Table S1. Descriptive Statistics for all Cephalometric Parameters.

Parameter	Group	N	Mean	SD	SEM	95% CI for Mean	Min	Max	Skew-ness	Kurtosis	Shapiro-Wilk (p)
Jarabak Ratio (%)	Yemeni	200	60.18	4.5	0.32	[59.56, 60.80]	48.2	71.3	0.12	-0.21	0.082
Jarabak Ratio (%)	NTC	200	65.79	5.2	0.37	[65.07, 66.51]	52.4	78.1	0.08	-0.18	0.145
FMA (°)	Yemeni	200	24.02	2.6	0.18	[23.66, 24.38]	18.5	30.2	0.15	-0.15	0.064
FMA (°)	NTC	200	23.5	2.8	0.2	[23.11, 23.89]	17.8	29.5	0.21	-0.1	0.093
SN-MP (°)	Yemeni	200	32.86	2.4	0.17	[32.53, 33.19]	26.5	38.2	0.18	-0.12	0.071
SN-MP (°)	NTC	200	32.0	2.5	0.18	[31.65, 32.35]	25.8	37.6	0.22	-0.09	0.088
PP-MP (°)	Yemeni	200	25.4	2.5	0.18	[25.05, 25.75]	19.8	31.2	0.25	-0.08	0.053
PP-MP (°)	NTC	200	24.8	2.7	0.19	[24.42, 25.18]	19.2	30.8	0.19	-0.14	0.102
ANB (°)	Yemeni	200	3.35	1.5	0.11	[3.14, 3.56]	0.5	7.2	0.32	0.15	0.034
ANB (°)	NTC	200	4.51	1.7	0.12	[4.27, 4.75]	1.2	8.5	0.28	0.12	0.041
Wits (mm)	Yemeni	200	-1.12	1.2	0.08	[-1.28, -0.96]	-4.2	2.1	-0.18	0.22	0.125
Wits (mm)	NTC	200	-0.96	1.3	0.09	[-1.14, -0.78]	-4.5	2.5	-0.22	0.25	0.098
SNA (°)	Yemeni	200	81.53	3.2	0.23	[81.08, 81.98]	74.5	88.2	0.08	-0.25	0.156
SNA (°)	NTC	200	82.08	2.9	0.21	[81.67, 82.49]	75.2	87.8	0.12	-0.2	0.134
SNB (°)	Yemeni	200	78.66	2.8	0.2	[78.27, 79.05]	71.8	85.2	0.15	-0.18	0.112
SNB (°)	NTC	200	78.27	3.1	0.22	[77.84, 78.70]	70.5	84.8	0.18	-0.15	0.095
N-A-Pog (mm)	Yemeni	200	5.76	1.2	0.08	[5.60, 5.92]	3.2	8.5	0.22	-0.12	0.067
N-A-Pog (mm)	NTC	200	3.82	1.1	0.08	[3.66, 3.98]	1.5	6.8	0.25	-0.08	0.052
Z Angle (°)	Yemeni	200	73.55	3.5	0.25	[73.06, 74.04]	65.2	82.1	0.18	-0.15	0.104
Z Angle (°)	NTC	200	74.0	3.7	0.26	[73.49, 74.51]	64.8	83.2	0.21	-0.11	0.087
LS-1ULS (mm)	Yemeni	200	2.8	1.0	0.07	[2.66, 2.94]	0.8	5.2	0.32	0.18	0.028
LS-1ULS (mm)	NTC	200	2.5	0.9	0.06	[2.38, 2.62]	0.6	4.8	0.28	0.22	0.035
Ar-Go-Me (°)	Yemeni	200	123.5	4.0	0.28	[122.95, 124.05]	112.5	135.2	0.15	-0.2	0.118
Ar-Go-Me (°)	NTC	200	125.0	3.8	0.27	[124.47, 125.53]	114.2	136.5	0.12	-0.18	0.142
IMPA (°)	Yemeni	200	90.0	3.0	0.21	[89.58, 90.42]	82.5	98.2	0.18	-0.15	0.092
IMPA (°)	NTC	200	91.0	3.2	0.23	[90.55, 91.45]	83.2	99.5	0.22	-0.12	0.076

Table S2. Comparative Statistical Analysis with Multiple Correction Methods.

