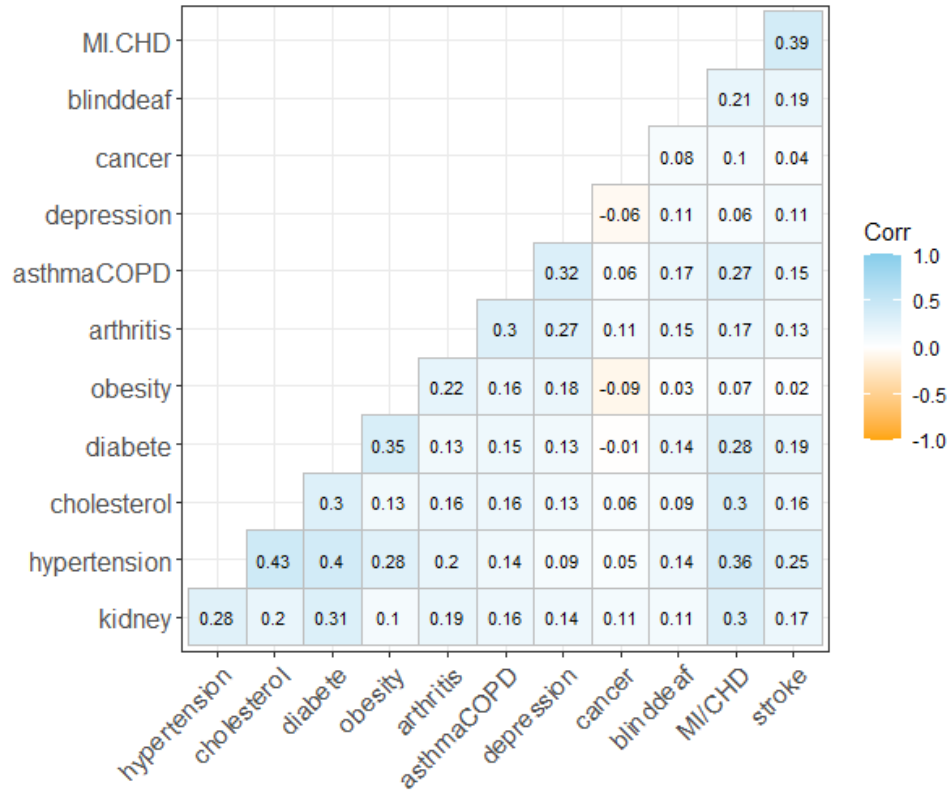Supplemental material for Multimorbidity Patterns in the US Adults with Subjective Cognitive

Decline and Their Relationship with Functional Difficulties

Appendix 1: Frequency, histogram and missing summary of all variables

Variable	Stats. Values	Frequency (%)	Histogram	Missing (%)
Age group	1. 45-49 2. 50-54 3. 55-59 4. 60-64 5. 65-69 6. 70-74 7. 75-79 8. 80+	1135 (7.30%) 1597 (10.30%) 1978 (12.80%) 2212 (14.30%) 2034 (13.10%) 2035 (13.10%) 1760 (11.40%) 2739 (17.70%)		131 (0.8%)
Sex	1. Male 2. Female	6889 (44.10%) 8732 (55.90%)		0 (0.0%)
Race	1. Non-white 2. white	12291 (80.30%) 3011 (19.70%)		319 (2.0%)
Urban/rural	1. Rural counties 2. Ruban counties	2509 (16.10%) 13112 (83.90%)		0 (0.0%)
Educational level	1. Didnot graduate high scho 2. Graduated high school 3. Attended college/tech sch 4. Graduated college/tech sch	1935 (12.40%) 4873 (31.30%) 4481 (28.80%) 4292 (27.50%)		40 (0.3%)
Household income	1. < $15, 000 2. $15, 000 to < $25,000 3. $25,000 to < $35,000 4. $35, 000 to < $50,000 5. $50, 000 +	2359 (18.40%) 3169 (24.70%) 1598 (12.50%) 1784 (13.90%) 3925 (30.60%)		2786 (17.8%)
Employment status	1. Out of work/homemaker/student 2. Retired 3. Unable to work	5163 (33.20%) 7114 (45.70%) 3273 (21.00%)		71 (0.5%)
Marital status	1. Divorced/widowed/separated/never married 2. Married/menber of an unmarried couple	8554 (55.10%) 6984 (44.90%)		83 (0.5%)
Hypertension	1. No high blood pressure 2. High blood pressure	5886 (37.80%) 9681 (62.20%)		54 (0.3%)
Diabetes	1. No diabetes 2. Diabetes	11274 (72.40%) 4302 (27.60%)		45 (0.3%)
Cholestoral level	1. No high cholesterol 2. High cholesterol	5955 (41.80%) 8283 (58.20%)		1383 (8.9%)
MI/CHD	1. No myocardial infarctionor coronary heart disease	11873 (77.90%) 3375 (22.10%)		373 (2.4%)
Stroke	1. No stroke 2. Stroke	13305 (86.00%) 2169 (14.00%)		147 (0.9%)
Arthritis	1. No arthritis 2. Arthritis	5718 (36.90%) 9775 (63.10%)		128 (0.8%)
Depression	1. No depression 2. Depression	8738 (56.50%) 6739 (43.50%)		144 (0.9%)
Kidney disease	1. No kidney disease 2. Kidney disease	14036 (90.70%) 1443 (9.30%)		142 (0.9%)
Obesity	1. < 30 2. > 30	9237 (61.60%) 5768 (38.40%)		616 (3.9%)
Blind	1. No blind or serious difficulty seeing, even with glasses 2. blind or serious difficulty seeing, even with glasses	12860 (82.80%) 2668 (17.20%)		93 (0.6%)
Deaf	1. No deaf or serious difficulty hearing 2. deaf or serious difficulty hearing	11635 (75.00%) 3878 (25.00%)		108 (0.7%)
Blind/deaf	1. No blind or serious difficulty hearing/seeing, even with glasses 2. blind or serious difficulty hearing/seeing, even with glasses	9944 (64.20%) 5535 (35.80%)		142 (0.9%)

Asthma	1. Asthma	2964 (19.20%)		182 (1.2%)
	2. No Asthma	12475 (80.80%)		
COPD	1. COPD, emphysema or chronic bronchitis	3603 (23.40%)		212 (1.4%)
	2. No COPD, emphysema or chronic bronchitis	11806 (76.60%)		
Asthma/COPD	1. Never asthmas/no COPD	10209 (66.50%)		261 (1.7%)
	2. Former/current asthmas/CO	5151 (33.50%)		
Skin cancer	1. No skin cancer	12849 (82.80%)		102 (0.7%)
	2. Skin cancer	2670 (17.20%)		
Other Cancer	1. No other cancers	12624 (81.30%)		93 (0.6%)
	2. Other cancers	2904 (18.70%)		
Cancer	1. No Cancer	10683 (69.00%)		143 (0.9%)
	2. Cancer	4795 (31.00%)		
Hepatitis C	1. No hepatitis C	2206 (95.90%)		13320 (85.3%)
	2. hepatitis C	95 (4.10%)		
Hepatitis B	1. No hepatitis B	2241 (97.80%)		13330 (85.3%)
	2. hepatitis B	50 (2.20%)		
Hepatitis	1. No hepatitis	2166 (94.50%)		13329 (85.3%)
	2. Hepatitis	126 (5.50%)		
Smoke status	1. Never smoke	2322 (15.00%)		109 (0.7%)
	2. Former smoker	818 (5.30%)		
	3. Current smoker, smokes so	5726 (36.90%)		
	4. Current smoker, smokes ev	6646 (42.80%)		
Heavy drinker	1. Not heavy drinker	14511 (94.80%)		312 (2.0%)
	2. Heavy drinker	798 (5.20%)		
Physical exercise	1. No physical activity/exer	6583 (42.20%)		38 (0.2%)
	2. Physical activity/exercis	9000 (57.80%)		
Fruit ≥ 1 per day	1. No fruit consumption	6261 (41.70%)		611 (3.9%)
	2. At least once fruit consu	8749 (58.30%)		
Vegetable ≥ 1 per day	1. No vegetable consumption	3524 (24.00%)		939 (6.0%)
	2. At least once vegetable c	11158 (76.00%)		
Funtional impairment	1. No funtional limitations	5652 (37.10%)		382 (2.4%)
	2. Funtional limitations	9587 (62.90%)		

