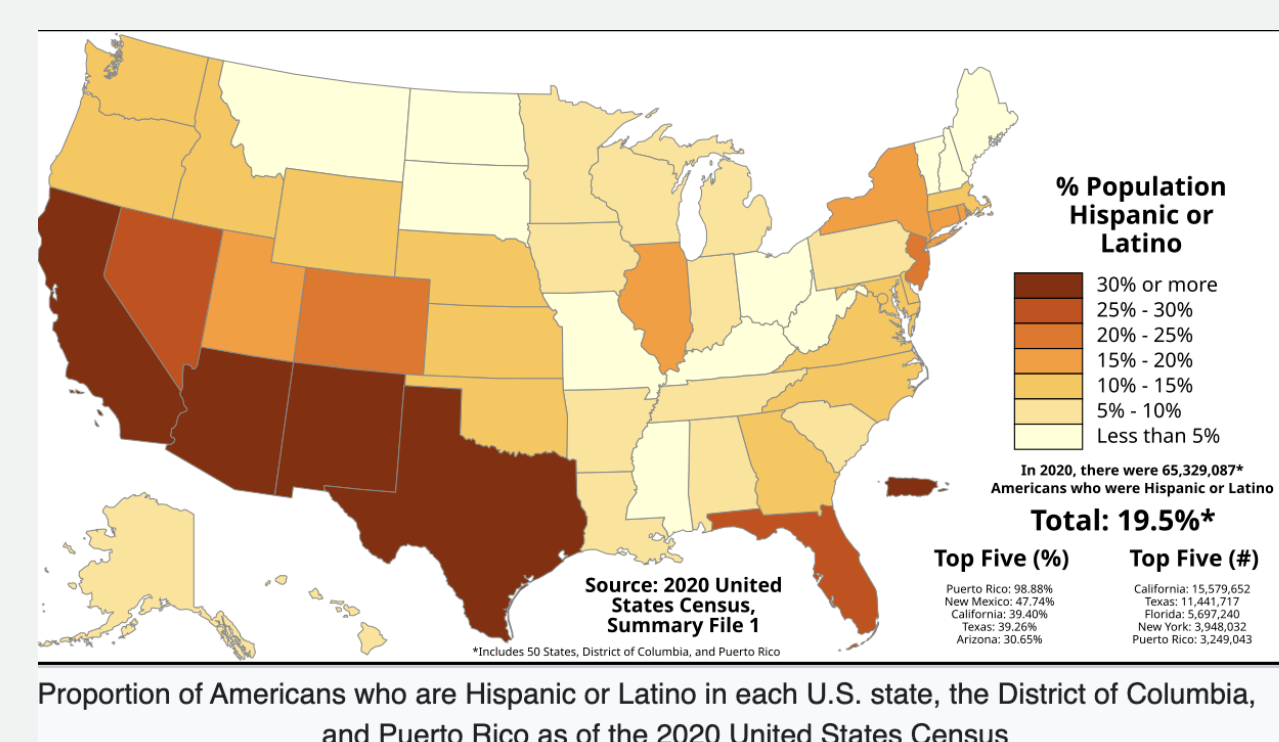




Introduction

WHY ETHNICITY MATTERS IN DENTAL MATURITY ASSESSMENT?

- Dental development is essential for diagnosis, treatment planning, and age estimation. However, most standards are based on non-Hispanic populations and may not accurately reflect Hispanic children.
- Ethnic differences in tooth development, combined with the underrepresentation of this rapidly growing population, highlight the need for population-specific research.
- To address this gap, the present study aimed to evaluate the bilateral symmetry of permanent tooth development in Hispanic children aged 7–13 years using the Haavikko method.



Proportion of Americans who are Hispanic or Latino in each U.S. state, the District of Columbia, and Puerto Rico as of the 2020 United States Census

•RSDM serves a predominantly Hispanic pediatric population.
•Makes an ideal setting to develop reference data for Hispanic children.

