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## **Soft tissue facial morphology related to headform: a three-dimensional quantitative analysis in childhood.**

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The object of this investigation was to determine whether children of the same age with different headforms differ in their three-dimensional soft-tissue facial characteristics. The three-dimensional coordinates of 22 standardized facial landmarks were automatically collected in a sample of 70 boys and 71 girls age 11 to 13 years attending a junior high school. From the collected landmarks, several three-dimensional facial angles, linear distances, linear distance ratios, and volumes were calculated. For each subject the cephalic index (maximal head breadth/ maximal head length x 100) was computed and three groups of measurements for each sex were obtained (dolicho-, meso- and brachycephalic). A two-way factorial analysis of variance compared the effects of sex and headform, and the interaction sex x headform. On average, boys had significantly ( $P < \text{or} = 0.05$ ) longer and wider faces than girls, with a larger lower third facial volume relative to middle third facial volume. A significant ( $P < \text{or} = 0.05$ ) effect of headform over facial morphology was found for all angles with a prevalent axial orientation. Conversely, no effect was demonstrated for angles with a sagittal orientation, nor for any other considered parameters. For each sex, the dolichocephalic children had smaller values than the brachycephalic children (i.e., more convex faces in the left-right direction), while the mesocephalic children had intermediate values. No sex x headform interactions were found. Results confirm that a different headform (skull) is associated with a different three-dimensional facial morphology (combined effect of skull and soft tissues), but without size differences.

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