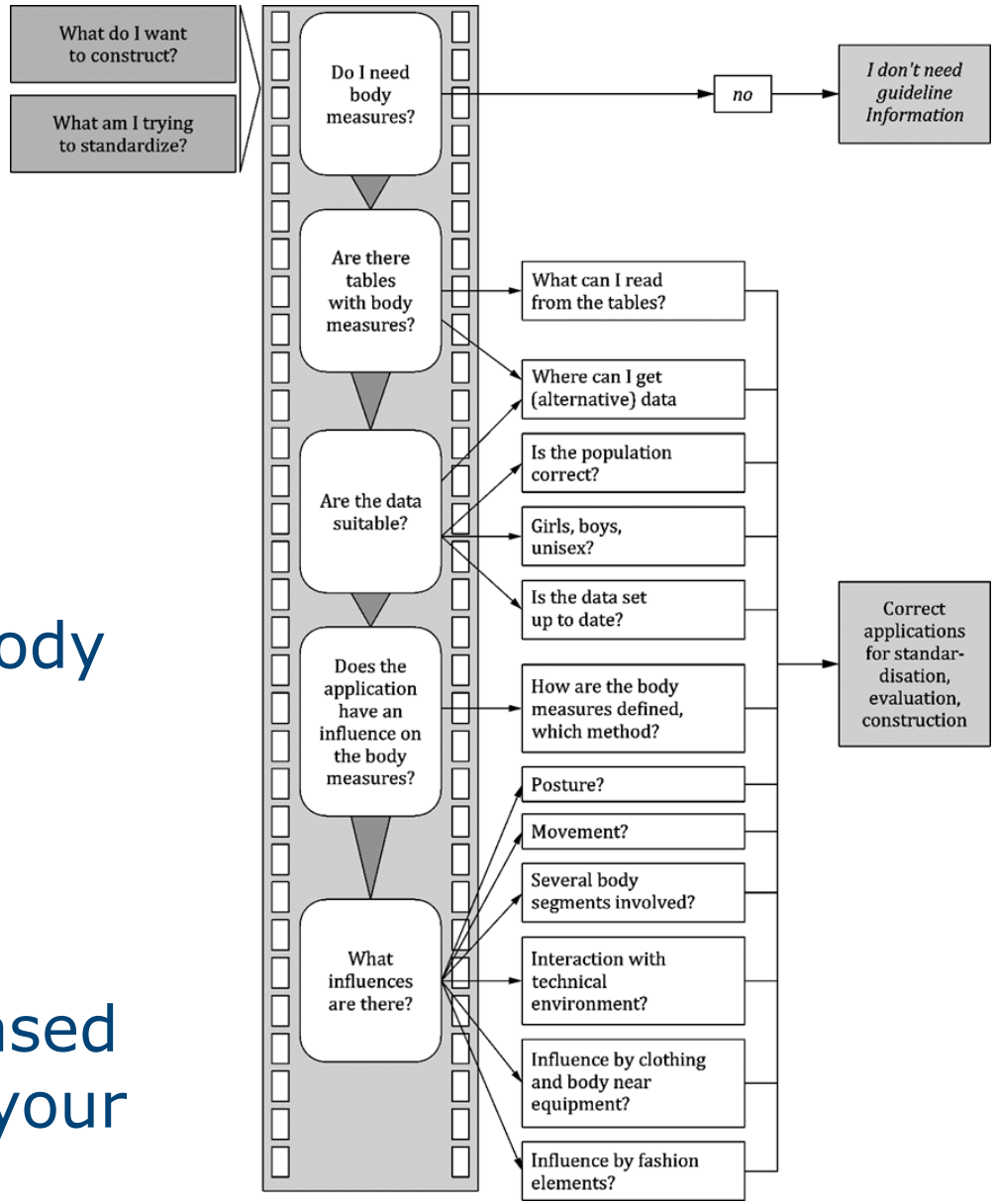
5. MONITOR
Ensure quality and continuously improve based on data

BASIS:
Anthropometric data of children in Europe

OUTCOME:
Products that fit children, provide protection and are easy to use

BENEFITS:
More safety, comfort and satisfaction for children, parents and manufacturers

Basic influence factors

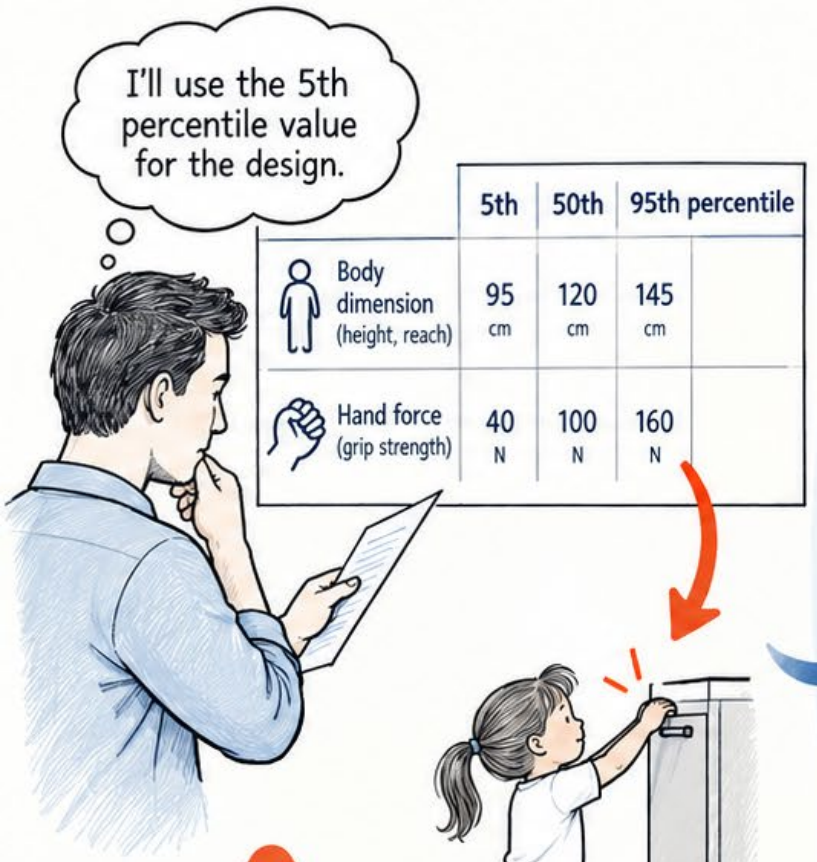


Find the right anthropometric and body strength data

(percentile values …)

