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Supplementary Material

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Death-as-missing adjusted EQ-5D

Table i. Means and estimates of differences in four-month EuroQol five-dimension questionnaire scores for survivors only between those attaining (Yes) and those not attaining (No) for each best practice tariff indicator; n = 5,732 provided baseline and four-month EuroQol five-dimension questionnaire score.

BPT	Mean EQ-5D four months		Analysis*		Adjusted analysis†	
	No	Yes	Difference (95% CI)	p	Difference (95% CI)	p
Surgery < 36	0.519	0.502	-0.017 (-0.038 to 0.003)	0.097	-0.004 (-0.021 to 0.014)	0.668
Joint care	0.472	0.508	0.036 (0.000 to 0.073)	0.053	0.036 (0.004 to 0.068)	0.026
MDT protocol	0.509	0.506	-0.003 (-0.084 to 0.078)	0.942	0.010 (-0.059 to 0.079)	0.780
Geriatrician < 72	0.474	0.509	0.034 (0.000 to 0.069)	0.048	0.016 (-0.013 to 0.044)	0.288
MDT rehab	0.529	0.506	-0.023 (-0.099 to 0.053)	0.548	-0.022 (-0.086 to 0.042)	0.498

Bone health	0.473	0.507	0.034 (-0.004 to 0.072)	0.076	0.049 (0.017 to 0.082)	0.003
Cognitive assessment	0.505	0.506	0.002 (-0.024 to 0.027)	0.887	0.020 (-0.002 to 0.042)	0.070

*Independent-samples *t*-test

†Regression analysis adjusting for baseline EQ-5D, age, sex, pre-fracture mobility, and pre-fracture residence

BPT, best practice tariff; EQ-5D, EuroQol five-dimension questionnaire; MDT, multidisciplinary team.

Model distributions of death-adjusted and death-as-missing EQ-5D

The models reported here for EQ-5D assume approximate normality. Figure a shows the distribution of death-adjusted EQ-5D (Figure aa) and death-adjusted EQ-5D (Figure ad) at four months. Figure aa shows a clear spike at 0 for those participants who died and were coded as 0. Figures ab and ae show histograms of the model residuals (the difference between the predicted and observed values) after adjusting for baseline EQ-5D, age, sex, pre-fracture mobility, and pre-fracture residence. These histograms are approximated by the normal distribution for both EQ-5D metrics, which is confirmed by quantile-quantile plots in Figures ac and af.

The fact that the covariates in the death-adjusted EQ-5D model are predictive of death at four months explains why the model residuals for this model do not show the same deviations from normality that are apparent in the raw data.

There are strong reasons in principle for preferring the death-adjusted EQ-5D; it allows us to use data from all participants and as such it is an 'unbiased' estimate of the population health-related quality of life. Irrespective of that, the analysis here leads one to conclude that the distributional properties (as regards the model fitting) of death-adjusted and death-as-missing are quite similar, and as such the death-adjusted metric is preferable as it uses data from all participants and thus is likely to lead to a more precise analysis.