Appendix 2: Correlation matrix of variables for latent class analysis

Appendix 3: Assessment of inverse probability of treatment weighting method

Figure 1: Absolute Standardized Difference in Unweighted and Weighted Means and Proportions in Each Pair of the Groups on Imputed Data 1
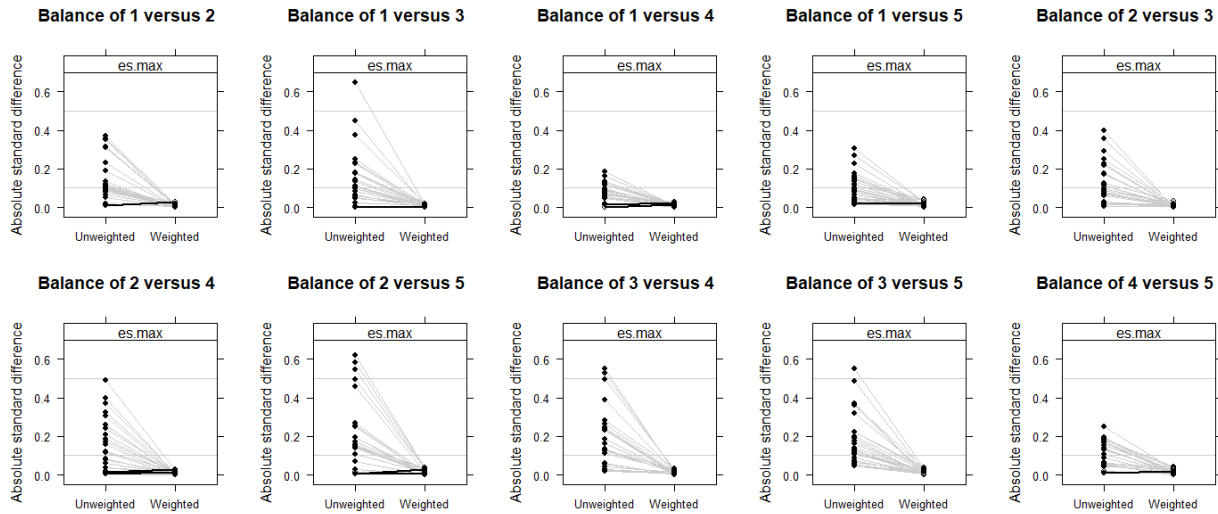
Figure 2: Absolute Standardized Difference in Unweighted and Weighted Means and Proportions in Each Pair of the Groups on Imputed Data 2
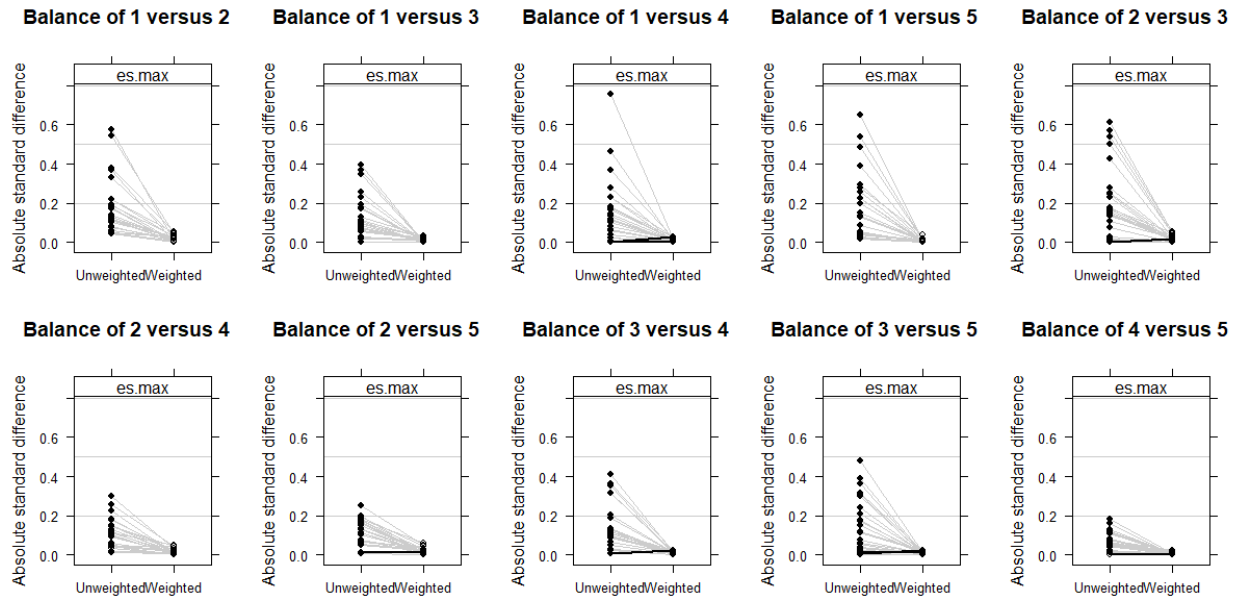
Figure 3: Absolute Standardized Difference in Unweighted and Weighted Means and

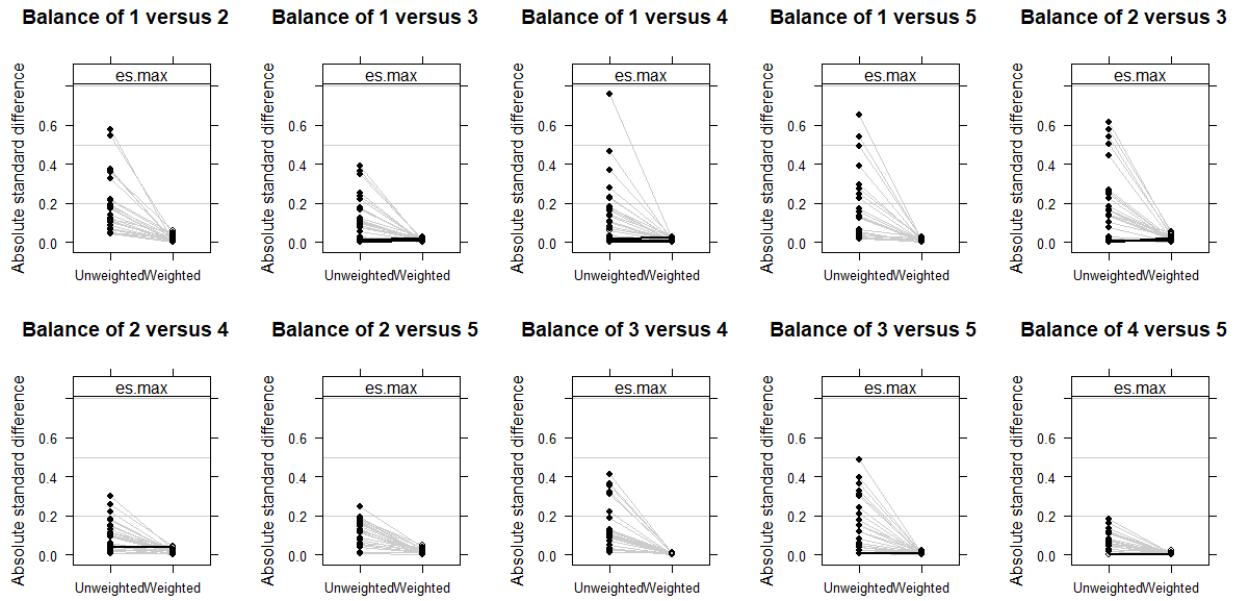Proportions in Each Pair of the Groups on Imputed Data 3

