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Appendix 1: Multiple Imputation of Missing Variables

Multiple imputation was carried out using the MICE (multivariate imputation by chained equations) algorithm with predictive mean matching[1]. This technique assumes that missing outcomes can be predicted based on available data. Twenty imputations were carried out **(Figure S1A, S1B, S1C, and S1D)**, using the existing SAM data, baseline study characteristics and PROM outcome measures (MFA, SF-36 and pain measures). For each imputation the mean trajectory of change in SAM outcome by surgery type was estimated using the linear mixed effects regression model described in the article. The estimates of improvement at each time point (along with the 95% confidence intervals) were averaged across imputations to derive a final estimate of improvement for each surgery type.

Appendix 1 Figure S1. Mean trajectories for step totals (A) high activity steps (B), sustained activity, 60 minutes (C) and peak activity index (D) for each of 20 imputed datasets and the mean averaged across imputations (dark lines) by surgery group, with 95% confidence intervals for the estimated trajectory from our observed data (upper panels) and mean, upper and lower confidence intervals averaged across imputations for both surgery groups (lower panel).
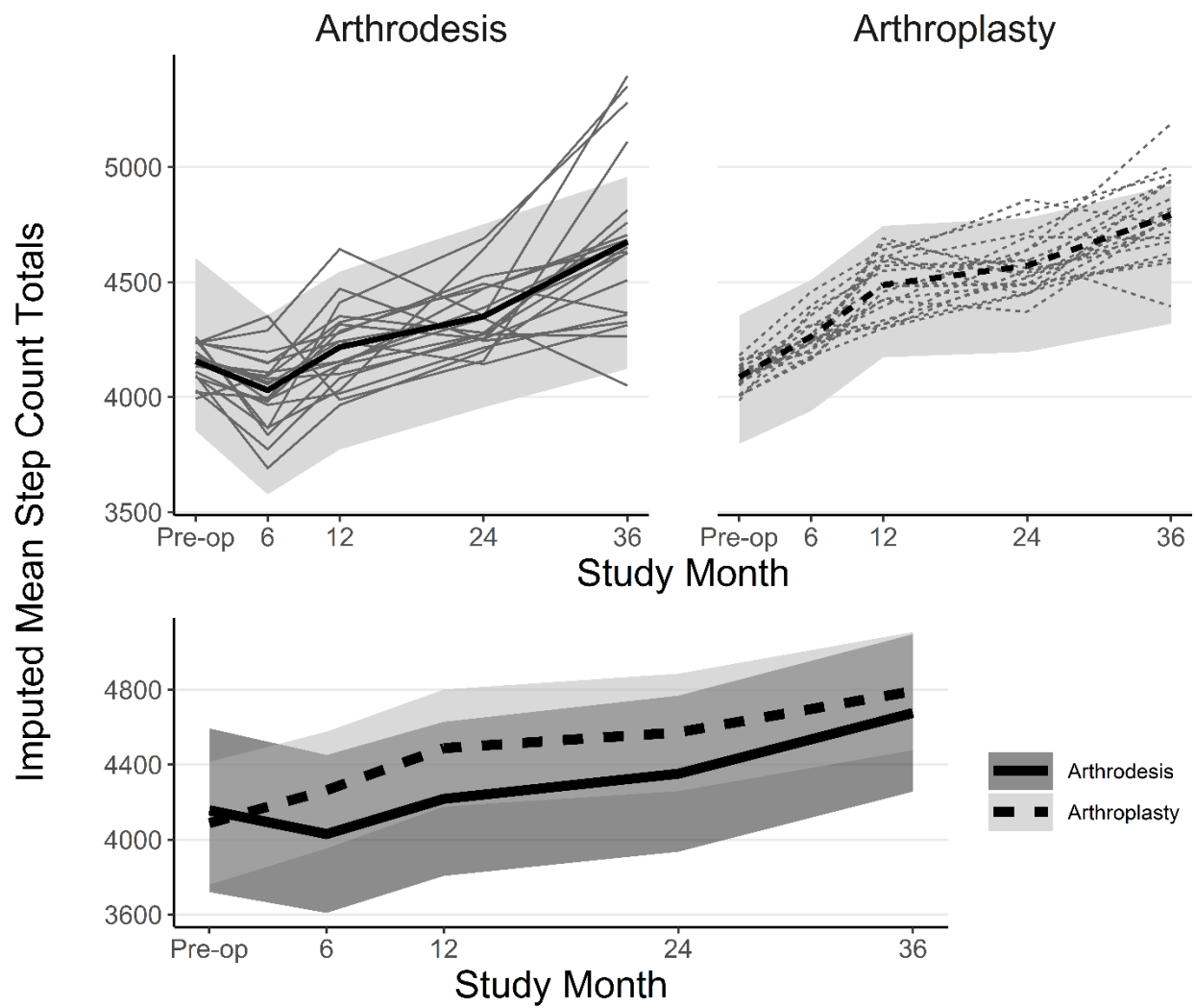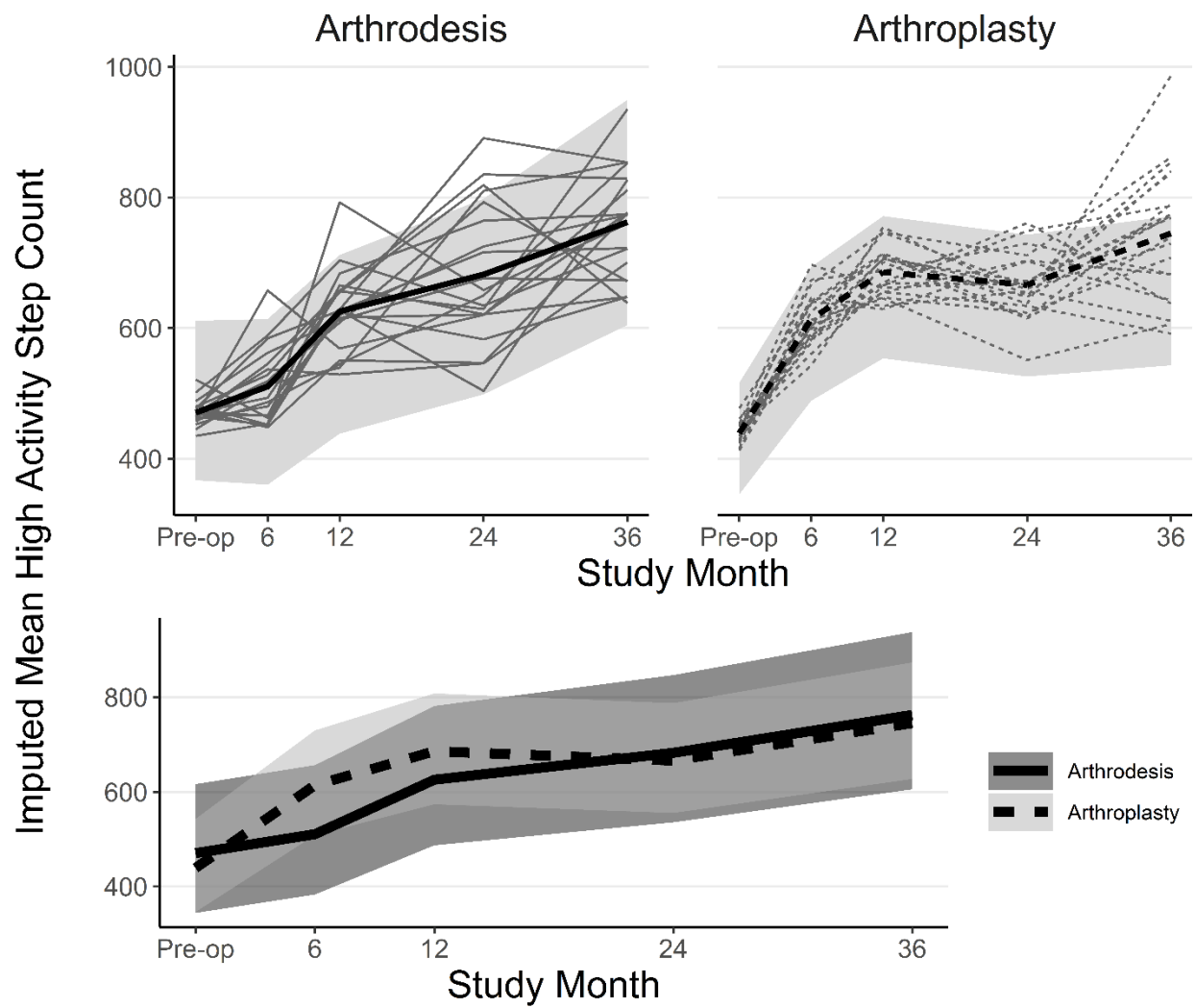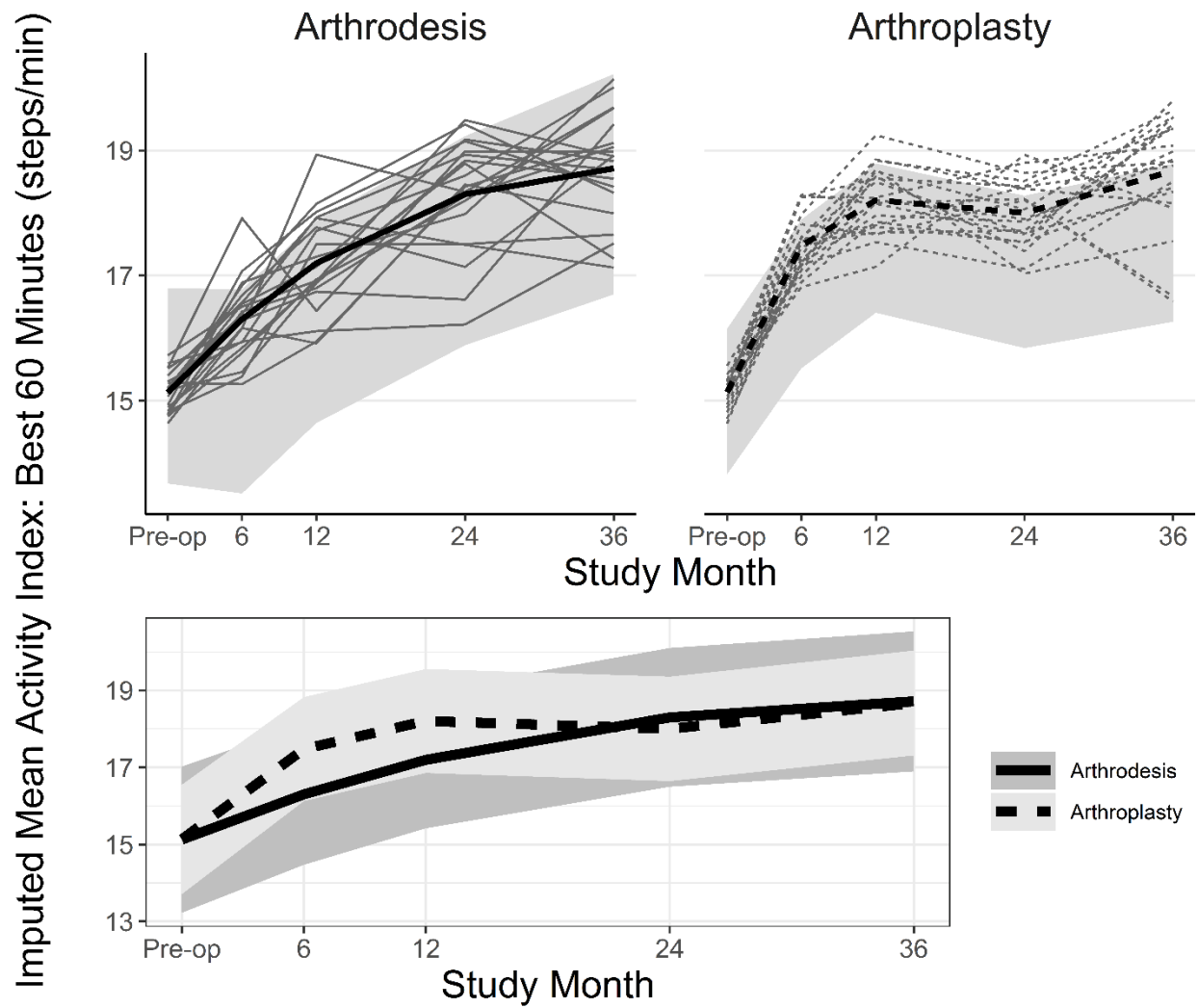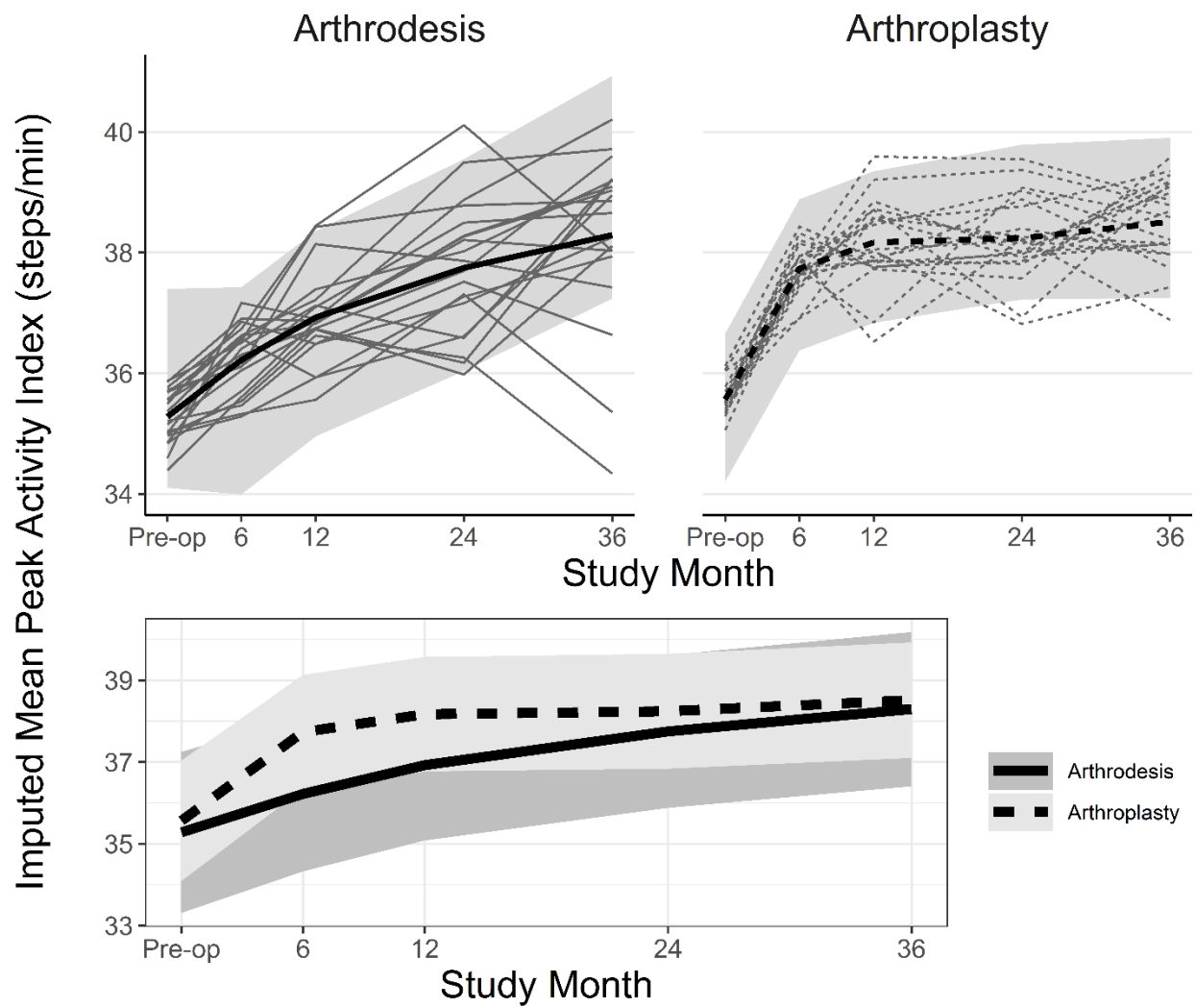
Fig. S1A

Fig. S1B

Fig. S1C

Fig. S1D

Appendix 2: Individual patient trajectories for each outcome

Appendix 2 Figure S2. Individual patient trajectories and mean trajectory by surgery group across the 36-month follow-up by surgical treatment for step totals (S2A), high activity steps (S2B), sustained activity, 60 minutes (S2C) and peak activity index (S2D). Mean trajectories were estimated from linear mixed effects regression of SAM outcome on follow-up time by surgical treatment interaction adjusted for differences in improvement by age, BMI and sex.