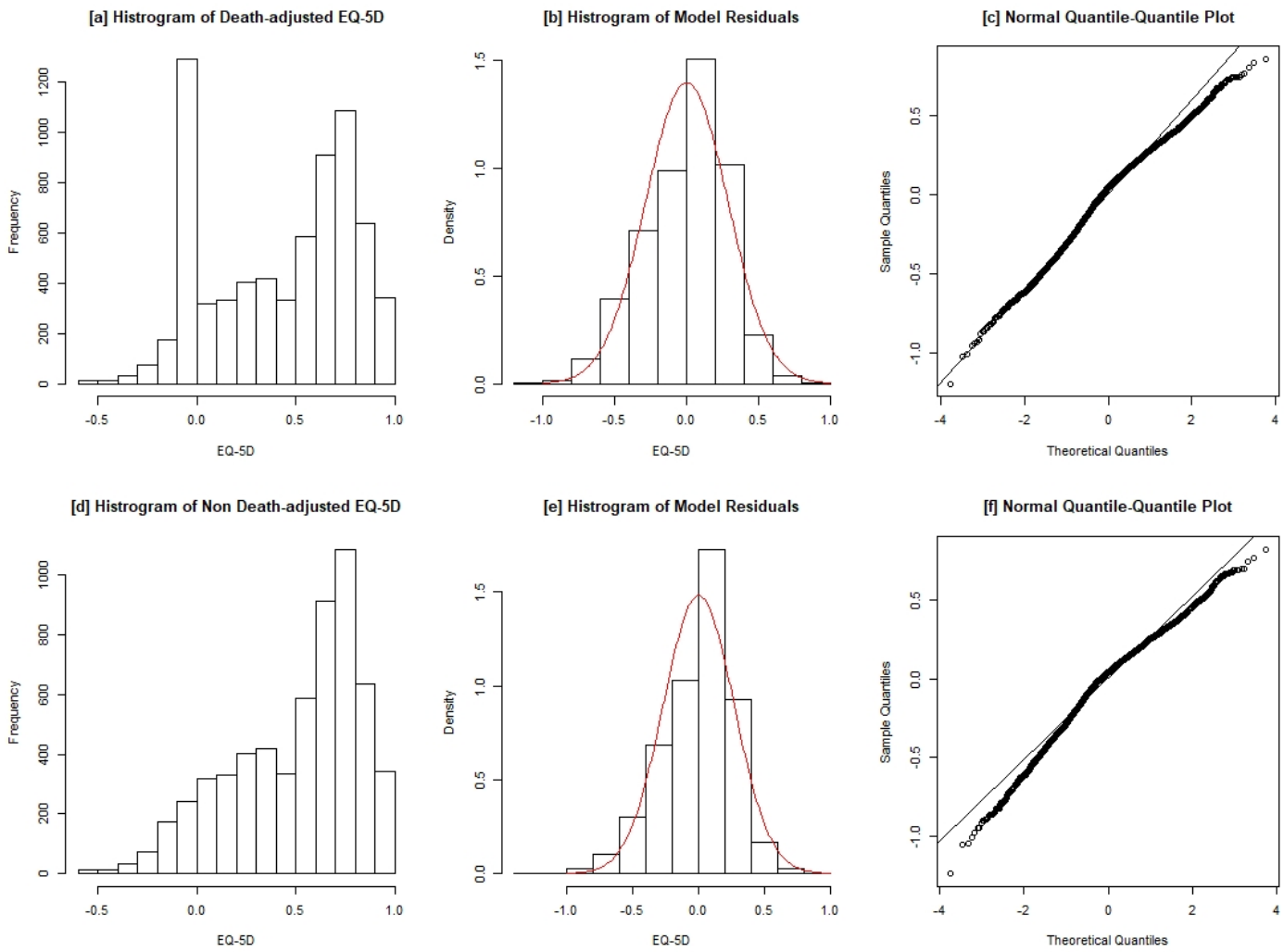

Figure a. Histograms of a) death-adjusted and d) death-as-missing adjusted EQ-5D, model residuals for b) death-adjusted and e) death-as-missing adjusted EQ-5D, and normal quantile-quantile plots for c) death-adjusted and f) death-as-missing adjusted EQ-5D.

Proxy reporting of EQ-5D

There was no evidence that method of reporting of EQ-5D differed significantly between best practice tariff (BPT) attainment groups.

Table ii. Numbers of study participants by method of reporting of baseline EQ-5D and BPT grouping.

BPT	Method of reporting, n (%)			Total
	Participant	NoK/Relative	Carer/Nursing home	
No	1,960 (70.83)	713 (25.77)	94 (3.40)	2,767
Yes	2,760 (71.82)	990 (25.76)	93 (2.42)	3,843
Total	4,720 (71.41)	1,703 (25.76)	187 (2.83)	6,610

A chi-squared test showed that there was no evidence for a statistically significant difference between participant and non-participant reporting (next of kin (NoK)/relative/carer/nursing home staff); (chi-squared statistic = 0.716, p-value = 0.398).