Figure 4: Absolute Standardized Difference in Unweighted and Weighted Means and

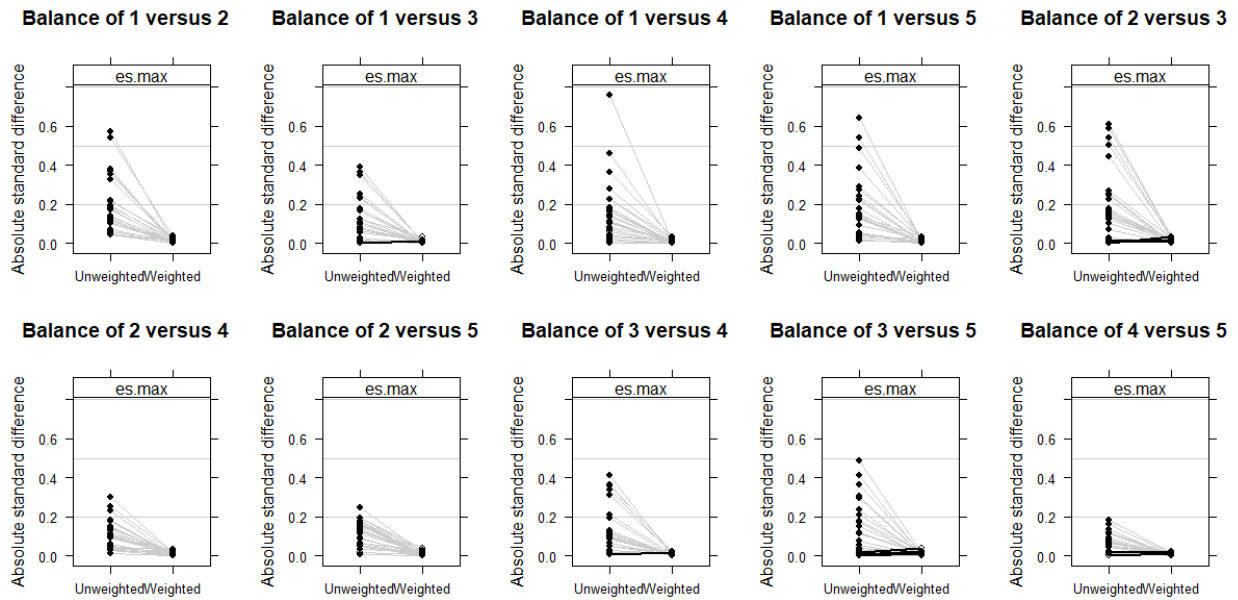Proportions in Each Pair of the Groups on Imputed Data 4

Figure 5: Absolute Standardized Difference in Unweighted and Weighted Means and

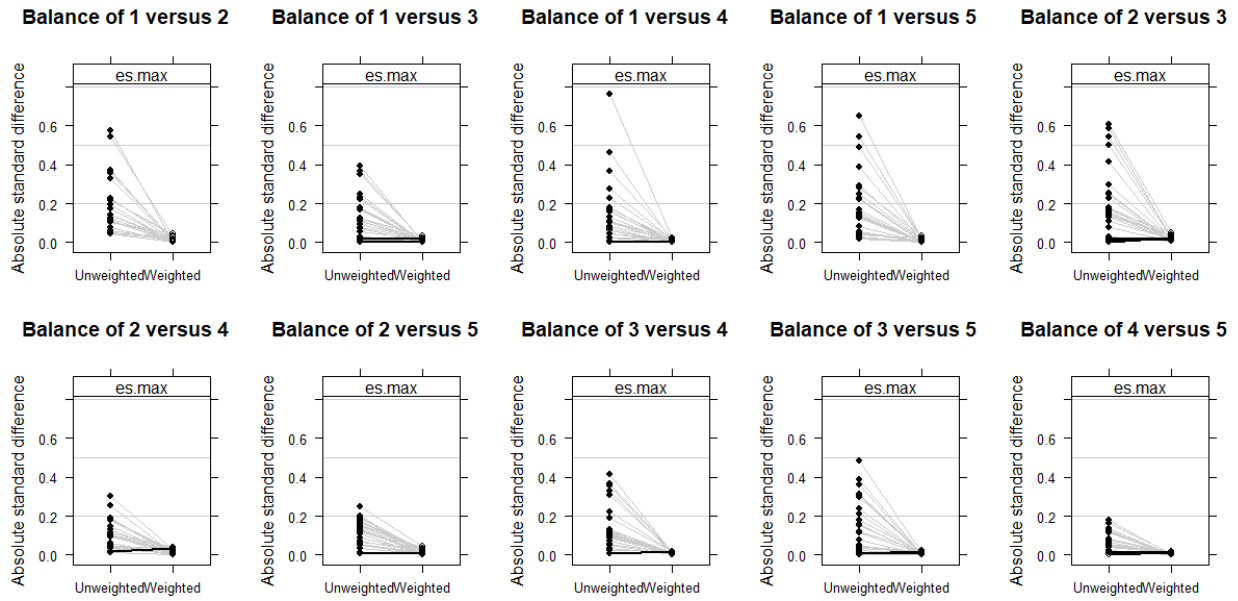Proportions in Each Pair of the Groups on Imputed Data 5

Figure 6: Absolute Standardized Difference in Unweighted and Weighted Means and

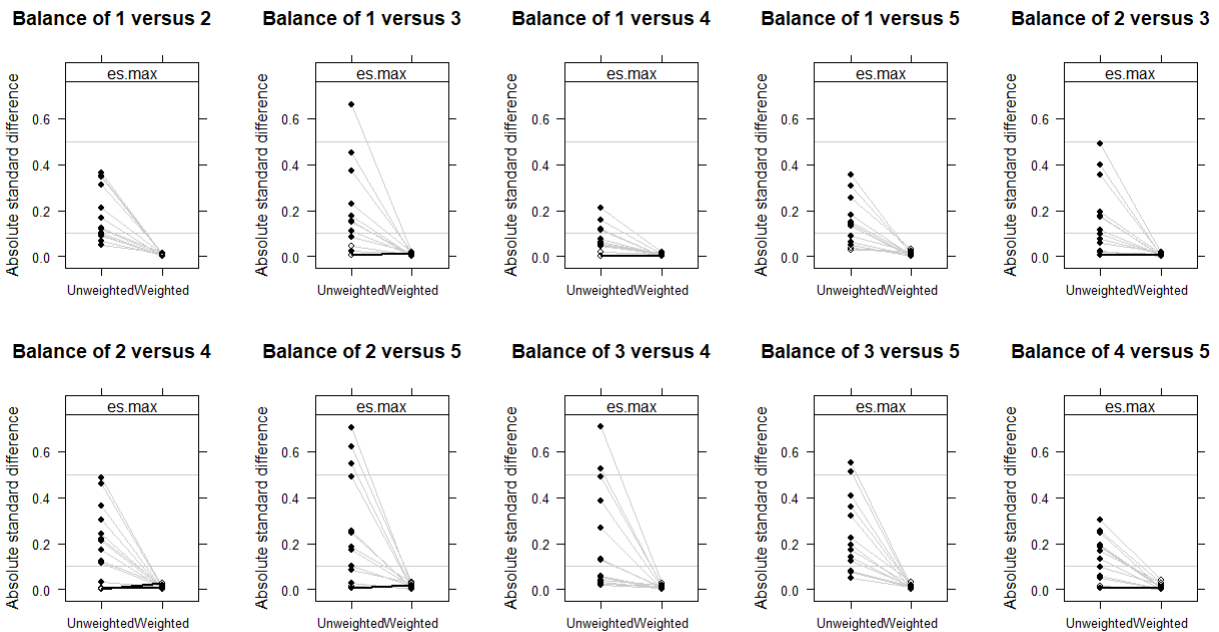Proportions in Each Pair of the Groups on Imputed Data 6