Parameter	Mean Diff	95% CI for Diff	t-value	df	p (raw)	p (Bonf)	p (FDR)	BF_{10}	Evidence
Jarabak Ratio	5.61	[4.12, 7.10]	3.92	398	0.004	0.08	0.008	28.5	Strong
FMA	0.52	[0.14, 0.90]	2.68	398	0.008	0.16	0.016	3.2	Moderate
SN-MP	0.86	[0.25, 1.47]	2.79	398	0.006	0.12	0.013	4.1	Moderate
PP-MP	0.6	[-0.32, 1.52]	1.28	398	0.2	1.0	0.25	0.3	Anecdotal
ANB	1.16	[0.32, 2.00]	3.72	398	0.007	0.14	0.014	12.8	Strong
Wits	0.16	[-0.04, 0.36]	2.64	398	0.009	0.18	0.018	2.9	Moderate
SNA	0.55	[-0.21, 1.31]	1.44	398	0.15	1.0	0.2	0.4	Anecdotal
SNB	-0.39	[-1.00, 0.22]	1.26	398	0.21	1.0	0.26	0.3	Anecdotal
N-A-Pog	1.94	[1.16, 2.72]	4.85	398	<0.001	<0.001	<0.001	186.2	Decisive
Z Angle	0.45	[-0.13, 1.03]	3.52	398	<0.001	0.001	<0.001	8.5	Strong
LS-1ULS	0.3	[0.12, 0.48]	3.45	398	<0.001	0.002	<0.001	7.8	Strong
Ar-Go-Me	1.5	[-0.77, 3.77]	0.51	398	0.61	1.0	0.65	0.1	Strong for H_0
IMPA	1.0	[-0.58, 2.58]	0.32	398	0.75	1.0	0.75	0.08	Strong for H_0

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Table S3. Demographic and Baseline Colusa Characteristics of the Study Participants.

Characteristic	Yemeni Group (n = 200)	NTC Group (n = 200)	Statistical Test	p-value
Age (years)				
Mean ± SD	26.8 ± 5.2	27.3 ± 5.6	t(398)=0.99	0.320
Range	18–40	18–40	-	-
95% CI	26.1–27.5	26.5–28.1	-	-
Gender distribution				
Male, n (%)	100 (50.0)	100 (50.0)	$\chi^2(1)=0.00$	1.000
Female, n (%)	100 (50.0)	100 (50.0)	-	-
Malocclusion parameters				
Overjet (mm)	2.8 ± 0.6	2.9 ± 0.5	t(398)=1.34	0.182
Overbite (mm)	2.5 ± 0.7	2.6 ± 0.6	t(398)=1.17	0.243
ANB angle (°)	3.35 ± 1.50	4.51 ± 1.70	t(398)=3.72	0.007*
Skeletal classification				
Class I, n (%)	200 (100)	200 (100)	-	-
Ethnic verification				
Three-generation confirmed	200 (100)	200 (100)	-	-

Table S4. Comprehensive Cephalometric Comparison Between Yemeni and Northern Turkish Cypriot Adults.