Table iii. Mortality and health-related quality of life by type of surgical delay.

Delay	**N**	**Deaths (%)**			**EQ-5D Baseline; mean**			**EQ-5D 4m; mean**		
			p-value*		p-value†			p-value†		
No delay	6,508	779 (12.0)	–		0.646	–		0.430	–	
Medical	747	154 (20.6)	< 0.001	–	0.624	0.257	–	0.363	< 0.001	–
Administrative	823	83 (10.1)	0.343	< 0.001	0.682	0.007	0.001	0.477	0.003	< 0.001
Other	144	16 (11.1)	0.999	0.036	0.668	0.785	0.336	0.490	0.126	0.001
Total	8,222	1,032 (12.6)			0.649			0.430		

*p-values from logistic regression analysis, adjusted for multiple-testing using Holm-Bonferroni method, where "–" is the comparator group indicator.
†p-values from linear regression analysis, adjusted for multiple-testing using Holm-Bonferroni method.

Propensity score matching

Propensity score matching (PSM) was implemented using the R package MatchIt (https://cran.r-project.org/web/packages/MatchIt/). Two-to-one nearest neighbour matching was used to obtain reduced datasets consisting of data from those participants who did not attain BPT matched as nearly as possible to two participants who did attain BPT, for each BPT criterion. The distributions of the estimated propensity scores, defined as the probability of not attaining BPT conditional on the observed covariates (baseline EQ-5D, sex, age, pre-fracture mobility, and pre-fracture residency), are shown in Figures b to h for matched and unmatched data for each BPT criterion. Table iv shows unadjusted and adjusted estimates of differences in four-month EQ-5D between those attaining each BPT criterion. BPT 2, BPT 6, and BPT 7 show evidence for statistically significant differences for both the adjusted and unadjusted analyses.

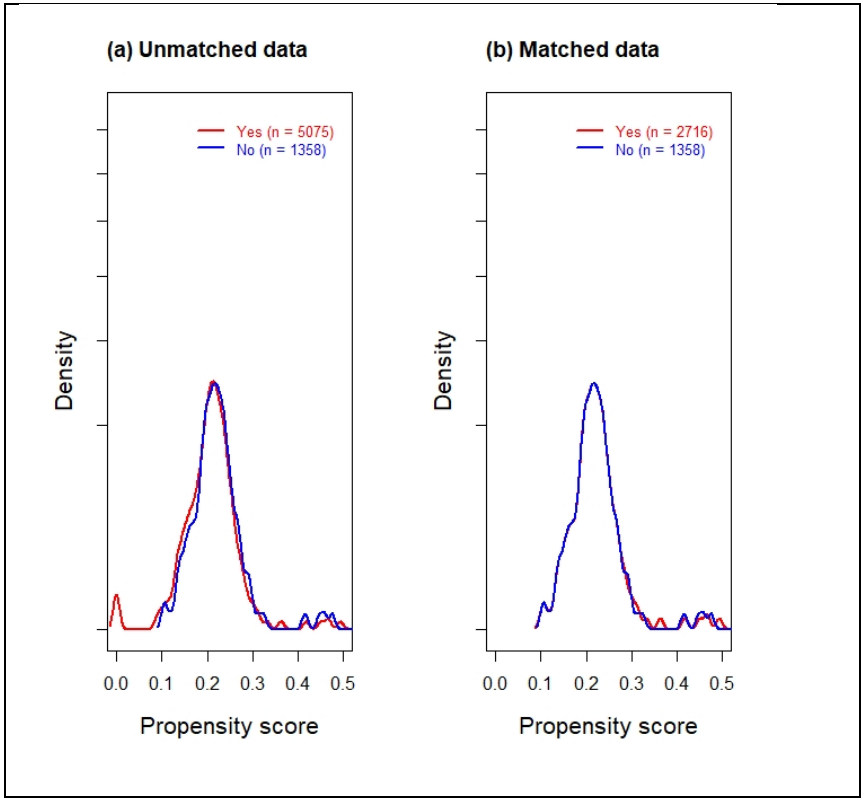

Figure b. Distributions of propensity scores for a) unmatched and b) matched data by BPT indicator (surgery < 36 hours).