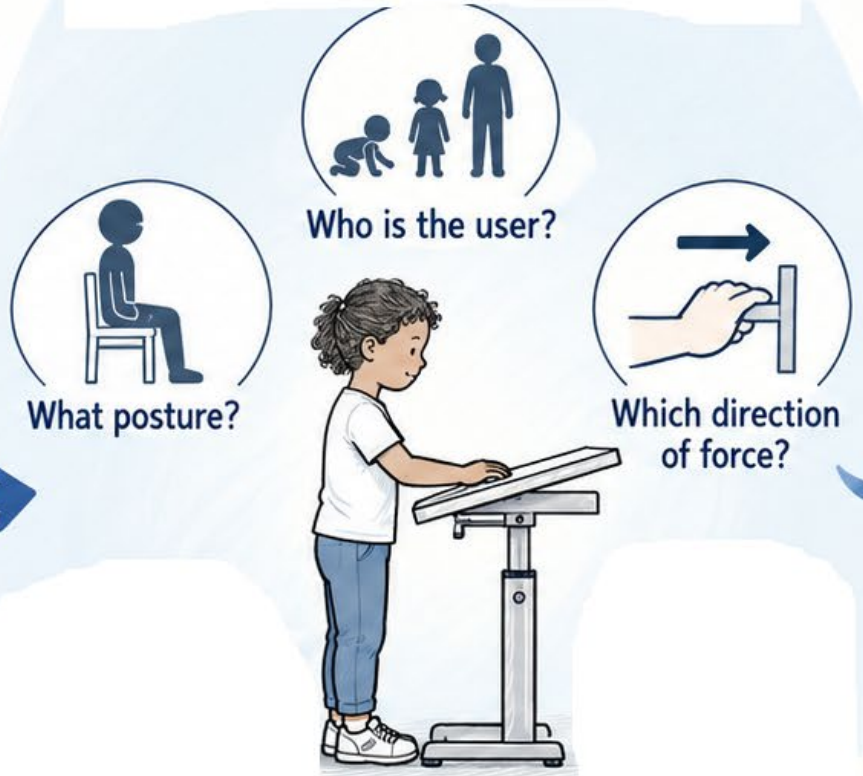
… and assess them based on their relevance to your application case.

A percentile is a number — not yet a design solution



	5th	50th	95th percentile
Body dimension (height, reach)	95 cm	120 cm	145 cm
Hand force (grip strength)	40 N	100 N	160 N