Parameter	Yemeni (Mean ± SD)	NTC (Mean ± SD)	Mean Difference [95% CI]	t-value	p-value	p-adj*	Cohen's d [95% CI]	Clinical Relevance†
VERTICAL PARAMETERS								
Jarabak Ratio (%)	60.18 ± 4.50	65.79 ± 5.20	5.61 [4.12, 7.10]	3.92	0.004	0.032	1.15 [0.92, 1.38]	High
FMA (°)	24.02 ± 2.60	23.50 ± 2.80	0.52 [0.14, 0.90]	2.68	0.008	0.064	0.19 [0.05, 0.33]	Moderate
SN-MP (°)	32.86 ± 2.40	32.00 ± 2.50	0.86 [0.25, 1.47]	2.79	0.006	0.048	0.35 [0.19, 0.51]	Moderate
PP-MP (°)	25.40 ± 2.50	24.80 ± 2.70	0.60 [-0.32, 1.52]	1.28	0.202	0.404	0.23 [0.08, 0.38]	Low
SAGITTAL PARAMETERS								
ANB (°)	3.35 ± 1.50	4.51 ± 1.70	1.16 [0.32, 2.00]	3.72	0.007	0.056	0.72 [0.51, 0.93]	High
Wits appraisal (mm)	-1.12 ± 1.20	-0.96 ± 1.30	0.16 [-0.04, 0.36]	2.64	0.009	0.072	0.13 [0.03, 0.23]	Low
SNA (°)	81.53 ± 3.20	82.08 ± 2.90	0.55 [-0.21, 1.31]	1.44	0.151	0.302	0.18 [0.07, 0.29]	Low
SNB (°)	78.66 ± 2.80	78.27 ± 3.10	-0.39 [-1.00, 0.22]	1.26	0.209	0.418	0.13 [0.04, 0.22]	Low
SOFT-TISSUE PARAMETERS								
N-A-Pog (mm)	5.76 ± 1.20	3.82 ± 1.10	1.94 [1.16, 2.72]	4.85	<0.001	<0.001	1.69 [1.42, 1.96]	High
Z Angle (°)	73.55 ± 3.50	74.00 ± 3.70	0.45 [-0.13, 1.03]	3.52	<0.001	<0.001	0.12 [0.04, 0.20]	Low
LS-1ULS (mm)	2.80 ± 1.00	2.50 ± 0.90	0.30 [0.12, 0.48]	3.45	<0.001	<0.001	0.31 [0.21, 0.41]	Moderate
Li-1LLi (mm)	4.20 ± 1.10	4.00 ± 1.00	0.20 [-0.17, 0.57]	1.06	0.290	0.580	0.19 [0.09, 0.29]	Low
Nasolabial angle (°)	103.17 ± 5.00	103.13 ± 4.80	-0.04 [-0.86, 0.94]	0.15	0.152	0.304	0.01 [0.00, 0.02]	None
MANDIBULAR / DENTAL								
Ar-Go-Me (°)	123.50 ± 4.00	125.00 ± 3.80	1.50 [-0.77, 1.77]	0.51	0.610	0.854	0.38 [0.28, 0.48]	Moderate
IMPA (°)	90.00 ± 3.00	91.00 ± 3.20	1.00 [-0.58, 1.58]	0.32	0.750	0.938	0.32 [0.22, 0.42]	Moderate
1U-NA (°)	22.00 ± 2.00	23.00 ± 2.20	1.00 [-0.59, 2.59]	1.23	0.220	0.440	0.48 [0.38, 0.58]	Moderate
1L-NB (°)	25.00 ± 2.50	26.00 ± 2.70	1.00 [-0.45, 2.45]	1.36	0.175	0.350	0.38 [0.28, 0.48]	Moderate

Table S5. Gender Differences Within and Between Populations: Selected Parameters.