Figure 7: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 7

Figure 8: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 8

Figure 9: Absolute Standardized Difference in Unweighted and Weighted Means and
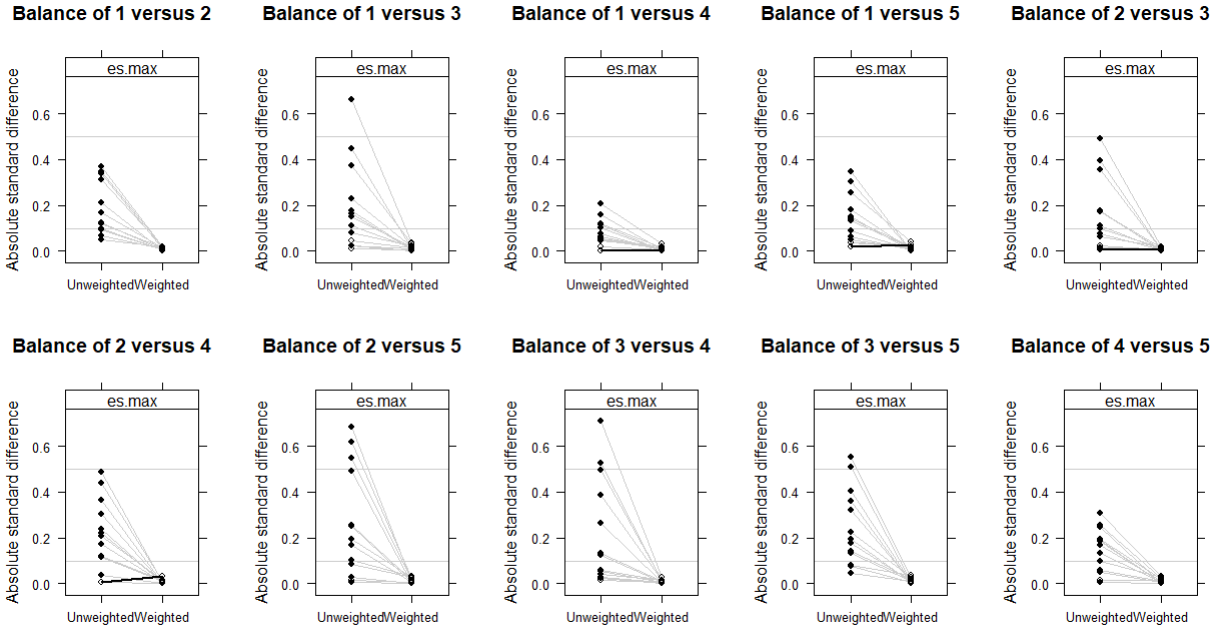
Proportions in Each Pair of the Groups on Imputed Data 9

Figure 10: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 10

Figure 11: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 11

Figure 12: Absolute Standardized Difference in Unweighted and Weighted Means and

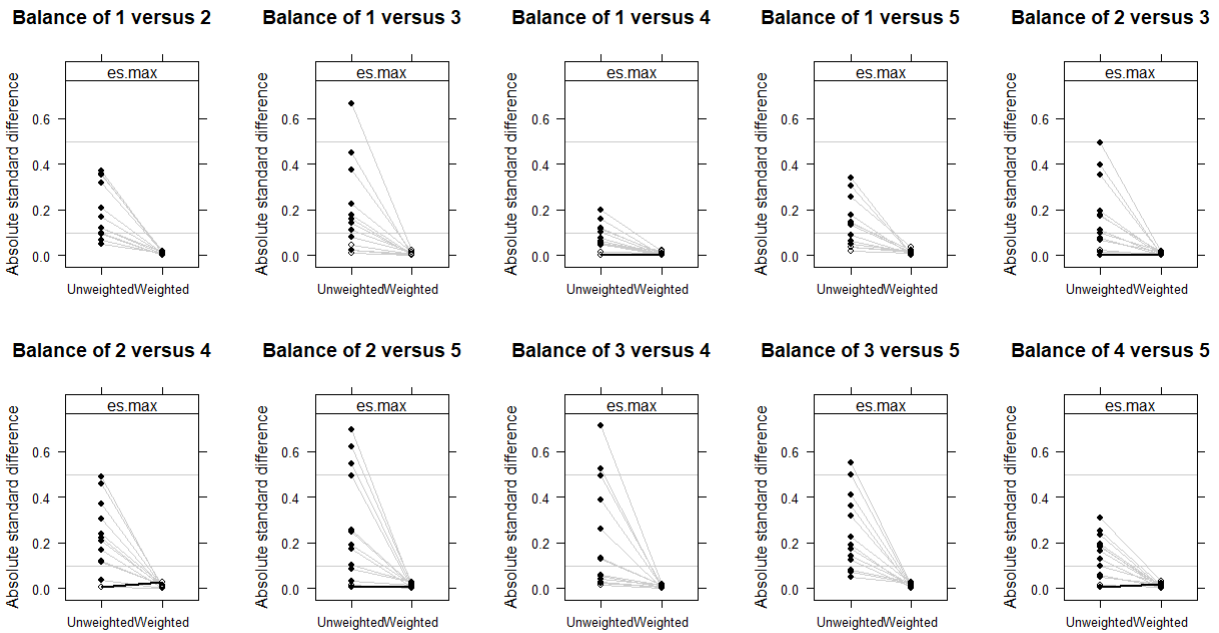Proportions in Each Pair of the Groups on Imputed Data 12

Figure 13: Absolute Standardized Difference in Unweighted and Weighted Means and

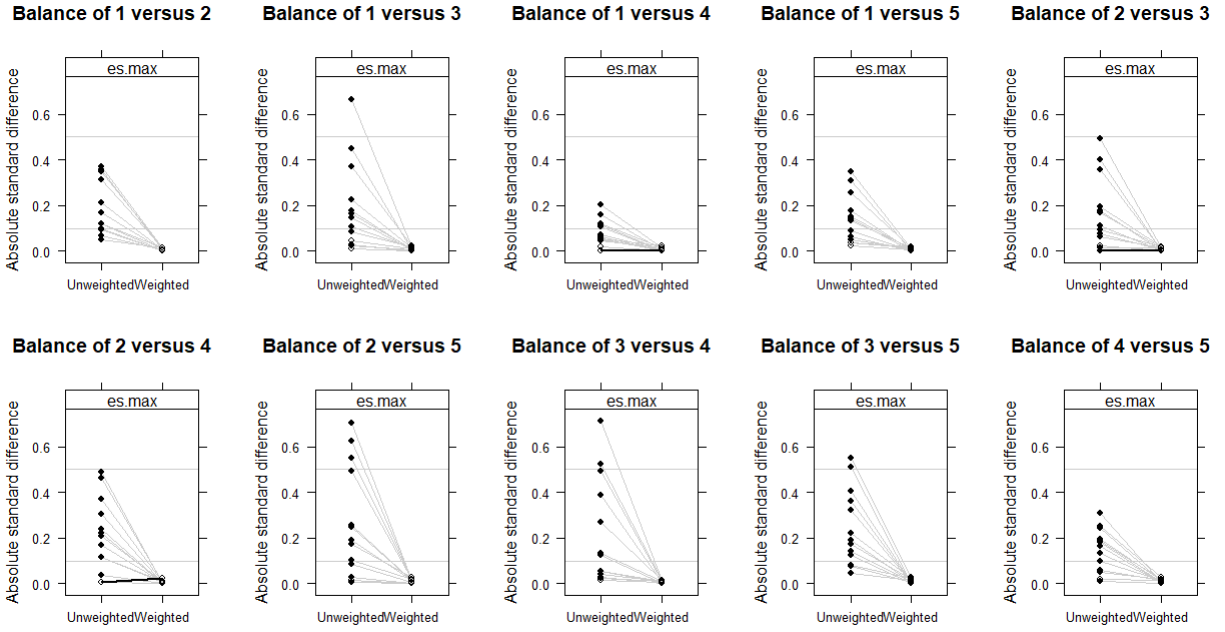Proportions in Each Pair of the Groups on Imputed Data 13