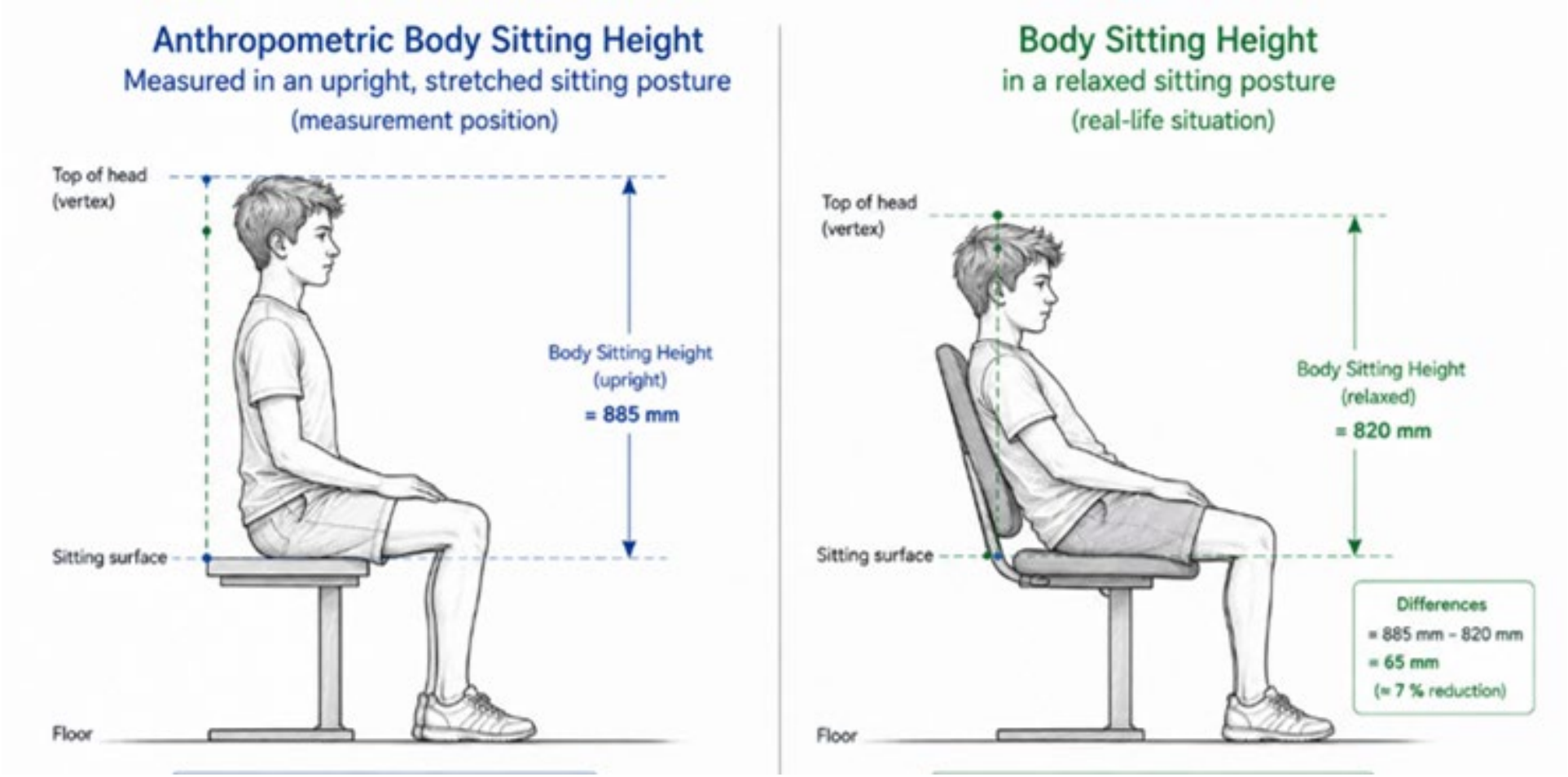
DATA ALONE



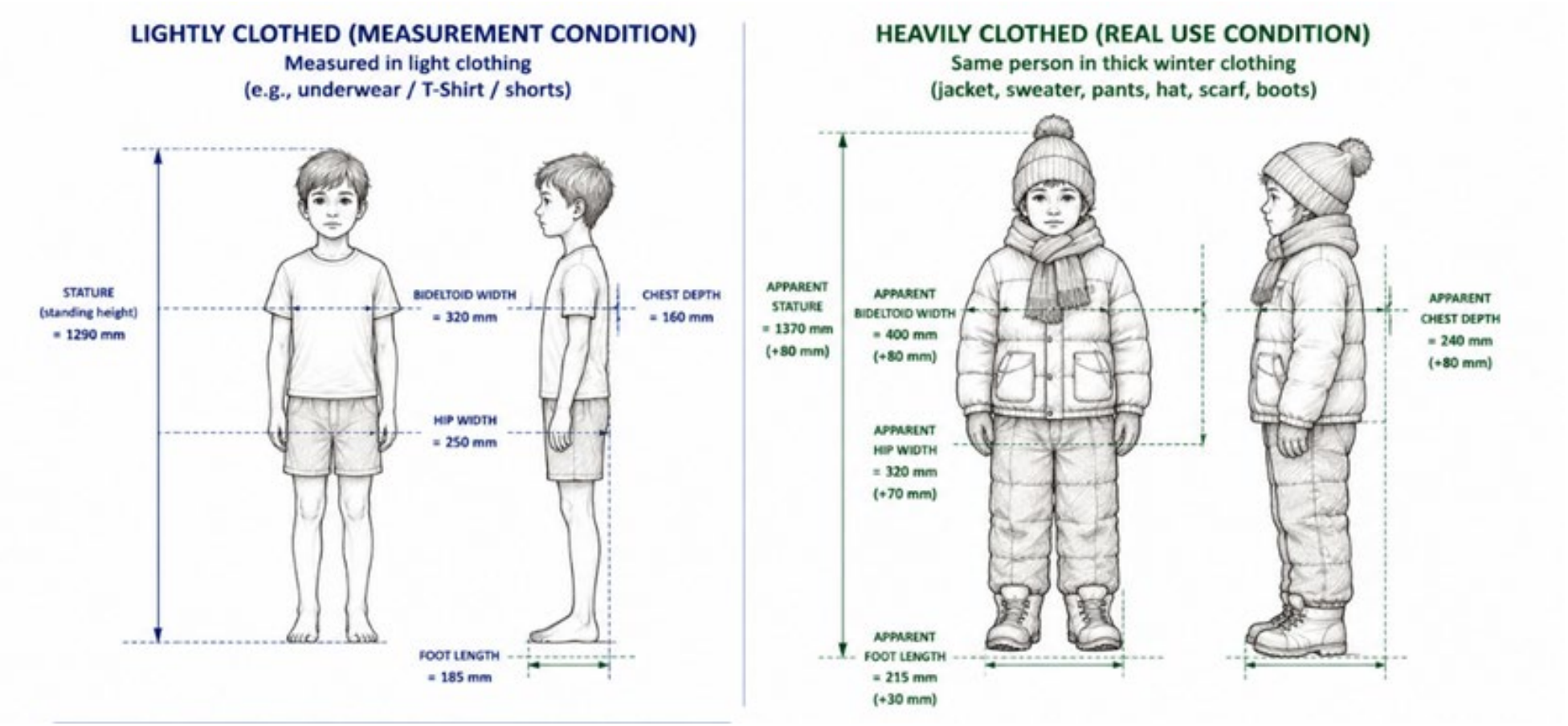
TRANSFER

CORRECT APPLICATION