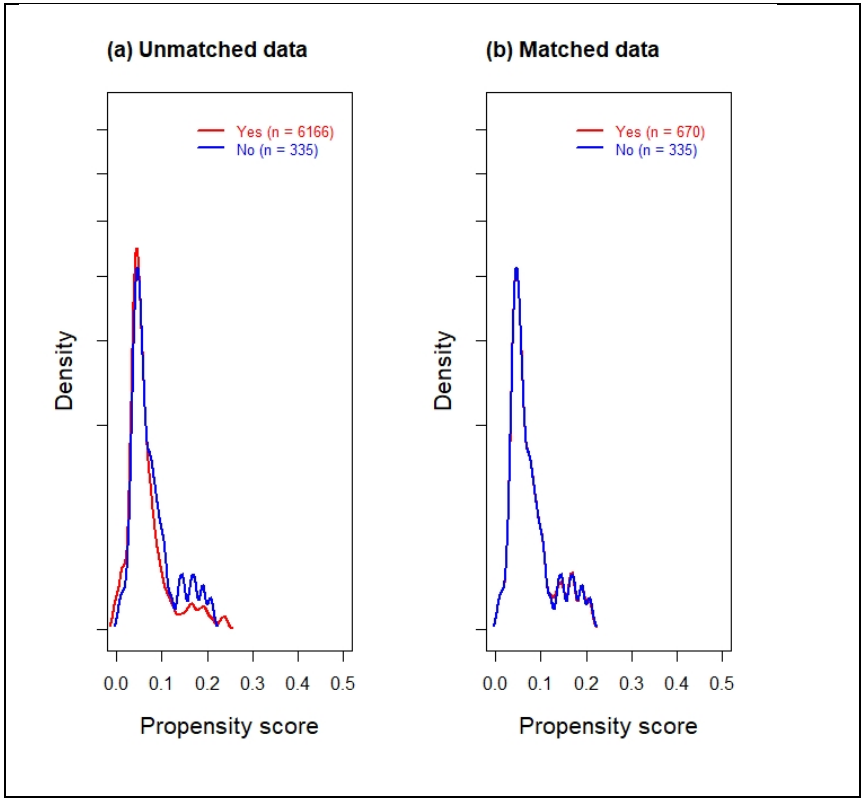

Figure c. Distributions of propensity scores for a) unmatched and b) matched data for joint care.

