Sex- and age-specific distributions of intervertebral disc morphology on T2-weighted MRI – A population-based study

ELECTRONIC SUPPLEMENTARY MATERIAL

Supplementary Figures

Supplementary Fig. 1 *Percentile curves of intervertebral disc morphology across spinal levels by sex and age group.*

Percentile curves for an intervertebral disc height, b diameter, c volume, and d normalized signal intensity at each disc level from C2/3 to L5/S1. Results are shown separately for men and women and stratified by age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc.

Supplementary Fig. 2 *Sensitivity analysis of multivariable fractional polynomial models using different weighting strategies.*

Adjusted predicted associations of age, body height, and body weight with intervertebral disc height, diameter, volume, and normalized signal intensity at C5/6 and L4/5. Results from primary models using recalibrated sampling weights are compared with models using sampling weights winsorised at the 99th percentile and unweighted models. Analyses were performed separately for men and women. Lines represent adjusted predicted mean values; shaded areas represent 95% confidence intervals. IVD, intervertebral disc.

Supplementary Fig. 3 *Prediction intervals for intervertebral disc morphology at C5/6.*

Sex-specific model-based adjusted predictions for an intervertebral disc height, b diameter, c volume, and d normalized signal intensity at C5/6, shown in relation to age, body height, and body weight. Lines represent adjusted predicted mean values; shaded areas represent 95% confidence intervals; outer bounds represent prediction intervals. Multivariable fractional polynomial models were fitted using recalibrated sampling weights. IVD, intervertebral disc.

Supplementary Fig. 4 *Prediction intervals for intervertebral disc morphology at L4/5.*

Sex-specific model-based adjusted predictions for a intervertebral disc height, b diameter, c volume, and d normalized signal intensity at L4/5, shown in relation to age, body height, and body weight. Lines represent adjusted predicted mean values; shaded areas represent 95% confidence intervals; outer bounds represent prediction intervals. Multivariable fractional polynomial models were fitted using recalibrated sampling weights. IVD, intervertebral disc.

Supplementary Tables

Supplementary Table 1 *Percentile distributions of intervertebral disc height by spinal level, sex, and age group.*

Percentiles of mean intervertebral disc height (mm) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc.

Supplementary Table 2 *Percentile distributions of intervertebral disc diameter by spinal level, sex, and age group.*

Percentiles of mean intervertebral disc diameter (mm) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc.

Supplementary Table 3 *Percentile distributions of intervertebral disc volume by spinal level, sex, and age group.*

Percentiles of intervertebral disc volume (mm^3) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc.

Supplementary Table 4 *Percentile distributions of normalized intervertebral disc signal intensity by spinal level, sex, and age group.*

Percentiles of normalized intervertebral disc signal intensity for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). Signal intensity was calculated as the mean MRI signal intensity within the disc mask normalized to the mean cerebrospinal fluid signal intensity. IVD, intervertebral disc; MRI, magnetic resonance imaging.

Supplementary Table 5 *Mean and standard deviation of intervertebral disc height by spinal level, sex, and age group.*

Mean ± standard deviation of intervertebral disc height (mm) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc; SD, standard deviation.

Supplementary Table 6 *Mean and standard deviation of intervertebral disc diameter by spinal level, sex, and age group.*

Mean ± standard deviation of intervertebral disc diameter (mm) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc; SD, standard deviation.

Supplementary Table 7 *Mean and standard deviation of intervertebral disc volume by spinal level, sex, and age group.*

Mean ± standard deviation of intervertebral disc volume (mm^3) for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). IVD, intervertebral disc; SD, standard deviation.

Supplementary Table 8 *Mean and standard deviation of normalized intervertebral disc signal intensity by spinal level, sex, and age group.*

Mean ± standard deviation of normalized intervertebral disc signal intensity for each disc level from C2/3 to L5/S1, stratified by sex and age group (<30, 30–39, 40–49, 50–59, and ≥60 years). Signal intensity was calculated as the mean MRI signal intensity within the disc mask normalized to the mean cerebrospinal fluid signal intensity. IVD, intervertebral disc; MRI, magnetic resonance imaging; SD, standard deviation.

Supplementary Table 9 *Multivariable fractional polynomial model specifications and coefficient estimates.*

Selected multivariable fractional polynomial regression models for intervertebral disc height, diameter, volume, and normalized signal intensity at C5/6 and L4/5, fitted separately for men and women. The table reports the selected fractional polynomial functions, regression coefficients, and corresponding measures of uncertainty for age, body height, and body weight. Models used recalibrated sampling weights and robust variance estimation. IVD, intervertebral disc.

Supplementary Table 10 *Internal performance of multivariable fractional polynomial models.*

Five-fold cross-validation results of sex-specific multivariable fractional polynomial models for intervertebral disc height, diameter, volume, and normalized signal intensity at C5/6 and L4/5. Weighted root mean square error, mean absolute error, and coefficient of determination were calculated from pooled out-of-fold predictions. IVD, intervertebral disc; MAE, mean absolute error; RMSE, root mean square error.