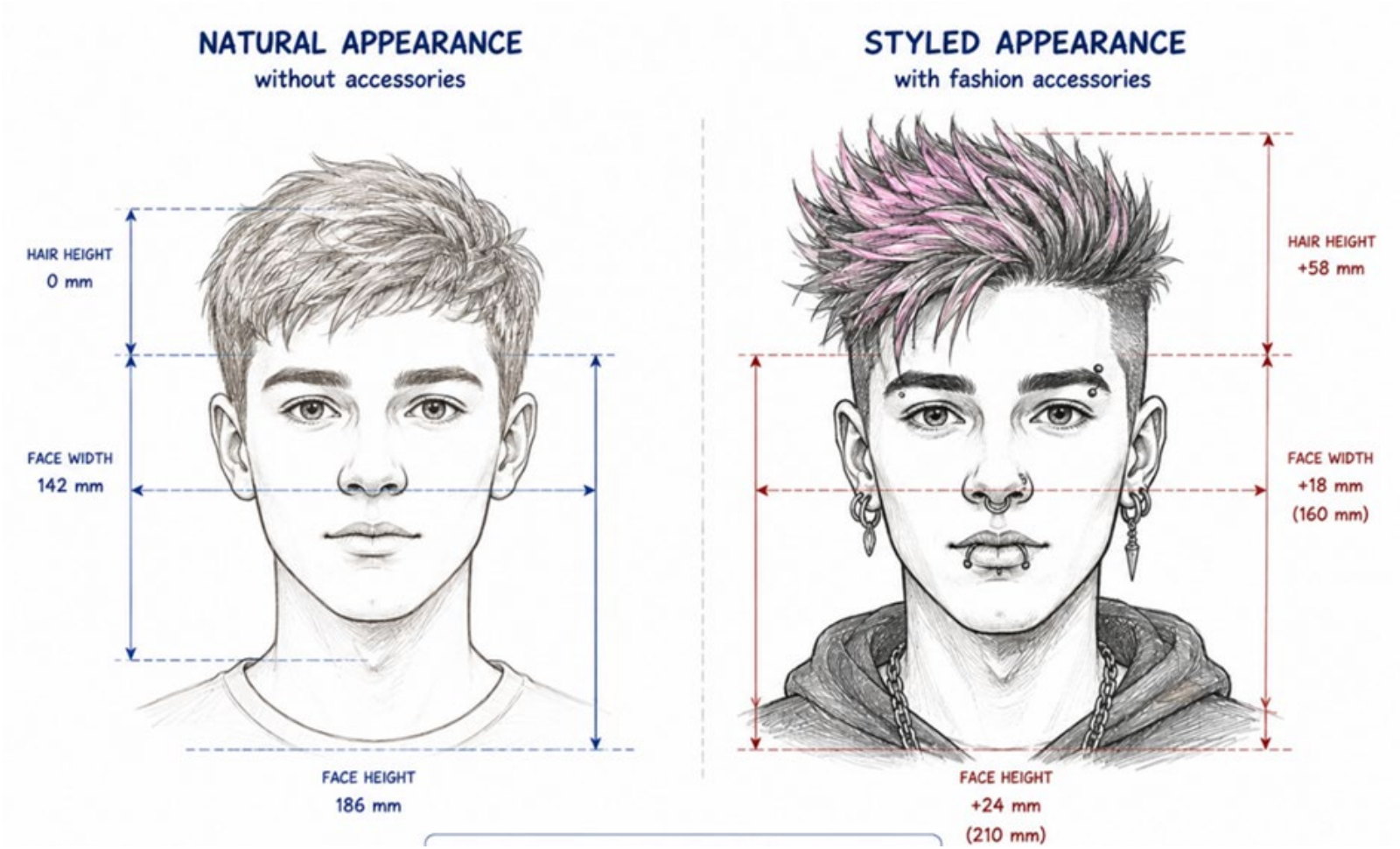
Influence factor: difference between measurement posture and application case