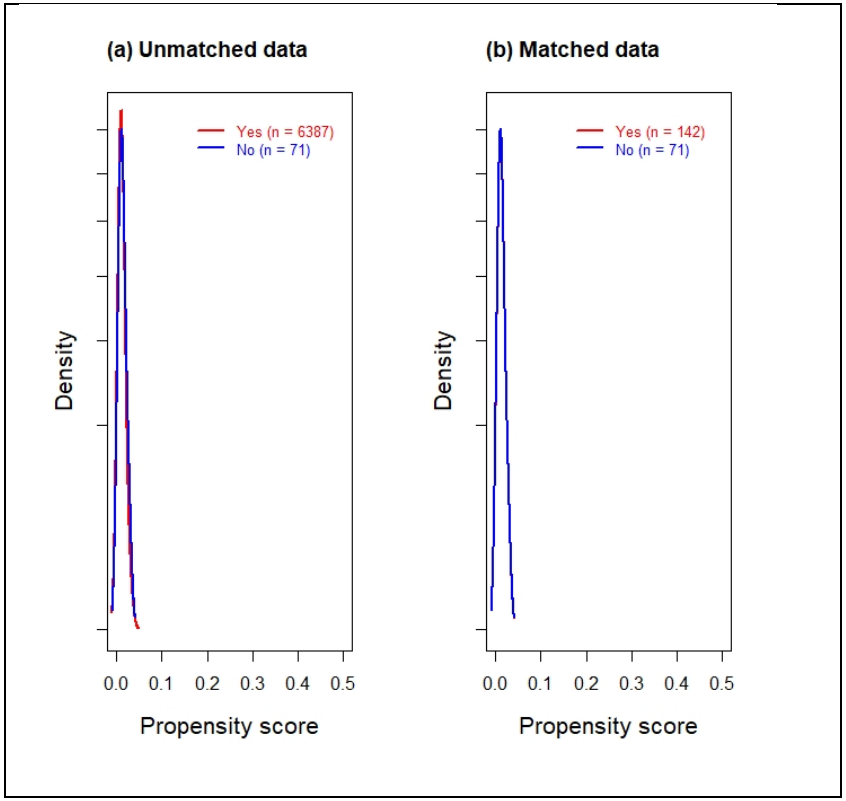

Figure d. Distributions of propensity scores for a) unmatched and b) matched data for multidisciplinary team protocol.

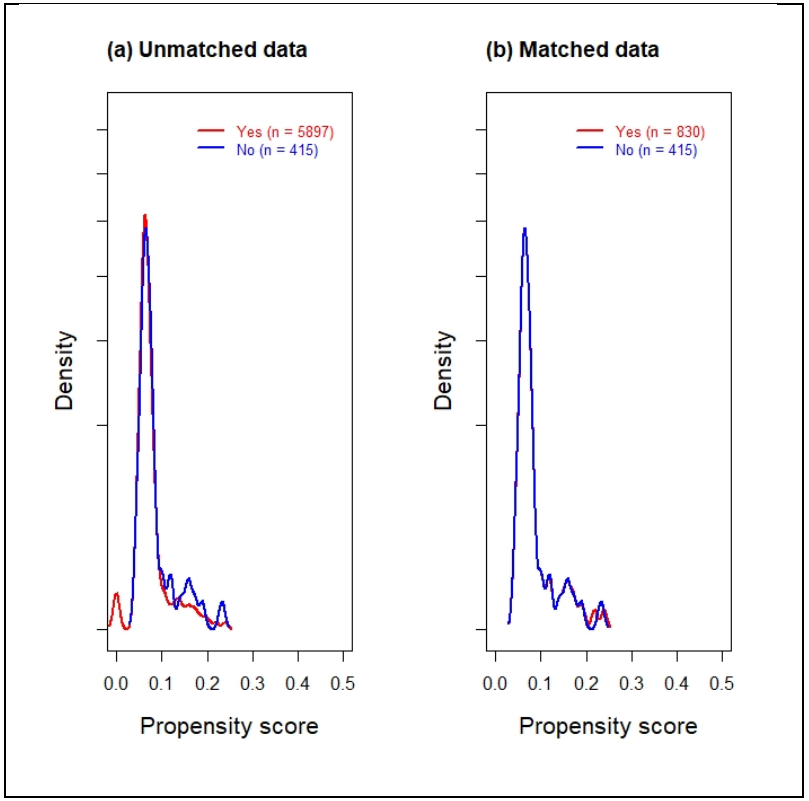

Figure e. Distributions of propensity scores for a) unmatched and b) matched data for geriatrician < 72 hours.