Figure 14: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 14

Figure 15: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 15

Figure 16: Absolute Standardized Difference in Unweighted and Weighted Means and

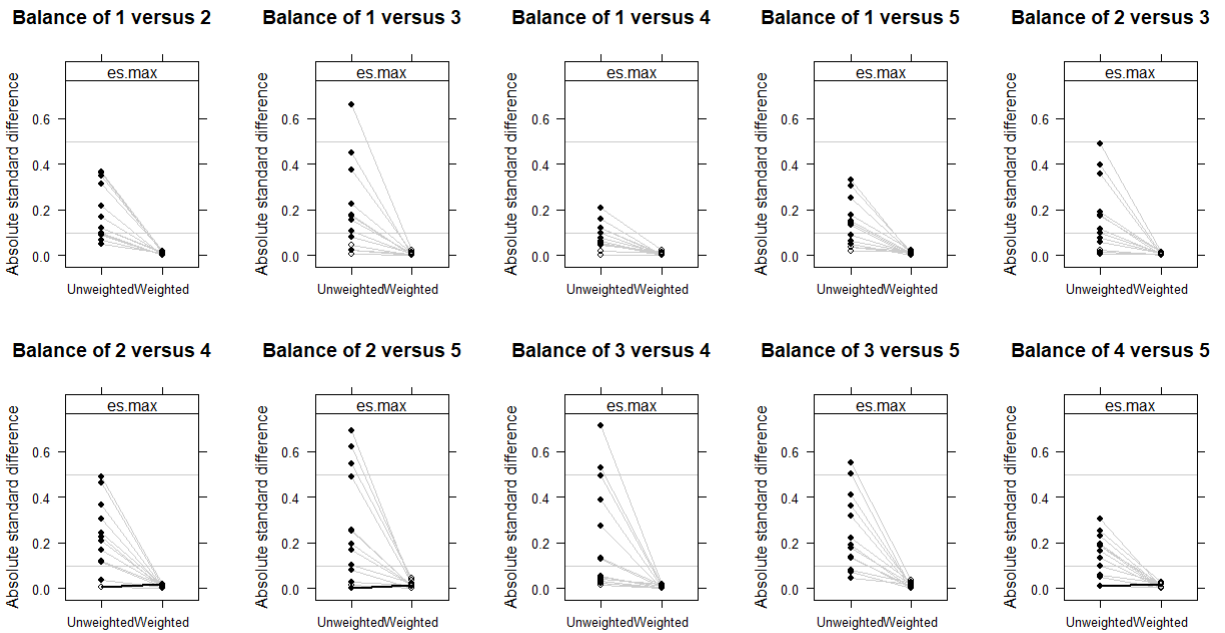Proportions in Each Pair of the Groups on Imputed Data 16

Figure 17: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 17

Figure 18: Absolute Standardized Difference in Unweighted and Weighted Means and
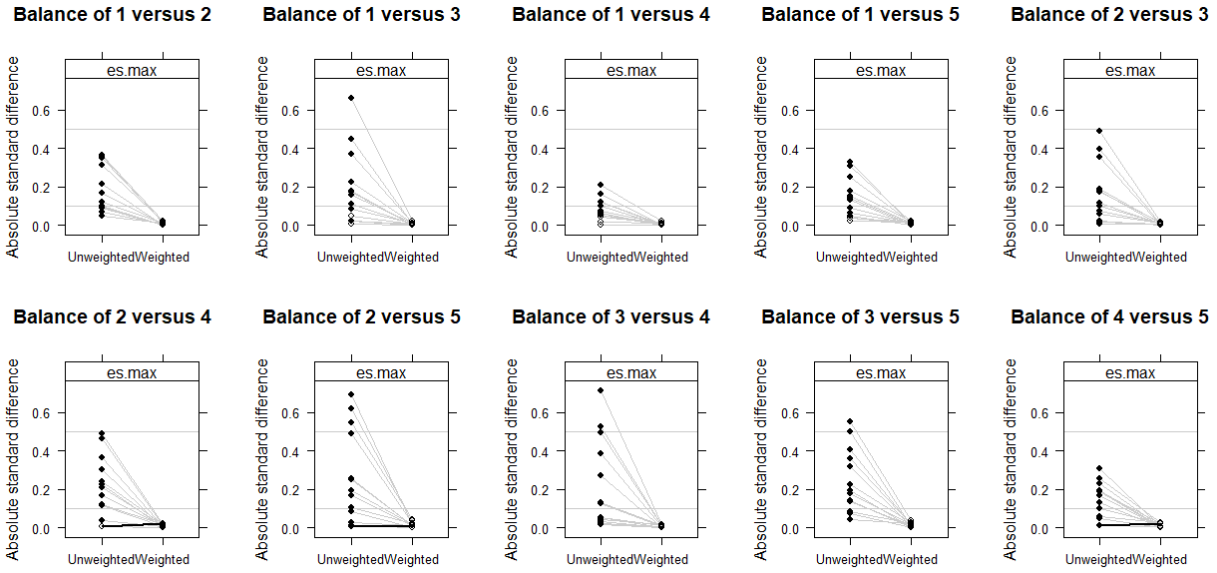
Proportions in Each Pair of the Groups on Imputed Data 18