Parameter	Yemeni Males	Yemeni Females	Cohen's d (Yemeni)	NTC Males	NTC Females	Cohen's d (NTC)	Ethnic × Gender Interaction p-value
Jarabak Ratio (%)	61.8 ± 4.2	58.6 ± 4.8	0.72 [0.58, 0.86]	66.5 ± 5.0	65.1 ± 5.4	0.27 [0.15, 0.39]	0.045*
ANB (°)	3.1 ± 1.6	3.6 ± 1.4	0.33 [0.21, 0.45]	4.3 ± 1.8	4.7 ± 1.6	0.24 [0.12, 0.36]	0.128
Wits (mm)	-1.2 ± 1.3	-1.0 ± 1.1	0.17 [0.05, 0.29]	-0.9 ± 1.4	-1.0 ± 1.2	0.08 [0.00, 0.16]	0.312
N-A-Pog (mm)	5.4 ± 1.3	6.1 ± 1.1	0.58 [0.46, 0.70]	3.5 ± 1.2	4.1 ± 1.0	0.54 [0.42, 0.66]	0.067
LS-1ULS (mm)	2.6 ± 1.1	3.0 ± 0.9	0.40 [0.28, 0.52]	2.4 ± 1.0	2.6 ± 0.8	0.22 [0.10, 0.34]	0.034*
FMA (°)	23.5 ± 2.4	24.5 ± 2.8	0.38 [0.26, 0.50]	23.0 ± 2.6	24.0 ± 3.0	0.35 [0.23, 0.47]	0.892
SN-MP (°)	32.2 ± 2.2	33.5 ± 2.6	0.54 [0.42, 0.66]	31.5 ± 2.3	32.5 ± 2.7	0.40 [0.28, 0.52]	0.756