Table 1. Demographic and Sample Characteristics

n	Number of Teeth	Mean Age in years (±SD)	Range of age	Female (F)	Male (M)
141	2,820	10.34 (± 1.98)	7.1–13.9	52.5 %	47.5 %

Fig. 1 Patient Distribution by Age and Gender

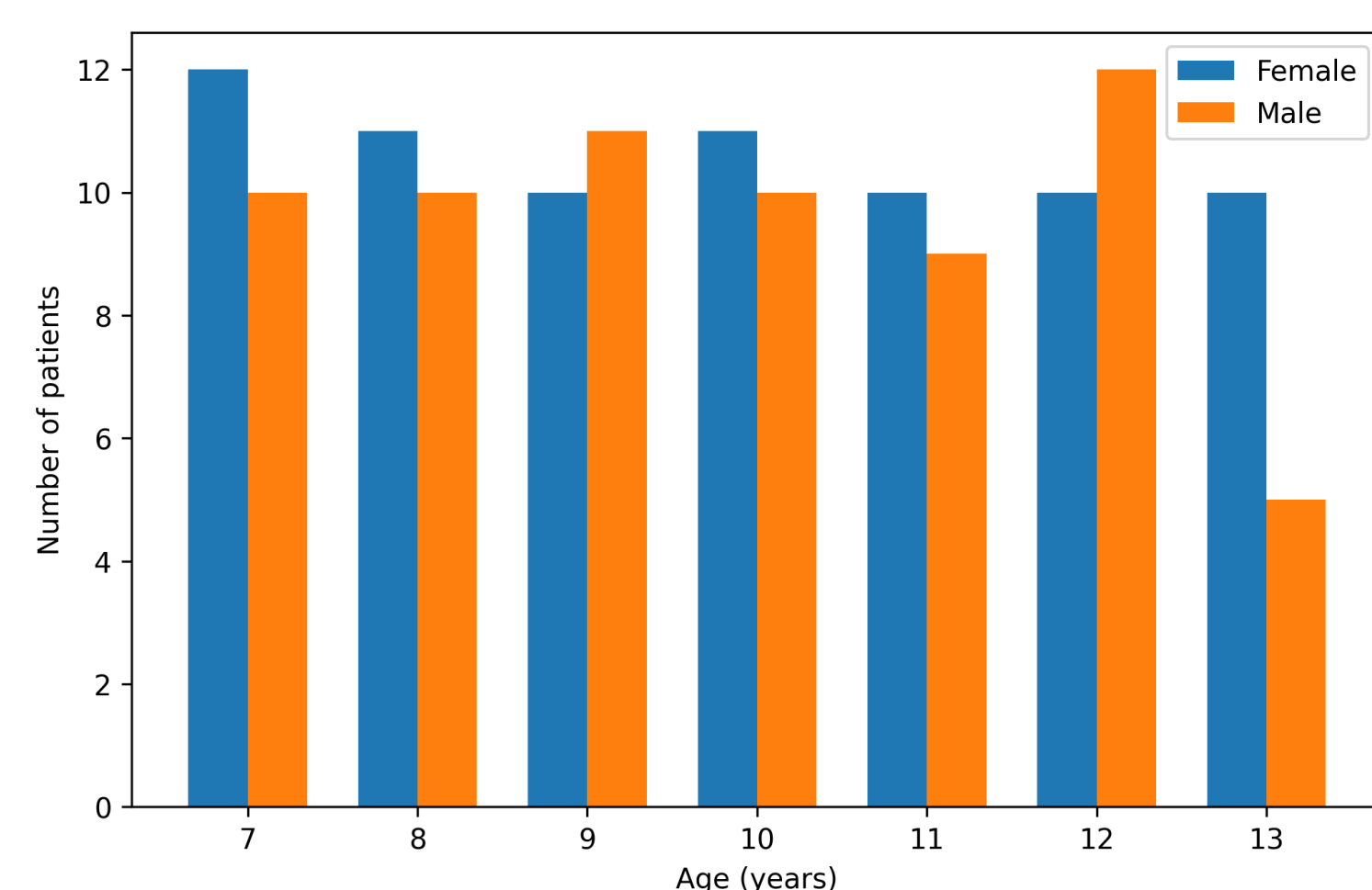


Fig. 2 Bilateral Difference by Tooth Group

