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Appendix A

Primary procedure codes

Primary hemiarthroplasty uncemented	NFB09	Hip
Primary hemiarthroplasty w cement	NFB19	Hip
Primary total arthroplasty uncemented	NFB29	Hip
Primary total arthroplasty hybrid	NFB39	Hip
Primary total arthroplasty w cement	NFB49	Hip
Other primary arthroplasty	NFB99	Hip
Primary uniprosthesis uncemented	NGB09	Knee
Primary uniprosthesis w cement	NGB19	Knee
Primary total arthroplasty uncemented	NGB29	Knee
Prim total arthroplasty hybrid	NGB39	Knee
Primary total arthroplasty w cement	NGB49	Knee
Primary patellofemoral arthroplasty	NGB53	Knee
Addition of patellar resurfacing	NGB59	Knee
Other primary arthroplasty	NGB99	Knee

Appendix B

Diagnostic codes indicating primary OA of the hip:

ICD 8: 713,00

ICD 9: 715B

ICD 10: M16.0 or M16.1

Diagnostic codes indicating primary OA of the knee:

ICD 8: 713,01

ICD 9: 715B

ICD 10: M17.0 or M17.1

Supplementary Table 1. Concordance rates for Total Hip and Knee Replacement for twin pairs being concordant non-obese, i.e. both twins have BMI<30kg/m², discordant for obesity, and concordant for being obese as well as the concordance rates for the entire study population.

	Concordant non-obese (N=27,259)	Discordant obese (N=2,308)	Concordant obese (N=326)	Overall (N=29,893)
Total Hip Replacement				
Concordant for <i>not</i> having replacement	25,951 (95.2%)	2,164 (93.8%)	304 (93.3%)	28,419 (95.1%)
Discordant	1,198 (4.4%)	134 (5.8%)	19 (5.8%)	1,351 (4.5%)
Concordant for having replacement	110 (0.4%)	10 (0.4%)	3 (0.9%)	123 (0.4%)
Total Knee Replacement				
Concordant for <i>not</i> having replacement	26,282 (96.4%)	2,141 (92.8%)	294 (90.2%)	28,717 (96.1%)
Discordant	916 (3.4%)	160 (6.9%)	27 (8.3%)	1,103 (3.7%)
Concordant for having replacement	61 (0.2%)	7 (0.3%)	5 (1.5%)	73 (0.2%)

Supplementary Table 2: Heritability models to estimate the proportion of additive genetic influence for different traits: A: genetic variance, C: shared (familial) environmental variance, E: individual-specific environmental variance. Estimates with 95% confidence intervals (CI) derived by the Wald method and cut at zero are given along with the -2 log likelihood (-2LL), the difference in -2 log likelihood (diff.LL), the degrees of freedom (df), the difference in degrees of freedom (diff.df), and the Akai information criteria (AIC). The p-value indicates whether an A(C)E model fit the data statistically significantly worse than a saturated model.

Heritability models	A	95% CI	C	95% CI	E	95% CI	-2LL	diff. LL	df	diff. df	AIC	p
Unadjusted ACE												
Hip Replacement	0.65	(0.47-0.83)	0	(0-0.15)	0.35	(0.29-0.42)	14396.6	4.6	59783	3	-105169.4	0.20
Knee Replacement	0.57	(0.34-0.80)	0	(0-0.17)	0.43	(0.35-0.51)	11967.3	3.5	59783	3	-107598.7	0.32
Adjusted ACE												
Hip Replacement	0.64	(0.46-0.82)	0	(0-0.15)	0.36	(0.30-0.42)	14279.5	4.8	59780	3	-105275.8	0.19
Knee Replacement	0.54	(0.31-0.78)	0	(0-0.19)	0.45	(0.37-0.54)	11526.1	2.7	59780	3	-108034.0	0.44
Sex-limited ACE												
Hip Replacement: Females	0.66	(0.59-0.74)	0	(0-0.00)	0.34	(0.26-0.41)						
Hip Replacement: Males	0.63	(0.54-0.73)	0	(0-0.00)	0.37	(0.27-0.46)	14180.7	14.3	59777	6	-105373.3	0.03
Knee Replacement: Females	0.51	(0.35-0.67)	0.01	(0-0.11)	0.48	(0.37-0.59)						
Knee Replacement: Males	0.33	(0-0.68)	0.26	(0-0.55)	0.41	(0.29-0.52)	12093.0	9.5	59777	6	-107461.0	0.15
AE												
Hip Replacement: AE vs. sat.	0.62	(0.59-0.70)			0.35	(0.30-0.41)	14396.6	4.6	59784	4	-105171.4	0.33
Hip Replacement: AE vs. ACE							14396.6	0	59784	1	-105171.4	>0.99
Knee Replacement: AE vs. sat.	0.57	(0.50-0.64)			0.43	(0.36-0.50)	11967.3	3.5	59784	4	-107600.7	0.48
Knee Replacement: AE vs. ACE							11967.3	0	59784	1	-107600.7	>0.99