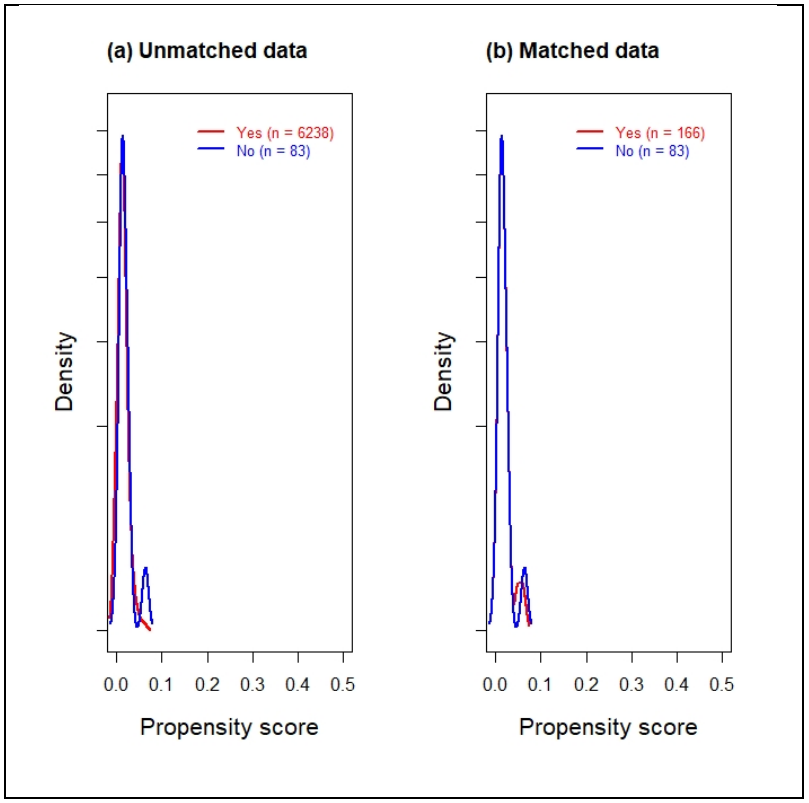

Figure f. Distributions of propensity scores for a) unmatched and b) matched data for multidisciplinary team rehab.

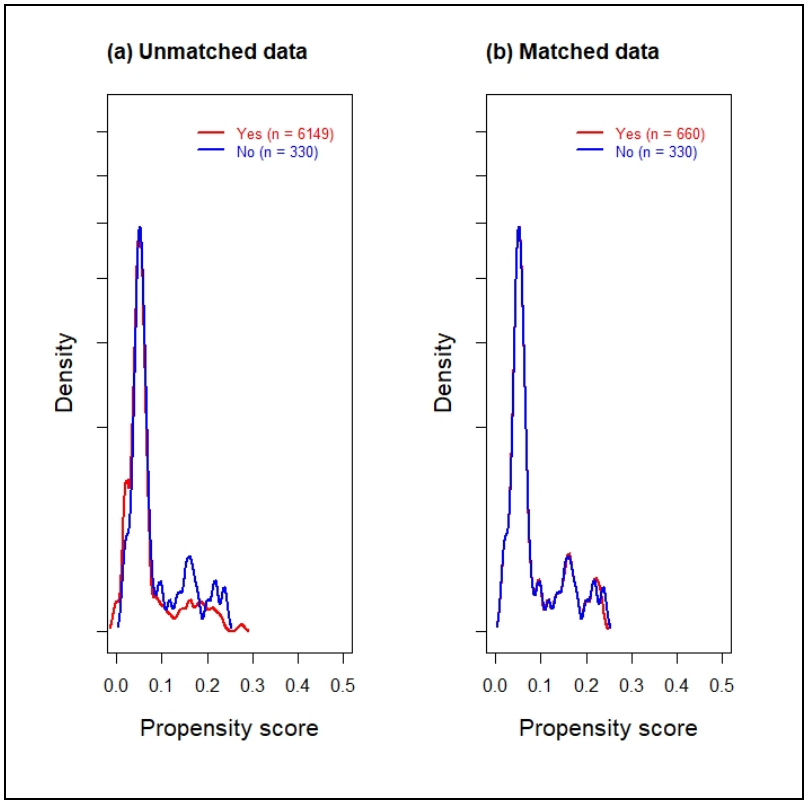

Figure g. Distributions of propensity scores for a) unmatched and b) matched data for bone health.