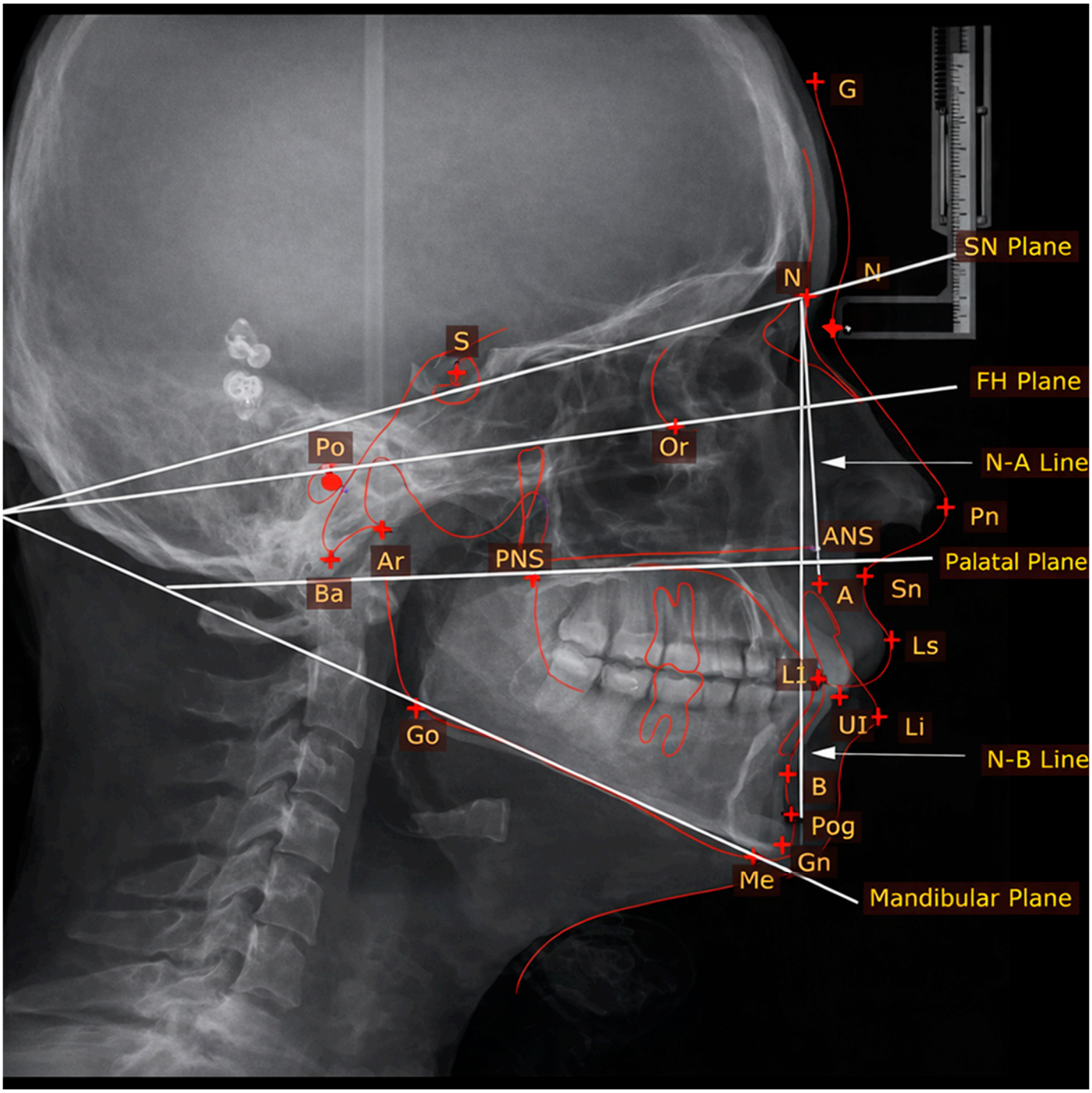


Figure S1. Lateral cephalometric radiograph demonstrating anatomical landmarks and reference planes. Skeletal landmarks: Sella (S), Nasion (N), Orbitale (Or), Porion (Po), Articulare (Ar), Basion (Ba), Anterior Nasal Spine (ANS), Posterior Nasal Spine (PNS), Point A, Point B, Pogonion (Pog), Gnathion (Gn), Menton (Me), and Gonion (Go). Soft-tissue landmarks: Glabella (G), Pronasale (Pn), Subnasale (Sn), Labrale Superius (Ls), and Labrale Inferius (Li). Reference planes illustrated: SN plane, Frankfurt Horizontal (FH) plane, Palatal plane, Mandibular plane, N-A line, and N-B line.

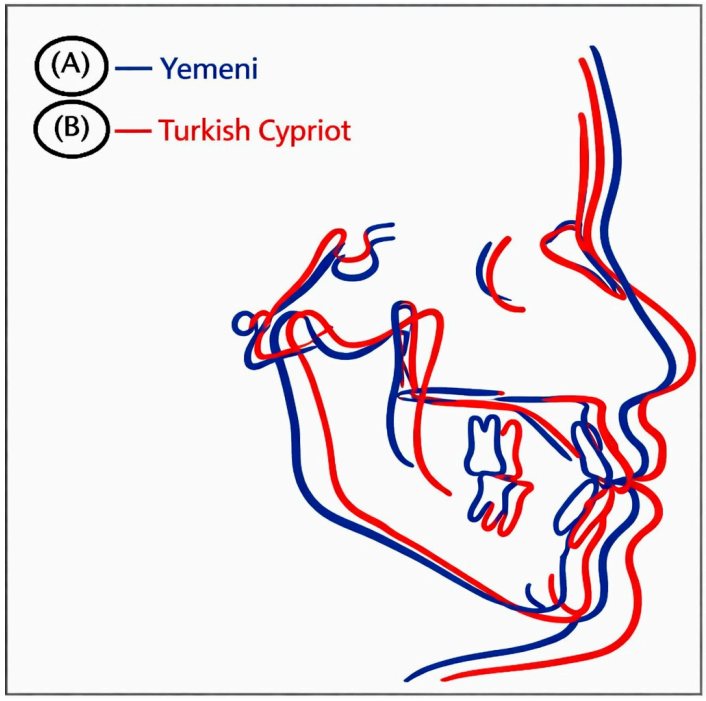


Figure 2. Mean cephalometric tracings superimposition comparing Yemeni (A, blue) and Northern Turkish Cypriot (B, red) adult populations, illustrating morphological differences in vertical dimensions and soft-tissue profile.