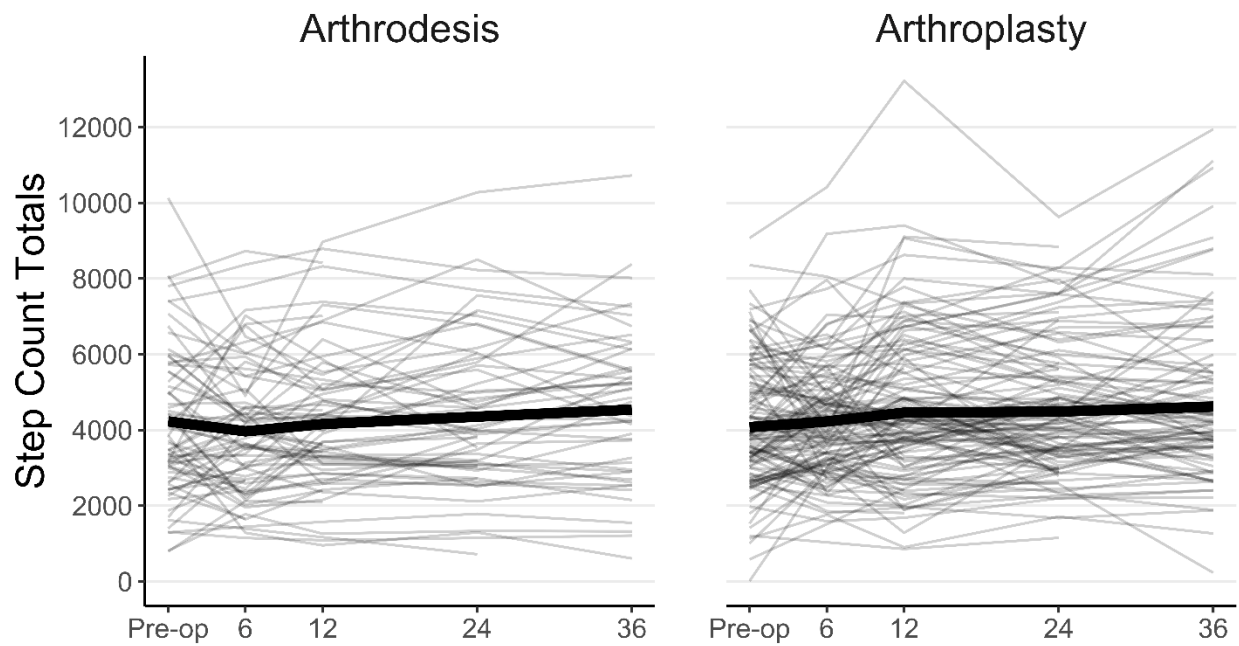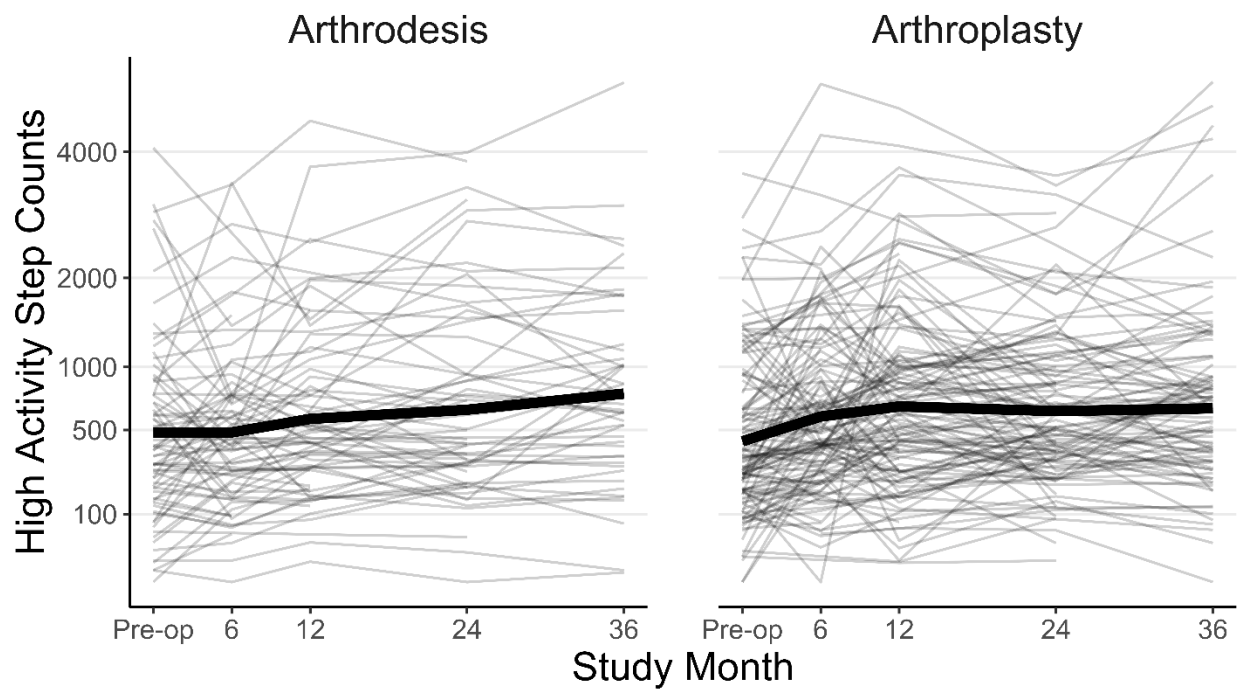
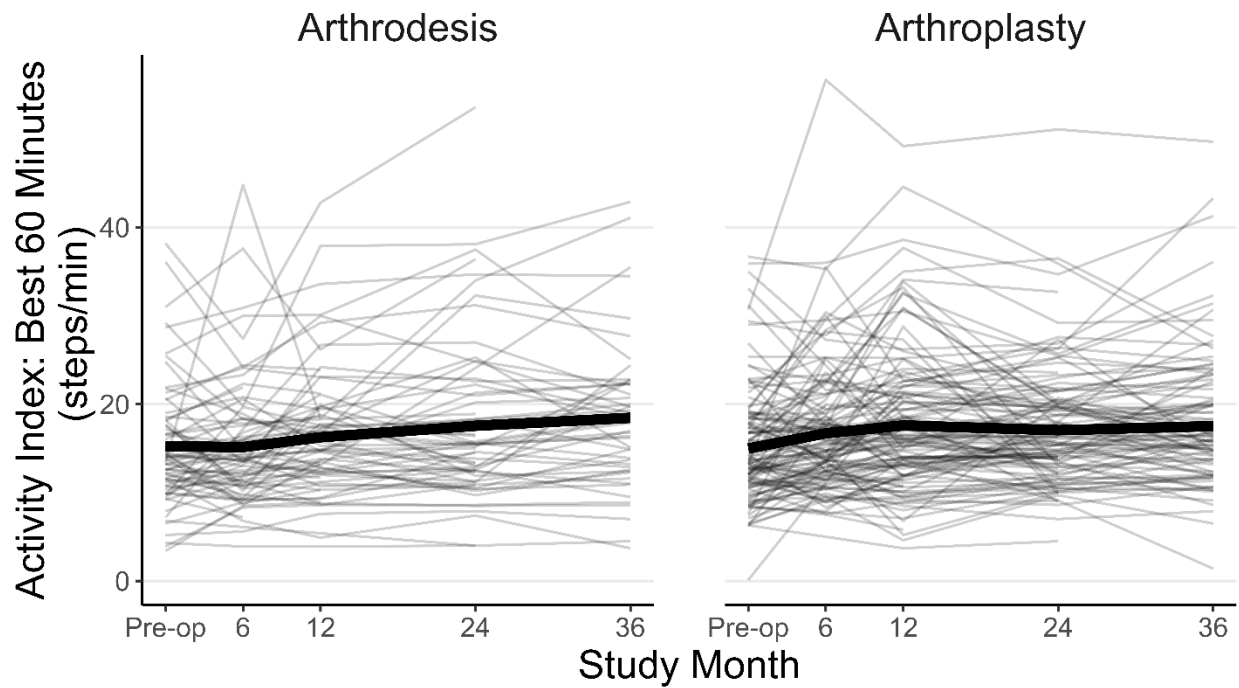