Figure 19: Absolute Standardized Difference in Unweighted and Weighted Means and

Proportions in Each Pair of the Groups on Imputed Data 19

Figure 20: Absolute Standardized Difference in Unweighted and Weighted Means and
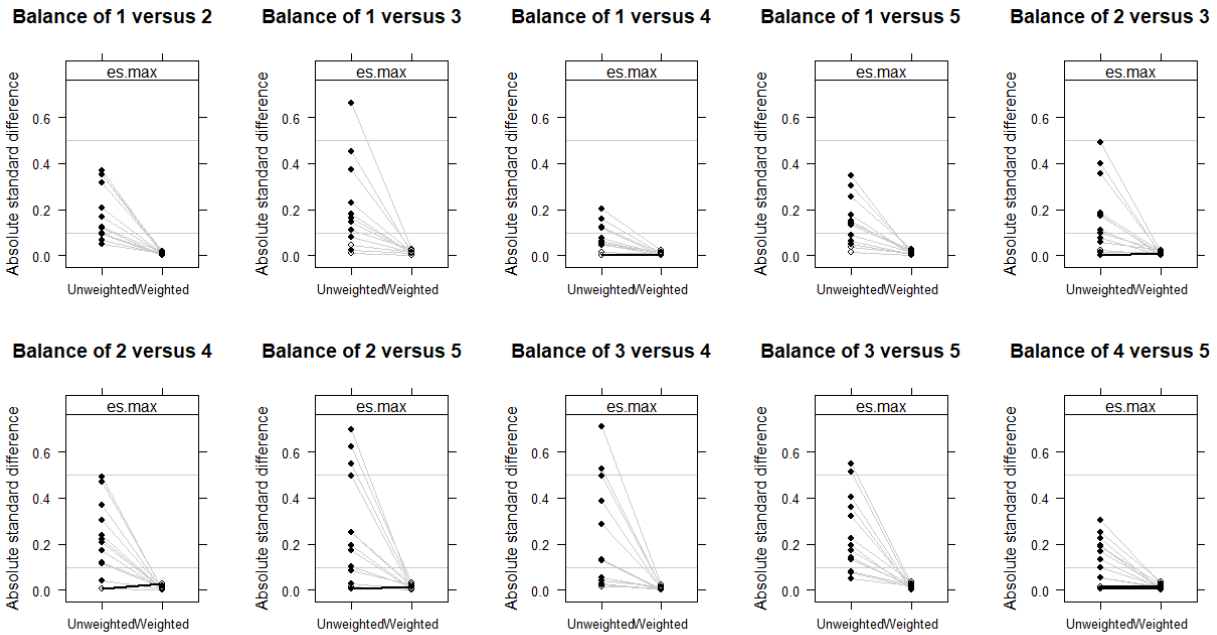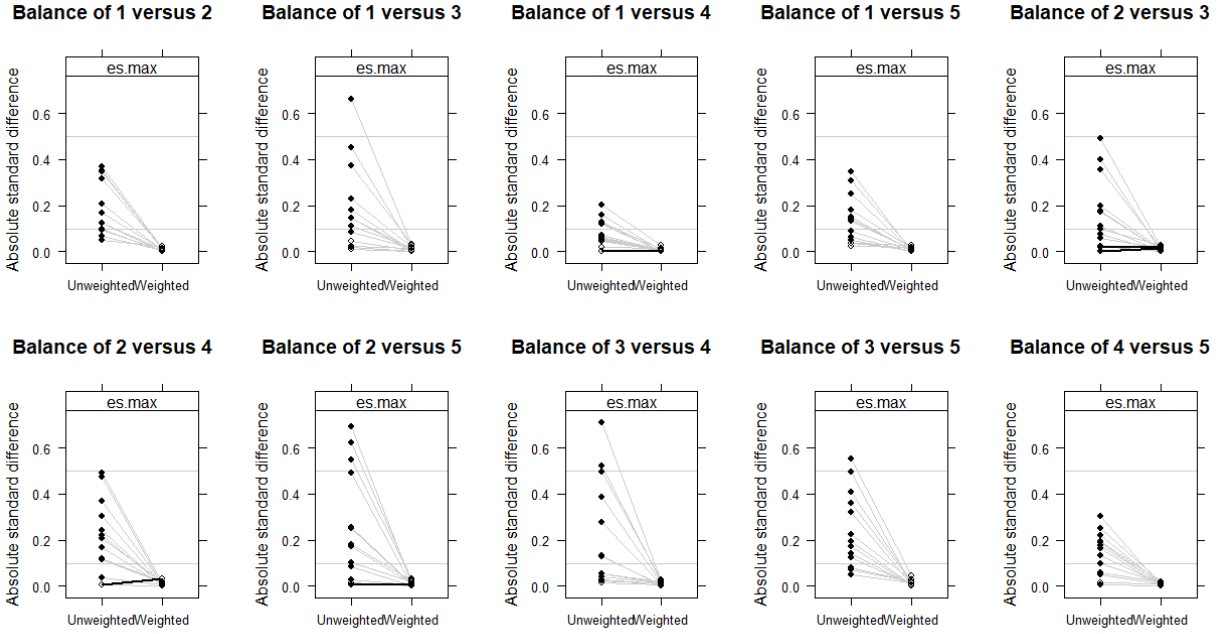