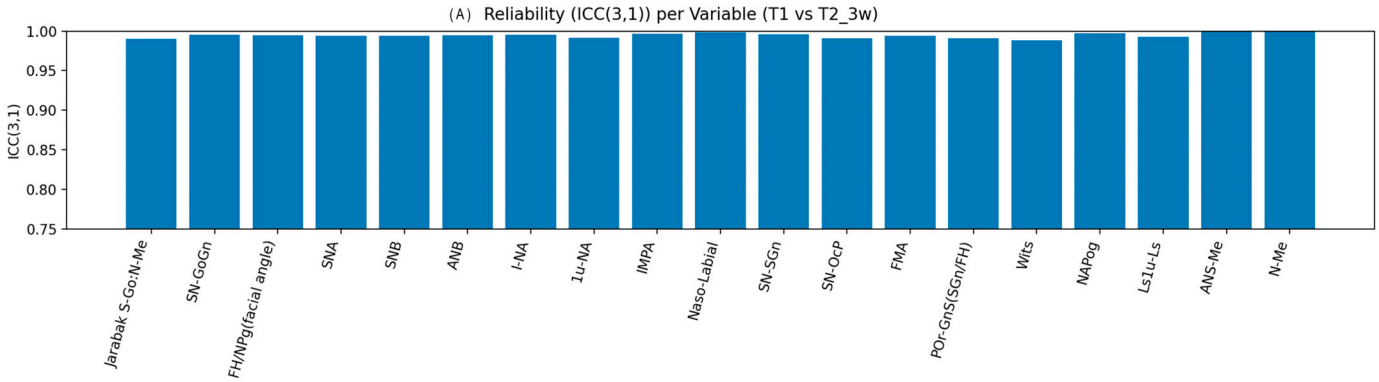


Figure S3. (A)

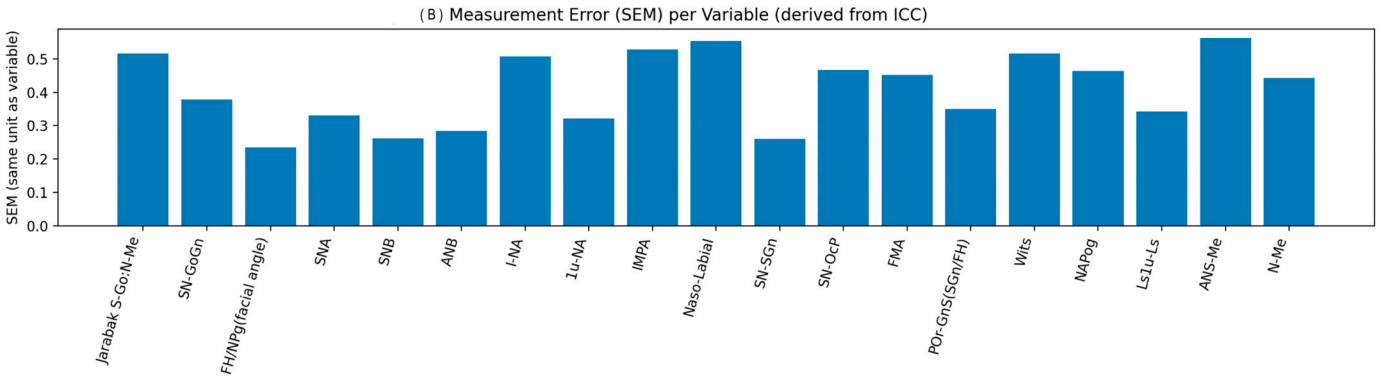


Figure S3(B).