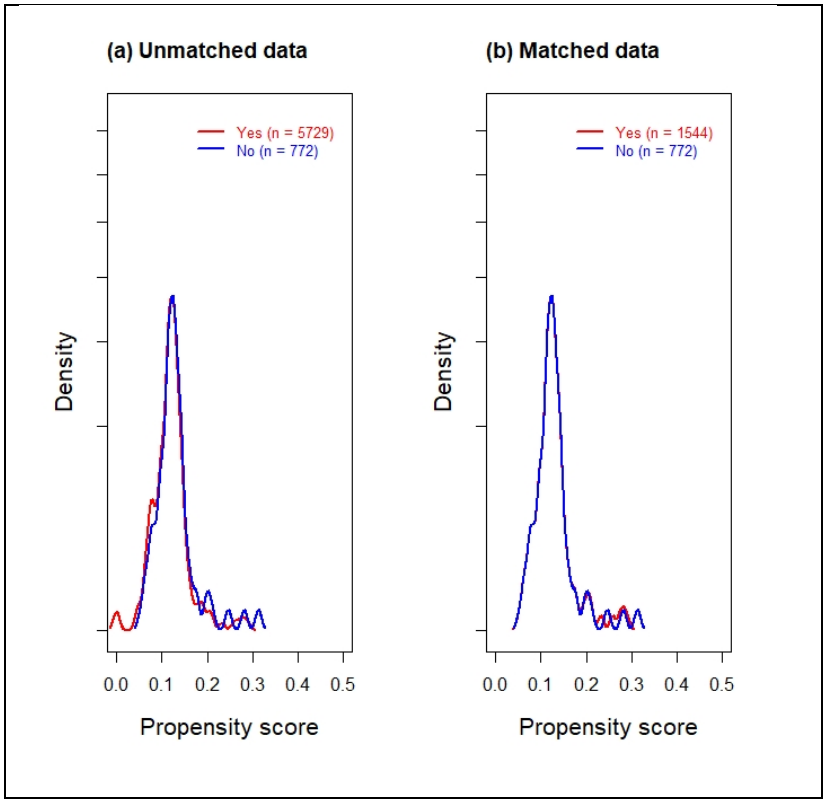

Figure h. Distributions of propensity scores for a) unmatched and b) matched data for cognitive assessment.

Table iv. Unadjusted and adjusted estimates of differences in four-month EQ-5D between those attaining (Yes) and those not attaining BPT (No) for each BPT criterion for matched data.

BPT	n		Analysis*		Adjusted analysis†	
	No	Yes	Difference (95% CI)	p-value	Difference (95% CI)	p-value
Surgery < 36	1,358	2,716	0.019 (-0.003 to 0.042)	0.089	0.013 (-0.005 to 0.032)	0.162
Joint care	335	670	0.059 (0.013 to 0.105)	0.012	0.053 (0.016 to 0.089)	0.005
MDT protocol	71	142	0.007 (-0.097 to 0.111)	0.898	0.037 (-0.053 to 0.127)	0.415
Geriatrician < 72	415	830	0.029 (-0.013 to 0.070)	0.176	0.023 (-0.012 to 0.057)	0.202
MDT rehab	83	166	0.021 (-0.072 to 0.114)	0.660	0.015 (-0.061 to 0.092)	0.692
Bone health	330	660	0.059 (0.013 to 0.105)	0.011	0.054 (0.016 to 0.093)	0.006
Cognitive assessment	772	1,544	0.040 (0.010 to 0.069)	0.009	0.031 (0.007 to 0.056)	0.013

*Independent-samples *t*-test.

†Regression analysis adjusting for baseline EQ-5D, age, sex, pre-fracture mobility, and pre-fracture residence.

CI, confidence interval; MDT, multidisciplinary team.