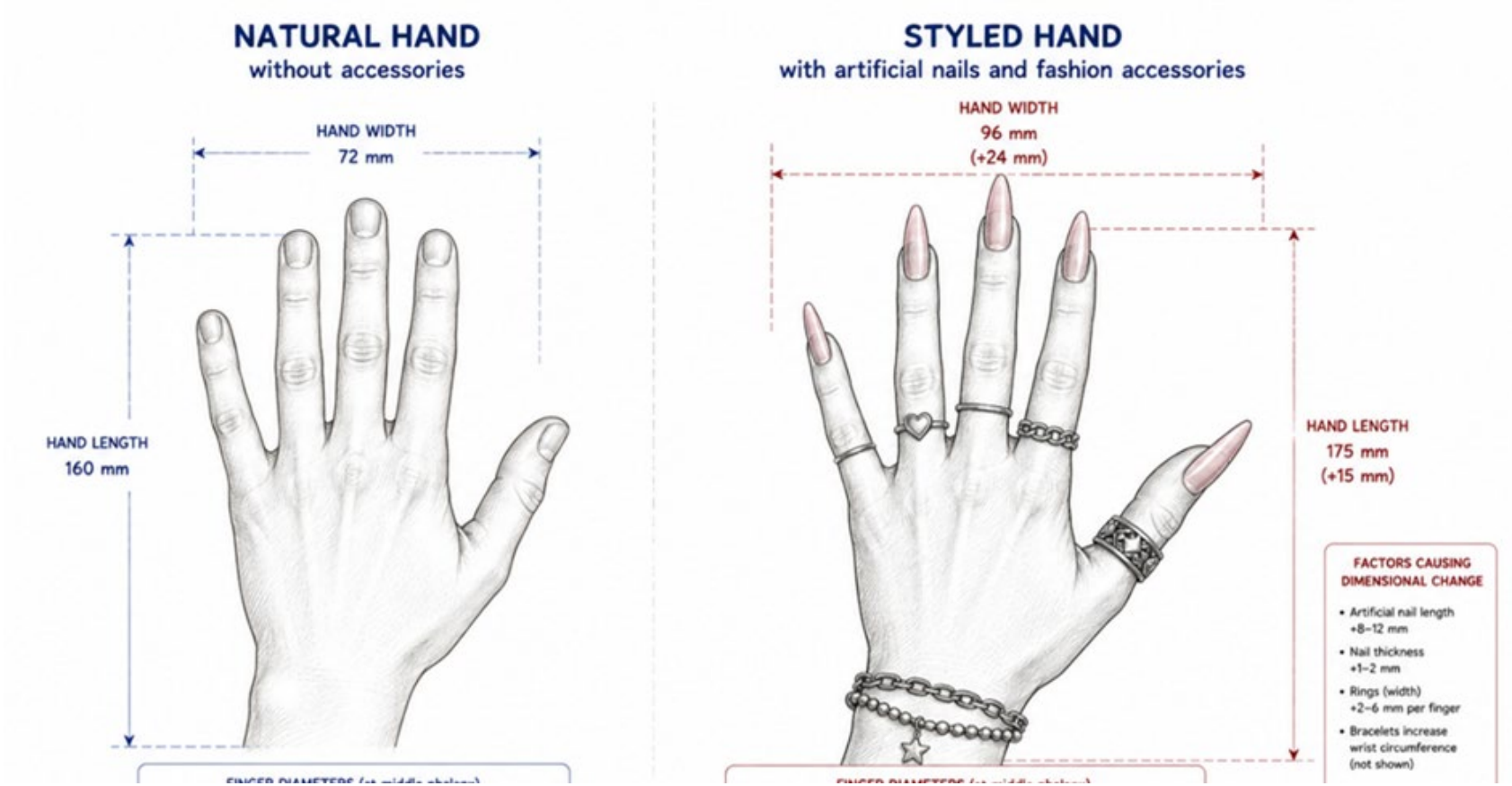
Influence factor: clothing



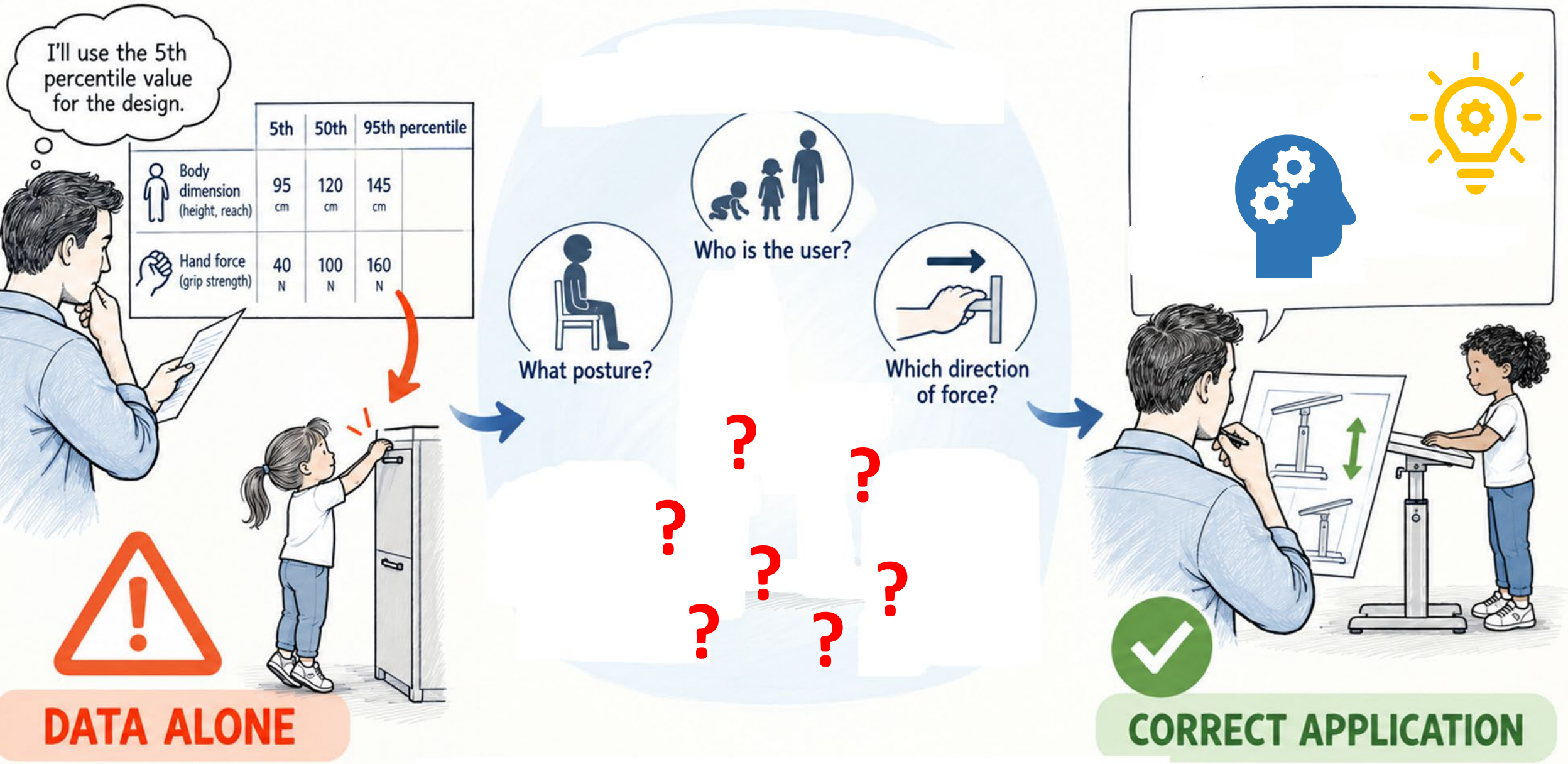
Influence factor: styling I



Influence factor: styling II



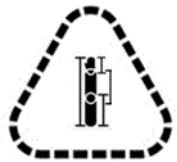
Where to find the answers?

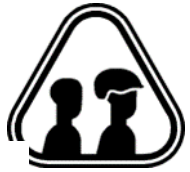


Development of a toolbox

Bio transfer data

Statistical/ methodological transfer data



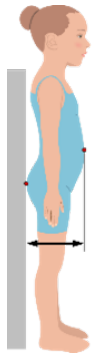


Interface transfer data

Example

Table A.39 — Table of percentiles 1 to 99: Body depth (standing) (mm)

Age	Sex	N	P01	P05	P50	P95	P99
y4-6	U	484	160	169	195	231	250
y4-6	F	238	162	171	197	233	253
y4-6	M	246	159	167	192	228	247
y7-9	U	540	174	185	218	270	301
y7-9	F	270	179	188	220	276	315
y7-9	M	270	170	181	216	264	290
y10-12	U	664	189	201	238	293	326
y10-12	F	332	192	203	237	289	320
y10-12	M	332	187	199	238	297	331
y13-15	U	662	204	216	254	313	349
y13-15	F	330	209	221	**257**	311	342
y13-15	M	332	201	212	**251**	315	358



Bio transfer data	Interface transfer data	Statistical aspects
 	 	

The following influencing factors shall be taken into account when using this body measure in an ergonomic context or when using it in standards:

— The measured body part or body segment is a link in a joint chain, i.e. its value changes if the body posture in which the standardised measurement was taken is abandoned during use.