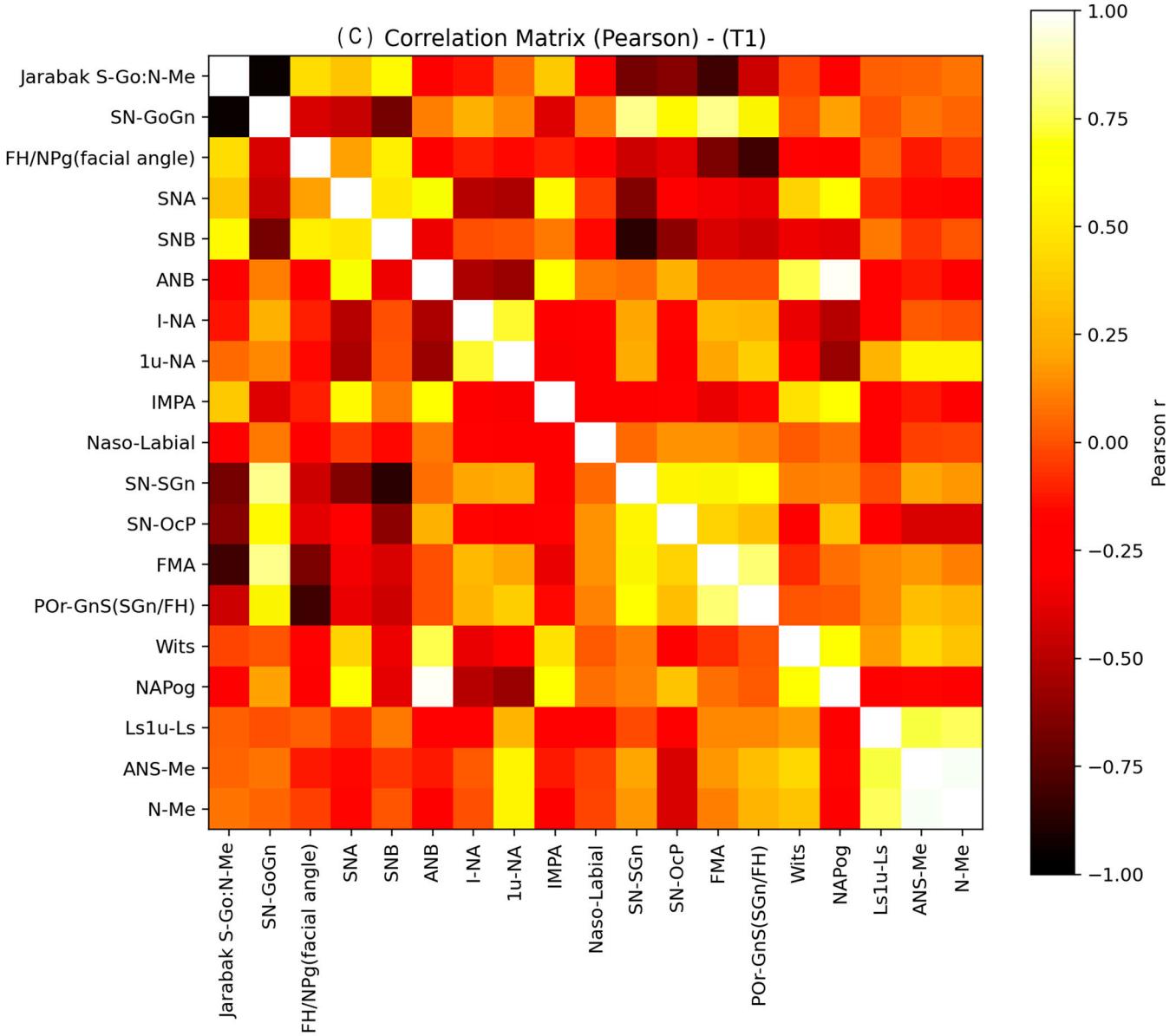


Figure S3(C).

Figure S3. Measurement reliability and inter-variable correlations. (A) Intra-class correlation. coefficients (ICCs) demonstrating excellent intra-examiner reliability (>0.95) across all variables. (B) Standard error of measurement (SEM) for each cephalometric parameter. (C) Pearson correlation matrix (heat map) showing relationships among cephalometric variables.

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