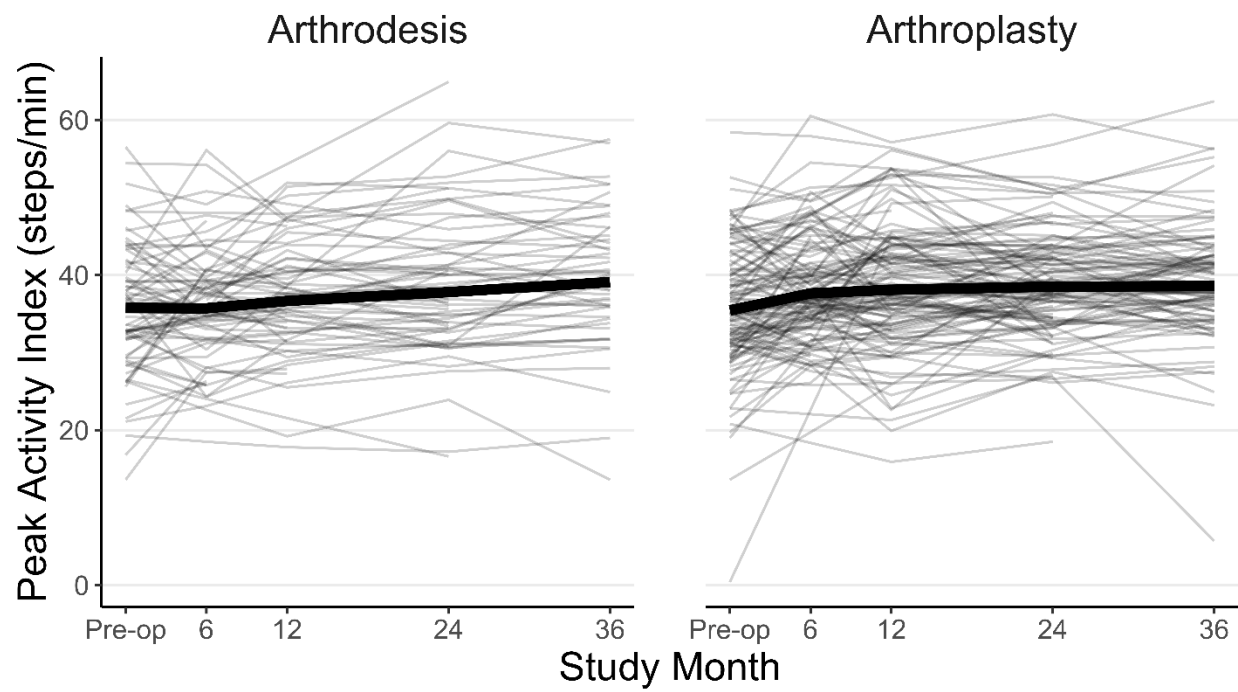**Fig. S2A**

Fig. S2B

Fig. S2C

Fig. S2D

REFERENCES

1. Buuren S, Groothuis-Oudshoorn K. Mice: Multivariate Imputation by Chained Equations in R. Journal of Statistical Software. 2011;45:1-67.