— Soft tissues are involved in the measurement of this body part or body segment (e.g. muscles, subcutaneous fatty tissue, other non-skeletal components). Accordingly, the value can change in an application situation because the body is not in the state as measured (movement, breathing).

— During application, allowances shall be made for clothing worn close to the body on the measured body part or body segment.

— Contact of the body surface in the area of this body measure with the technical environment (interface) can result in varying degrees of change to the specified value (compression of non-skeletal areas, displacement of soft tissue). The extent depends on the form and dynamics of the contact at the interface in the respective application situation

— Comparing M/F in age group y13-15 P50-values are higher for F what can be of ergonomic relevance in application cases.

Resumé and outlook

- **User driven approach**: Thanks to this approach – which involves continuously and very closely engaging stakeholders and experienced standards experts in the design and substantive issues – the guidelines now available represent an exemplary example of knowledge transfer from research to practice.

- **Add on value**: The addition of guidelines on the correct use of data to the anthropometric survey of children in Europe has been well received, both in expert discussions within the international standardisation community and within the scientific discourse in the field of applied anthropometry.

- **Outlook:** In both standardisation and transfer-oriented research, practical information on the application of anthropometric data, as proposed in the guidelines, must no longer be overlooked. In this respect, the guidelines should serve to set the benchmark for the structure and content of **future standards with anthropometric and body strength data**.

Anthropometric & strength data of children for use in standardisation

Relevance for standardisation community

Levent ÇAGLAR
Chief Ergonomist @ FIRA International, UK

Anthropometric & Strength Data for Children in Europe

CEN/TR 18296-1:2025

Ergonomics - Anthropometric and strength data of children in Europe

Part 1: Statistical summaries of the data

CEN/TS 18296-2:2026

Ergonomics - Anthropometric and strength data of children in Europe

Part 2: Guidelines for the correct application of anthropometric and strength data

CEN TR 18296 -1: 2026
Contains comprehensive set of anthropometric and strength data for children in Europe.

It is

- extensive;
- relevant;
- up to date;
- reliable;
- accessible as CEN Document, and
- accompanied by Guidance document on its use (Part 2).

Anthropometric & Strength Data for Children in Europe

Reliable and appropriate anthropometric & strength data are:

- the building blocks for the development of ergonomic and safe products which enhance the user experience and comfort;

- the essential tools for
  - ✓ specifying safety requirements in product standards
  - ✓ devising test methods in standards,
  - ✓ carrying out risk assessments.

Anthropometric & Strength Data for Children in Europe

Appropriate anthropometric data ensures that products children use or come into contact with

- match the sizes of children
- are fit for purpose
- are easy & efficient to use
- are safe
- improve the development, health and well being of children

Anthropometric & Strength Data for Children in Europe

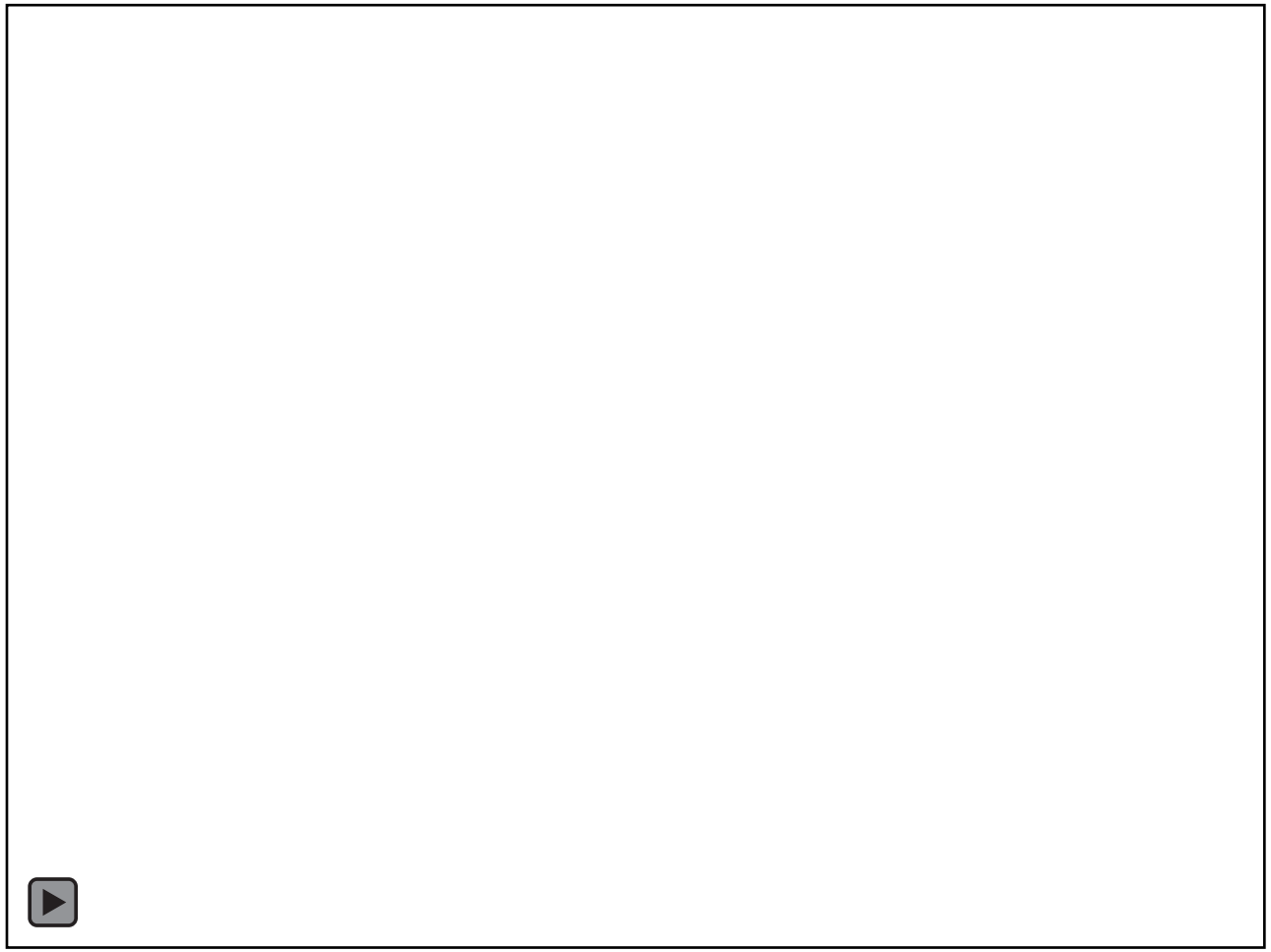
Ensuring operation of controls are beyond the strength of children, for stopping them having access to danger