Proportions in Each Pair of the Groups on Imputed Data 20
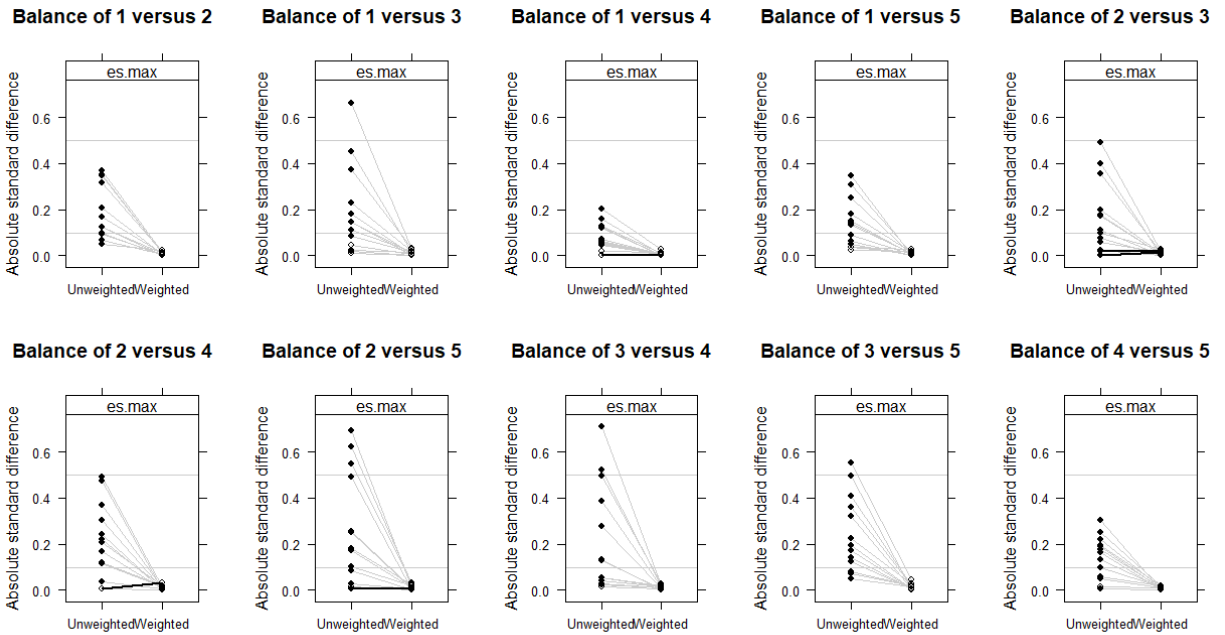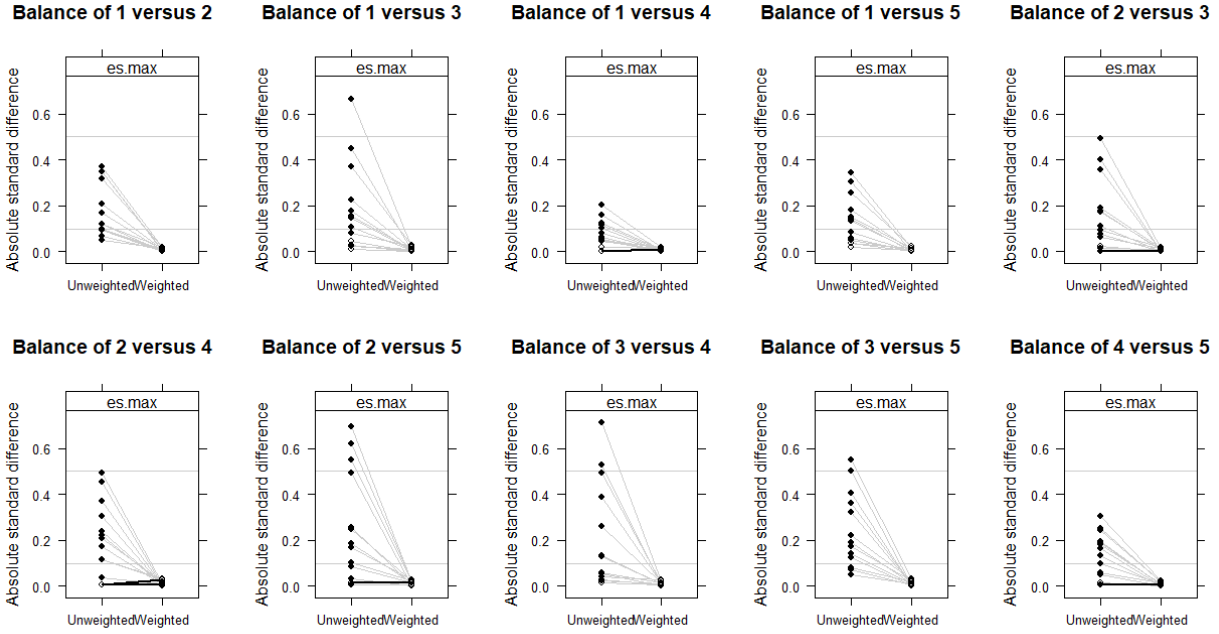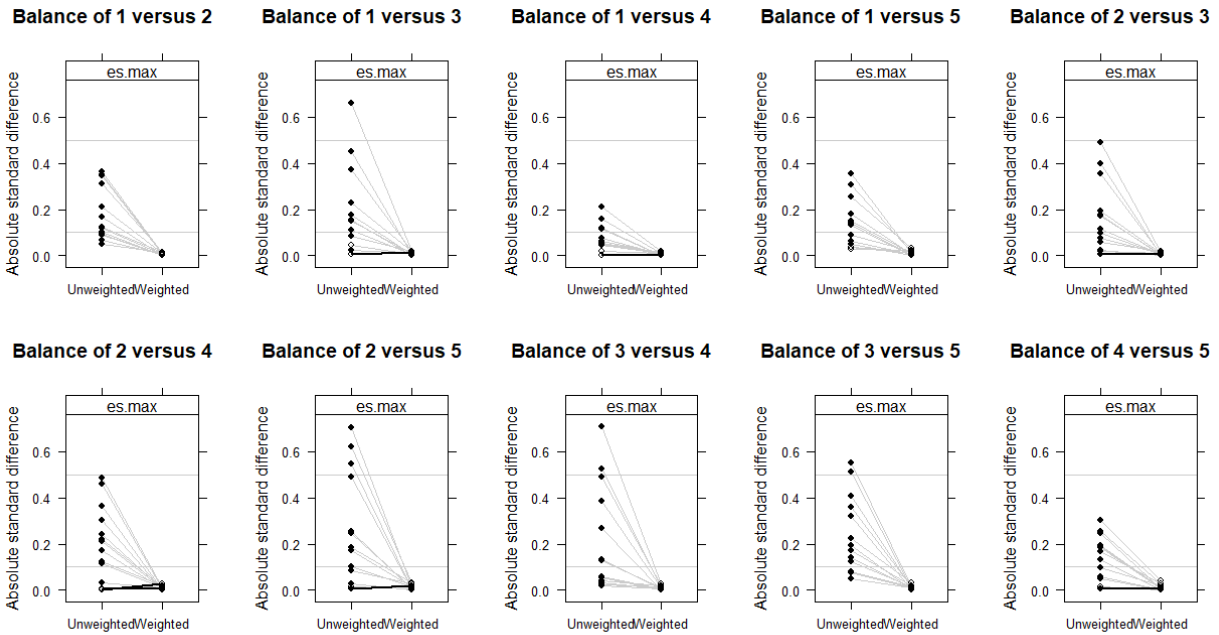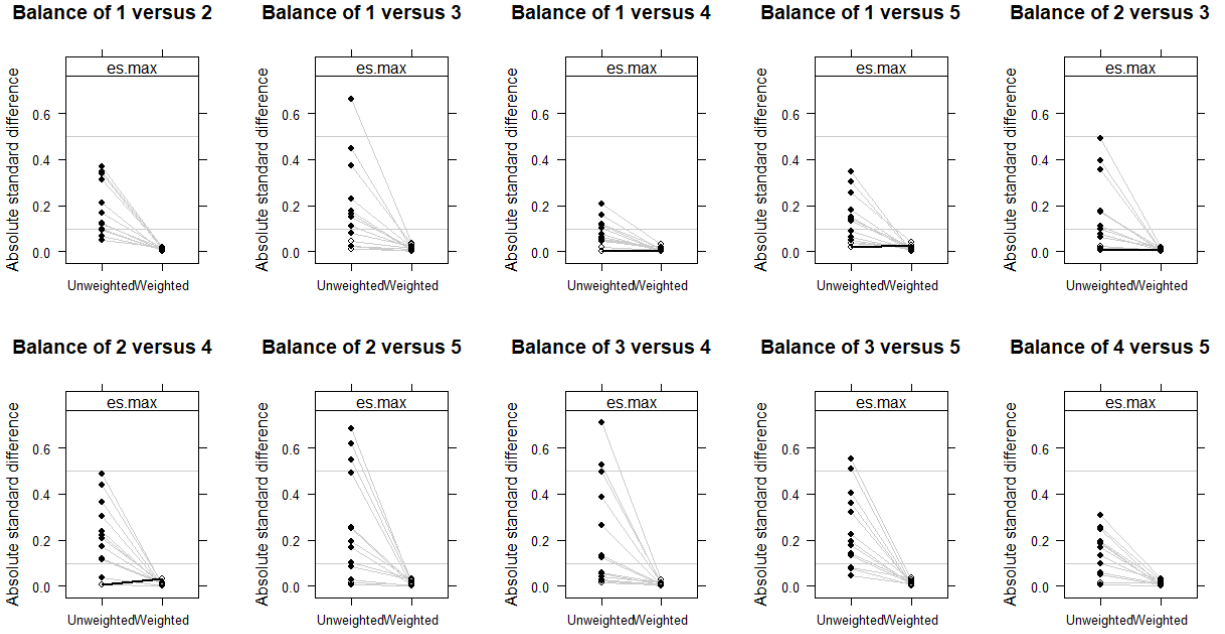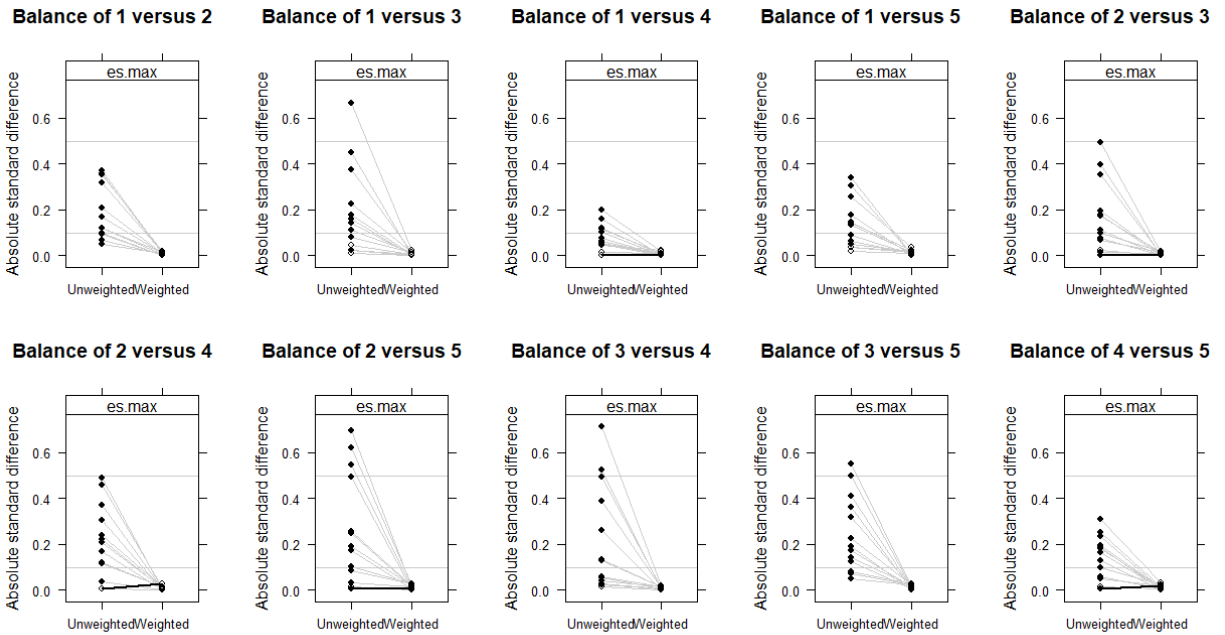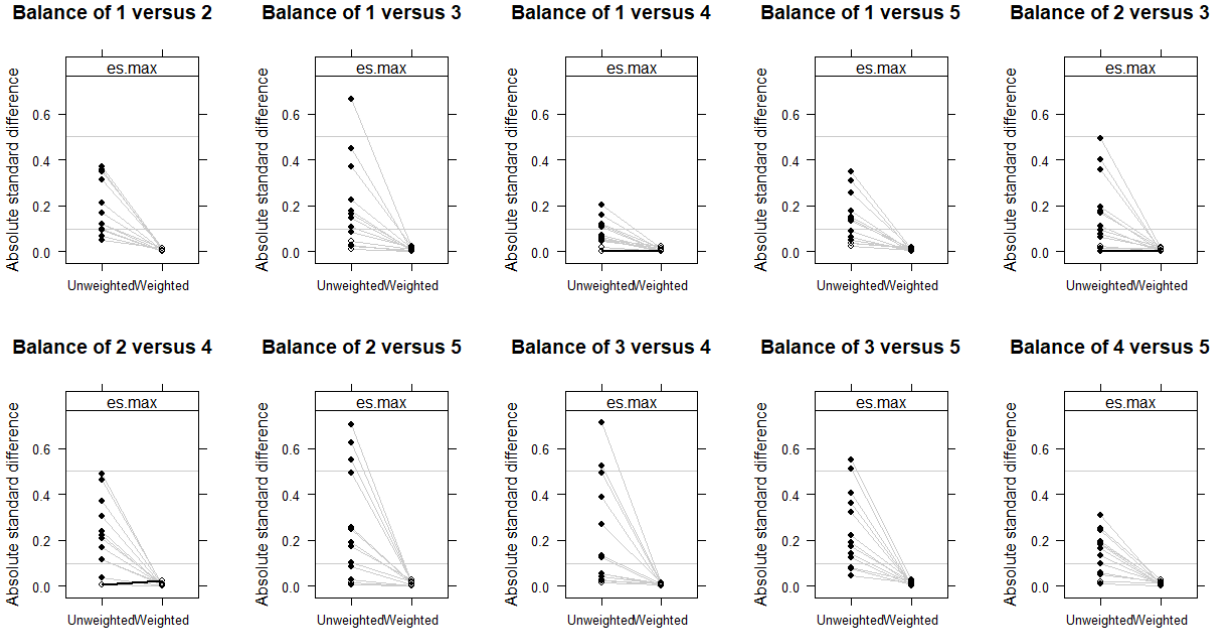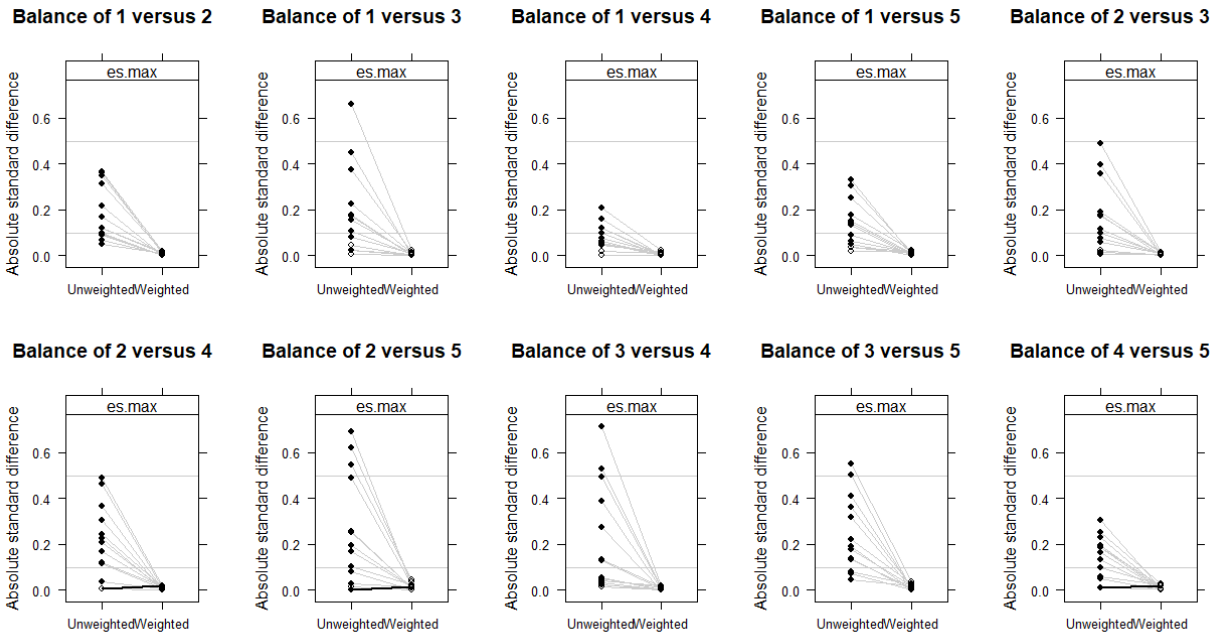