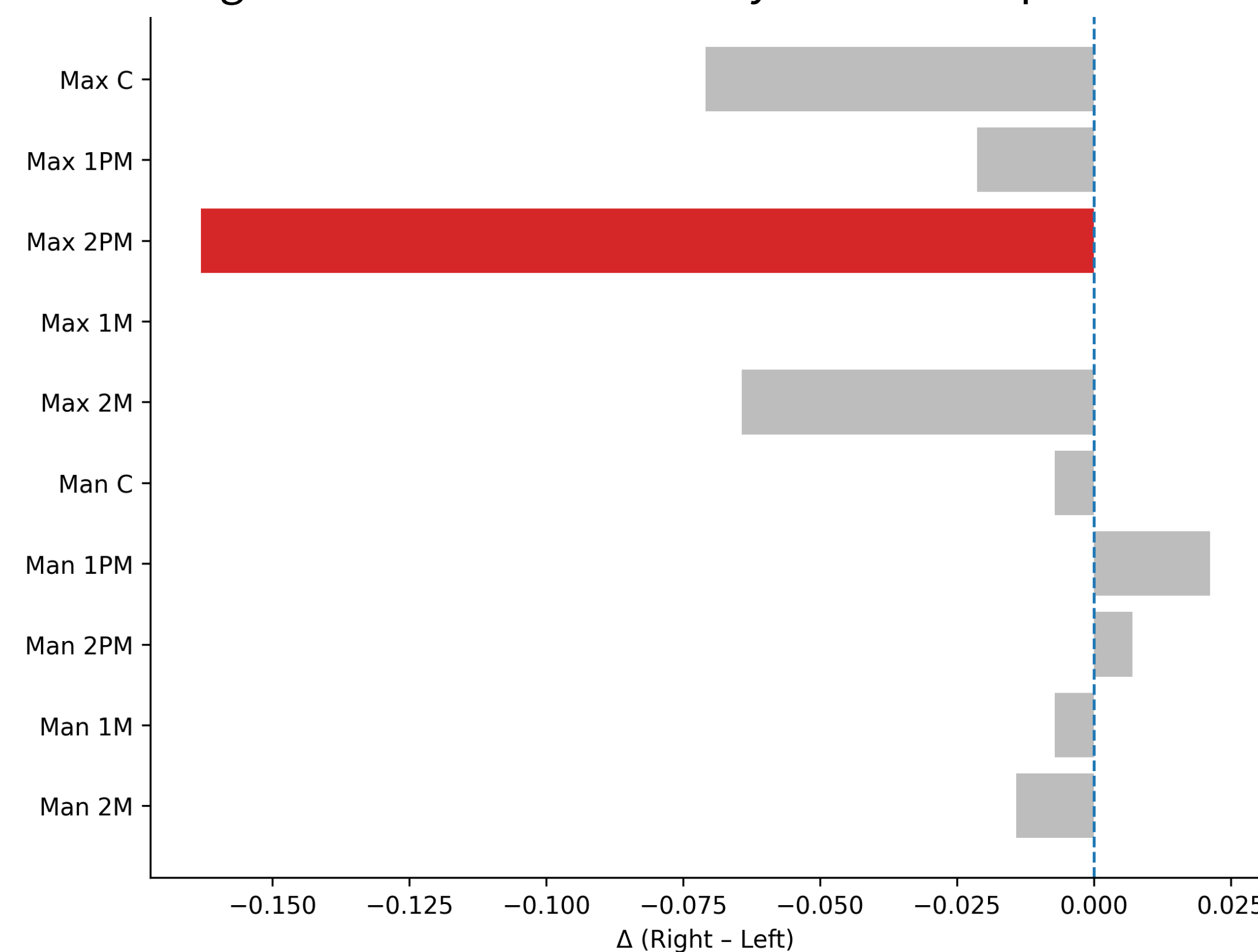
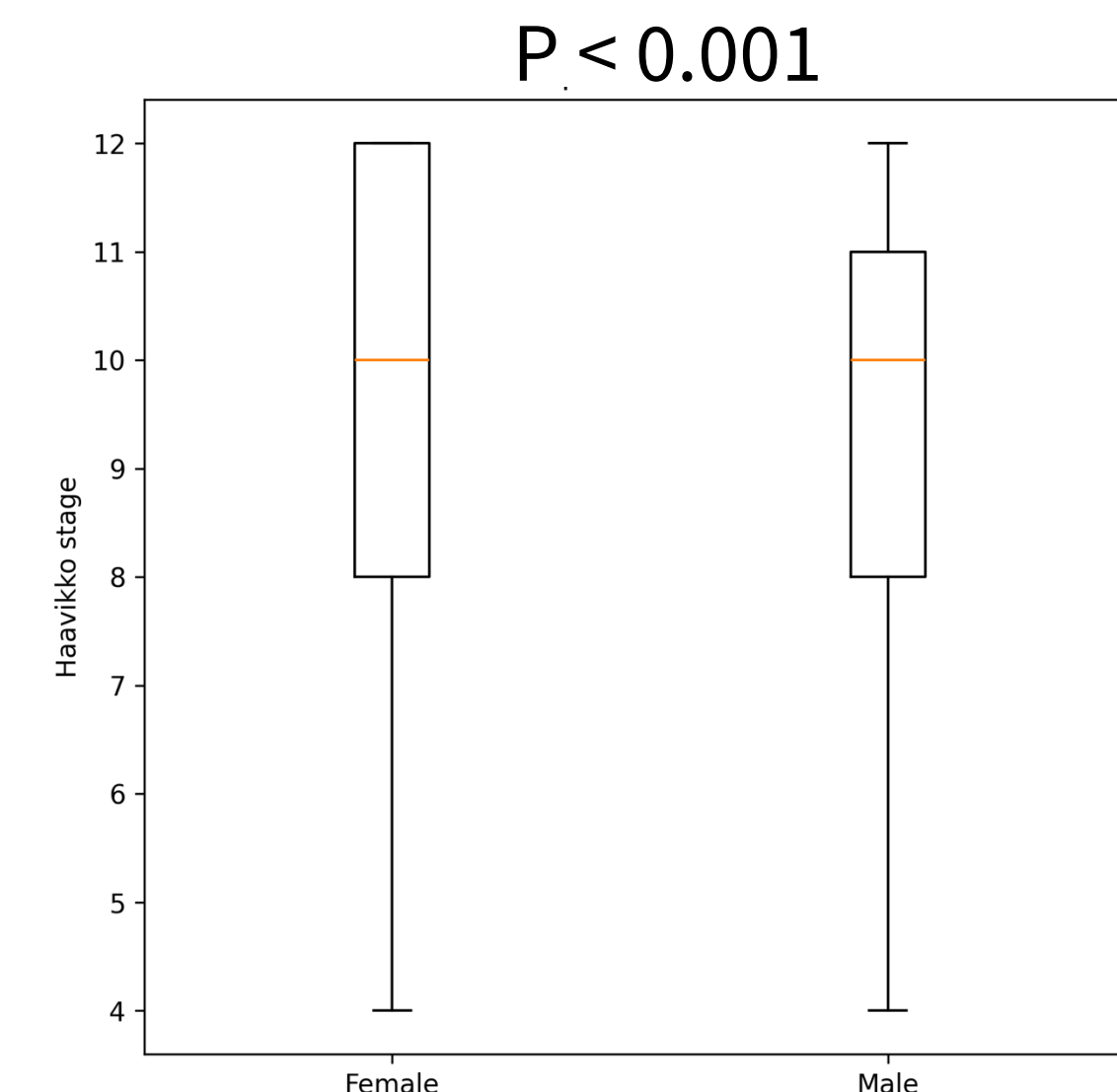
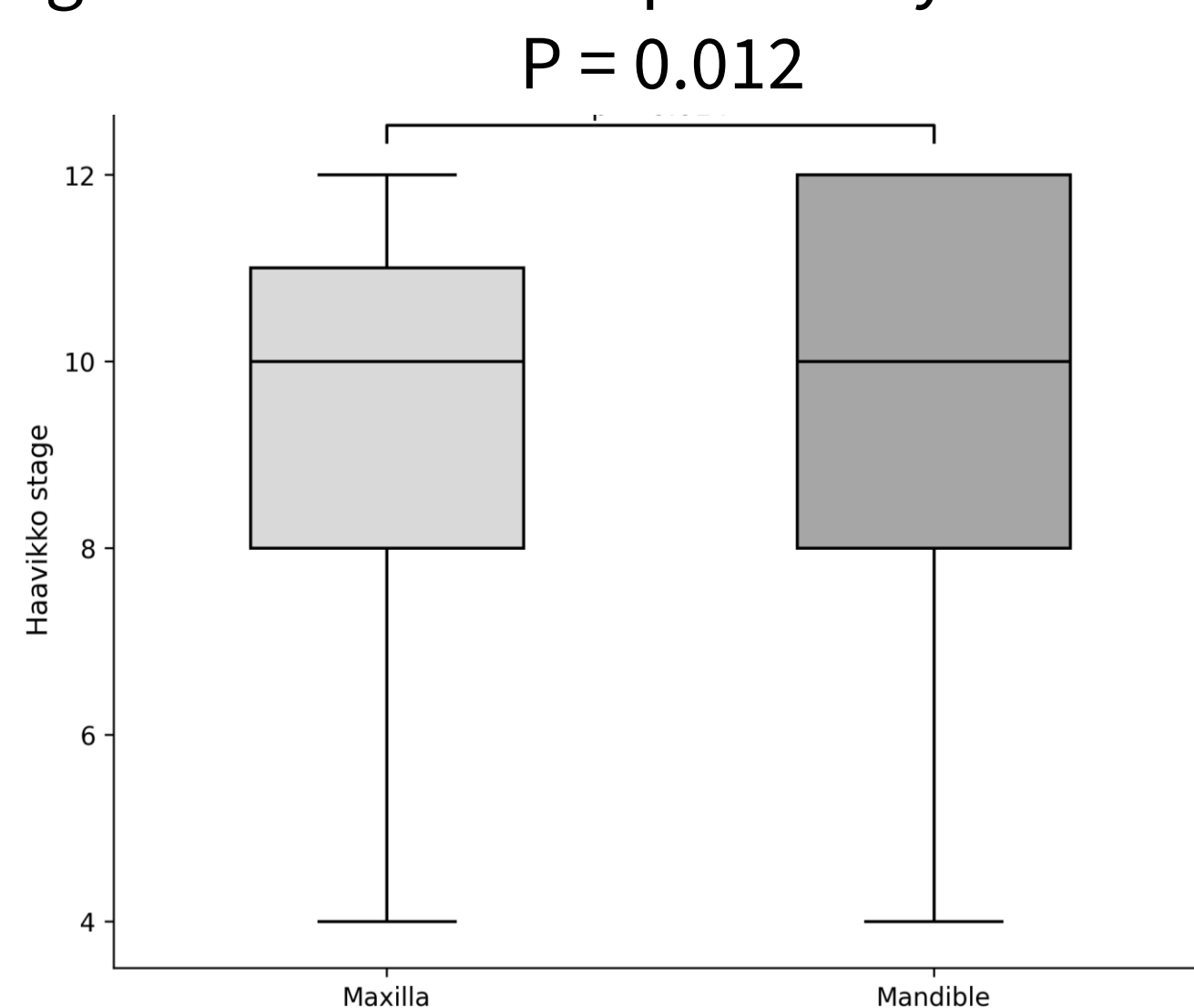