Or in other circumstances where children should be able to get away from danger, by ensuring the operation of controls should be within the strength capability of children

Anthropometric & Strength Data for Children in Europe

Children grow continuously, their sizes and shapes change all the time.

Range can be very large even for the same age.



Anthropometric & Strength Data for Children in Europe

Children grow continuously, their sizes and shapes change all the time.

Range can be very large even for the same age.

Anthropometric & Strength Data for Children in Europe

CEN TR 18296 Pt 1 provides data for extremes as well as means.

Enabling the standard makers to identify the correct dimensions to prevent accidents and injury to children depending on the risk levels.

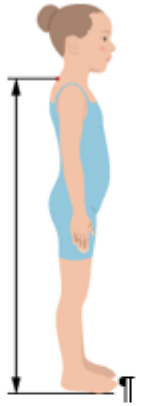


Figure 70 — Back neck height

Table 19 — Table of percentiles 1 to 99: Back neck height (mm)

Age	Sex	N	P01	P05	P10	P25	P50	P75	P90	P95	P99
y01	U	244	529	559	575	600	628	655	678	692	718
y01	M	122	550	571	584	605	629	655	680	695	725
y01	F	122	512	549	567	596	626	653	677	691	715

Anthropometric & Strength Data for Children in Europe

CEN TR 18296 Pt 1 provides data for each age and at 3-month intervals for the babies

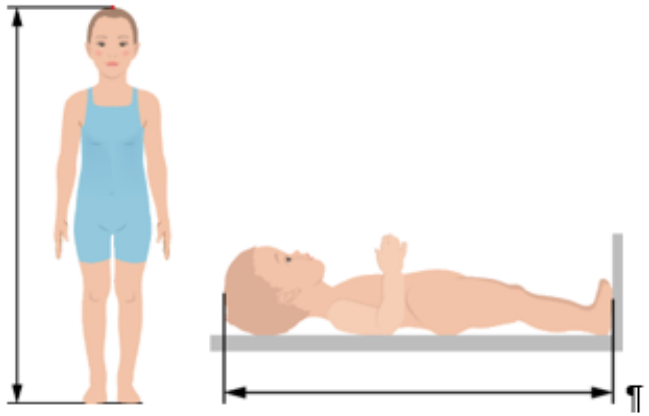


Figure 67 — Stature (y0–1 right)

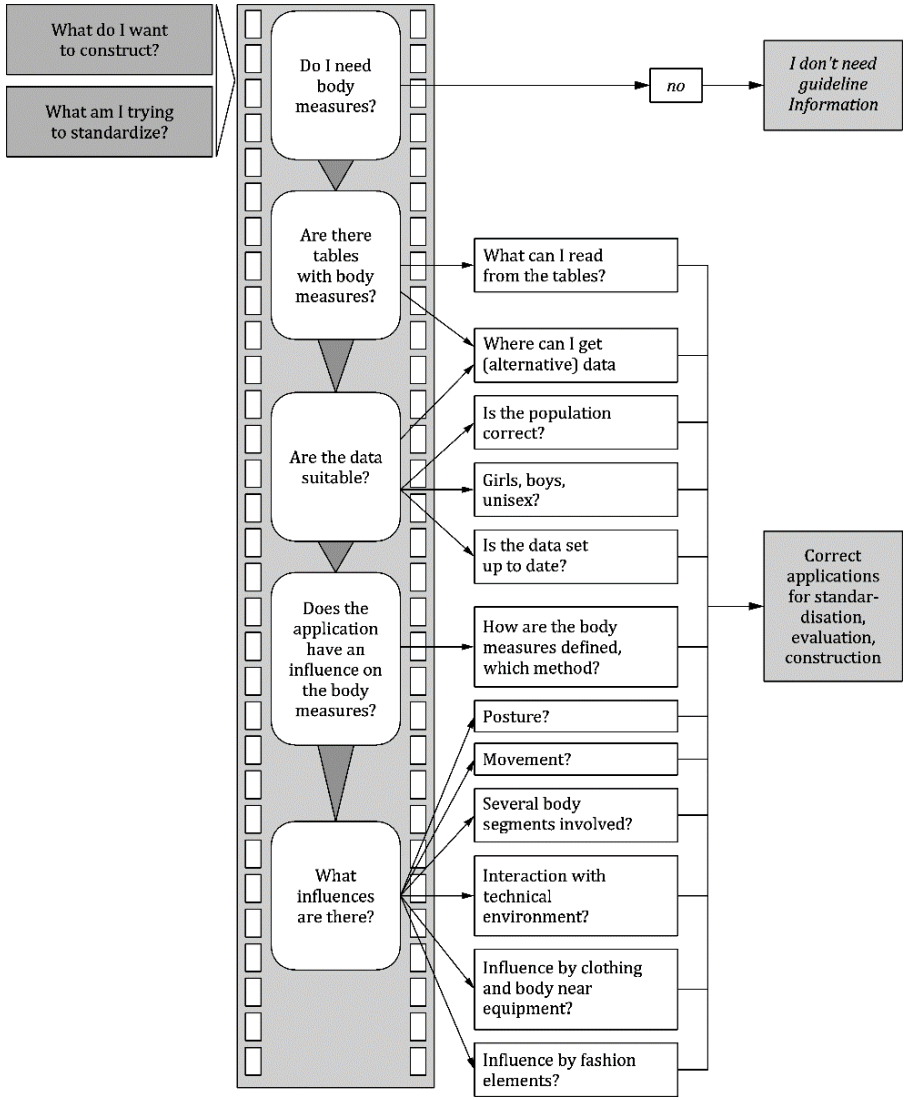
Table 16 — Table of percentiles 1 to 99: Stature (mm)

