

## G36 Dental Development in a London Population of Diverse Ethnicity

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**Learning Overview:** After attending this presentation, attendees will understand that ethnic-specific reference data are essential for dental age estimation, especially around the 18-year-old threshold.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing ethnic differences in third molar development between Black British and White British subjects. The attainment of Demirjian tooth development stages in third molars occurs earlier in Black British subjects compared with White British subjects.<sup>1</sup>

The aim of the research was to test the null hypothesis that there is no ethnic difference in the timing of tooth development in Black British and White British children and young adults.

This study (IRAS Project ID 239922) is relevant because ethnic or ancestral differences in dental maturation have been inadequately studied. Data was collected from digitized Dental Panoramic Tomographs (DPTs) from the archives of a teaching hospital. This convenience sample compared dental maturation of Black British and White British ethnic groups residing in and around London. The main inclusion criterion was a self-assigned ethnicity in the hospital records. All those reporting Black ethnicity were included in the Black British group. For both Black British and White British ethnicities, a DPT for up to 50 male and 50 female subjects in half-year age bands in the age range of 11 to 24 years was examined. The current sample totals 3,675 subjects. The Anglo-Canadian eight-stage scoring system was used.<sup>1</sup> Datasets for females and males of the two ethnic groups were compared. Nearly all stages of third molars developed earlier in the Black British group compared to the White British group, the difference being greater in females. For Demirjian Stages D, E, F, and G of all four third molars, with the exception of Stage D in the right-sided third molars in females, Student's *t*-tests demonstrated a significant difference ( $p < 0.03$ ).

The table below shows results for the lower left third molar (LL8) Stages A-H<sup>1</sup> in males aged 11-24 years.

Results for lower left third molar (LL8) Stages A-H for males (Ages in decimal years)												
TDS	Black British					Difference between		White British				
	<i>n</i>	Mean	SD	Min	Max	Means	<i>p</i> value	<i>n</i>	Mean	SD	Min	Max
LL8A	0							24	12.41	1.21	11.01	15.09
LL8B	3	13.20	0.45	12.71	13.62	-0.40	0.5570	62	12.81	1.15	11.05	16.70
LL8C	30	13.09	1.19	11.61	15.69	0.37	0.1739	149	13.47	1.40	11.05	17.87
LL8D	47	13.34	1.29	11.15	16.36	1.10	0.0001	65	14.44	1.54	11.74	19.28
LL8E	65	14.38	1.52	11.44	19.53	1.45	<0.0001	131	15.83	1.78	11.50	21.57
LL8F	48	16.11	1.14	14.19	18.73	1.32	<0.0001	87	17.42	1.51	13.15	20.83
LL8G	46	17.52	1.36	14.93	20.71	1.28	<0.0001	80	18.80	1.50	15.76	23.41
LL8H	74			14.13	20.69		<0.0001	330			16.28	23.39

Ages compared using Student's *t*-test for Stages A-G and Mann Whitney Test for Stage H (censored)

Censoring the ages at 20.71 years for Black British and 23.41 years for White British (i.e., the maximum ages for LL8 at Stage G), a Mann Whitney test showed significant difference ( $p < 0.0001$ ) between the two ethnic groups for Stage H of the LL8.<sup>2</sup>

The following table shows percentages of all assessable third molars at Stages A-H in 17- and 18-year-old males, illustrating earlier development in Black British compared to White British subjects.

TDS	TDS A-H of all assessable third molars (%)			
	18-year-old males		17-year-old males	
	Black British	White British	Black British	White British
A	0	0	0	0
B	0	0	0	0
C	0	0	0	1
D	0	0	0	4
E	4	13	3	20
F	10	26	21	32
G	38	21	38	26
H	48	40	38	17
Total	100	100	100	100

In conclusion, differences between Black British and White British ethnic groups from a London population indicate that ethnically appropriate reference datasets are essential for age assessment throughout childhood and young adulthood in skeletal remains as well as the living but may be particularly important when decision-making regarding the 18-year-old threshold.

The data demonstrate that there are highly significant differences in dental development between Black and White ethnic groups in a United Kingdom population.

**Reference(s):**

- <sup>1</sup> Demirjian A., Goldstein H., Tanner J.M. 1973. *Human Biology* 45:211-27.
- <sup>2</sup> Roberts G.J., McDonald F., Andiappan M., Lucas V.S. 2015. *Journal of Forensic and Legal Medicine* 36: 177-184.

**Dental Age Estimation, Ethnicity, 18-Year-Old Threshold**