Fig. 4 Dental Development by dental Arch

Fig. 3 Dental Development by Gender



Methods

This retrospective cross-sectional study analyzed digital panoramic radiographs (D0330) obtained from the Axiom database at Rutgers School of Dental Medicine (RSDM), Newark, New Jersey, between January 2020 and December 2025. A convenience sample of 141 Hispanic children aged 7–13 years was included in the study. Only radiographs with adequate quality and clear visualization of permanent teeth were considered. Tooth development stages were assessed for all permanent teeth, excluding third molars, using the Haavikko method (stages 0–12). Inter-examiner reliability was assessed by comparing the examiner’s evaluations with those of an expert examiner using Cohen’s Kappa coefficient, ($\kappa = 0.90$). Data were recorded in a standardized dataset, entered into Microsoft Excel, and analyzed using SAS version 9.4 and IBM SPSS Statistics version 30. Descriptive statistics were used to summarize the demographic data. Inferential analyses were conducted using non-parametric tests appropriate for ordinal variables. The Wilcoxon signed-rank test was used to evaluate bilateral differences between right and left homologous teeth, and the Mann-Whitney U test was applied to compare developmental stages between sexes and between the maxilla and mandible at the tooth level. Statistical significance was set at $p < 0.05$.

Results

- A total of 141 children were included in the analysis, comprising 2,820 permanent teeth.
- Dental development demonstrated a high degree of bilateral symmetry across all tooth groups.
- Statistically significant difference was observed only in the maxillary second premolars ($p = 0.013$).
- Statistically significant differences were observed between males and females ($p < 0.001$), with females demonstrating more advanced developmental stages than males.
- Statistically significant difference was also identified between dental arches ($p = 0.012$), with mandibular teeth showing slightly more advanced development compared to maxillary teeth.

Discussion

The demographic characteristics (Table 1) show a well-distributed sample with balanced sex and age groups, supporting the reliability of the analysis. Patient distribution by age and sex (Fig. 1) was consistent across groups, minimizing potential bias.

Bilateral comparison (Fig. 2) demonstrated strong symmetry across all tooth groups, with minimal differences between sides. Although there was significant difference in the dental development of the maxillary second premolars; this difference was small and not clinically relevant.

Gender analysis (Fig. 3) showed more advanced developmental stages in females ($p < 0.001$), consistent with earlier maturation patterns. Arch comparison (Fig. 4) indicated slightly more advanced development in the mandible ($p = 0.012$), although the difference was small and not clinically meaningful.

Dental development in this population is highly symmetrical, with minor variations that are unlikely to affect clinical interpretation. Further studies are needed to evaluate the relationship between dental age and chronological age and to include larger Hispanic populations to strengthen the generalizability of these findings.

Conclusion

Dental development in Hispanic children demonstrates strong bilateral symmetry, with only minimal differences that are not clinically relevant. Although statistically significant variations were observed between sexes and arches, these differences were small in magnitude. The Haavikko method proved to be a reliable tool for assessing dental development in this population, supporting clinical and orthodontic decision-making.

References

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