Age	Sex	N	P01	P05	P10	P25	P50	P75	P90	P95	P99
m03	U	256	555	581	595	616	640	663	683	694	716
m03	M	128	563	590	603	625	647	669	688	698	718
m03	F	128	551	575	588	609	632	655	676	689	712
m06	U	250	617	637	647	665	685	705	723	734	755
m06	M	126	621	642	653	672	693	713	732	743	764
m06	F	124	610	632	643	661	679	696	711	719	735

CEN/TS 18296 Part 2: Guidelines for the correct application of anthropometric and strength data

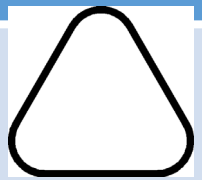
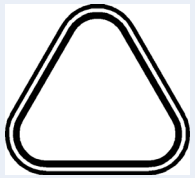
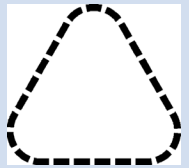
It is unique to have guidelines for the use of anthropometric and strength data.

Guidance on the selection and application of and the limitations in the manipulation of anthropometric data is extremely useful for the standard makers who are after all not anthropometricians.



CEN/TS 18296 Part 2: Guidelines for the correct application of anthropometric and strength data

Use of icons in warning the standard makers factors which affect the use of data (***Beyond numbers***) is an excellent idea and will be extremely helpful for the standard makers.

Icon frame for bio transfer	
Icon frame for interface transfer for the interaction between body part and technical elements at the interface	
Icon for personal data clothing and self-imposed physical alterations	

Anthropometric & Strength Data for Children in Europe

In conclusion, having access to the relevant anthropometric and strength data and the guidance document will help

- the standard makers to draw up relevant safety requirements and test methods/equipment for product standards, and also

- the designers to develop products and services which are safe, comfortable and joy to use.

Anthropometric & Strength Data for Children in Europe

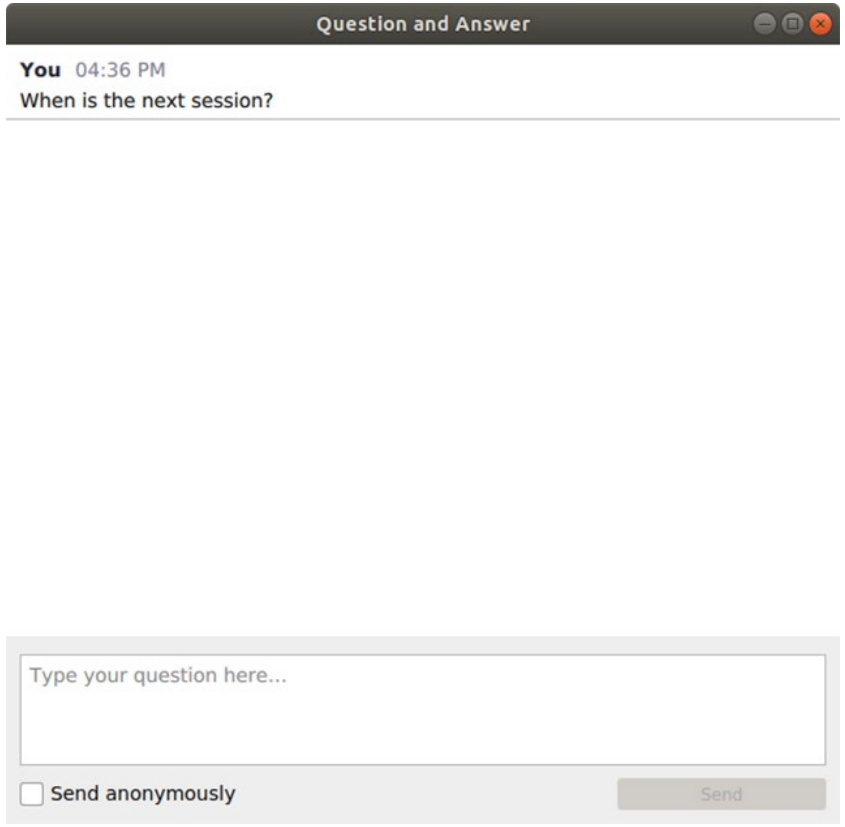
Producing clothing, shoes, gloves fit well
improves the user experience and
helps the development of children

Correctly sized furniture allows children
adopt healthy postures
avoiding back pain in the long term

Your feedback

Question time

- Use the Q&A panel to submit your questions



European Standardization Organizations

Thank you for your participation!

Upcoming events/webinars:

2026-09-11 – Webinar 'Climate Resilience in Standardization: Applying CEN-CENELEC Guide 32'

2026-09-14 - Webinar 'Harmonized standards in support of the Machinery Regulation: Update of gap-analysis and new Annex ZA/ZZ'

2026-10-01 - Webinar 'The EN Development Process - First batch of changes'

2026-10-06 - Webinar 'Towards a New European Anthropometric Database for User-Driven and Inclusive Standards'