Table 1: Summary statistics of estimated propensity score from GBM

		class1	class2	class3	class4	class5
Imputation 1	Minimum	0.028	0.076	0.028	0.004	0.001

	1st Quintile	0.144	0.174	0.137	0.100	0.064
	Median	0.193	0.258	0.201	0.151	0.118
	Mean	0.188	0.276	0.224	0.177	0.135
	3rd Quintile	0.238	0.338	0.308	0.230	0.186
	Maximum	0.646	0.785	0.618	0.731	0.839
	Standard deviation	0.069	0.125	0.106	0.104	0.094
Imputation 2	Minimum	0.038	0.059	0.033	0.010	0.001
	1st Quintile	0.143	0.177	0.137	0.103	0.063
	Median	0.195	0.249	0.196	0.153	0.116
	Mean	0.188	0.276	0.224	0.177	0.135
	3rd Quintile	0.231	0.343	0.310	0.227	0.185
	Maximum	0.675	0.756	0.649	0.701	0.741
	Standard deviation	0.068	0.125	0.106	0.098	0.095
Imputation 3	Minimum	0.049	0.068	0.037	0.005	0.000
	1st Quintile	0.152	0.180	0.138	0.101	0.063
	Median	0.197	0.260	0.196	0.151	0.122
	Mean	0.189	0.277	0.224	0.177	0.135
	3rd Quintile	0.230	0.348	0.311	0.226	0.185
	Maximum	0.535	0.778	0.621	0.760	0.869
	Standard deviation	0.064	0.123	0.105	0.102	0.095
Imputation 4	Minimum	0.033	0.063	0.034	0.003	0.001
	1st Quintile	0.146	0.179	0.134	0.096	0.064
	Median	0.194	0.253	0.194	0.149	0.114
	Mean	0.189	0.275	0.224	0.177	0.135
	3rd Quintile	0.235	0.335	0.307	0.230	0.185
	Maximum	0.496	0.797	0.555	0.727	0.712
	Standard deviation	0.067	0.124	0.106	0.105	0.095
Imputation 5	Minimum	0.038	0.078	0.032	0.014	0.001
	1st Quintile	0.153	0.176	0.136	0.110	0.062
	Median	0.200	0.261	0.196	0.154	0.116
	Mean	0.189	0.276	0.224	0.177	0.135
	3rd Quintile	0.234	0.343	0.305	0.221	0.187
	Maximum	0.597	0.754	0.630	0.660	0.774
	Standard deviation	0.064	0.124	0.108	0.093	0.096
Imputation 6	Minimum	0.038	0.046	0.029	0.014	0.000
	1st Quintile	0.148	0.177	0.137	0.110	0.064
	Median	0.197	0.259	0.196	0.153	0.117

	Mean	0.189	0.276	0.224	0.177	0.135
	3rd Quintile	0.231	0.347	0.314	0.221	0.184
	Maximum	0.542	0.770	0.615	0.636	0.889
	Standard deviation	0.066	0.126	0.108	0.094	0.098
Imputation 7	Minimum	0.041	0.056	0.006	0.011	0.001
	1st Quintile	0.147	0.178	0.120	0.107	0.062
	Median	0.201	0.257	0.199	0.151	0.114
	Mean	0.189	0.275	0.223	0.177	0.135
	3rd Quintile	0.232	0.342	0.311	0.223	0.188
	Maximum	0.597	0.774	0.853	0.640	0.837
	Standard deviation	0.064	0.128	0.125	0.096	0.100
Imputation 8	Minimum	0.051	0.059	0.030	0.016	0.001
	1st Quintile	0.149	0.179	0.138	0.106	0.061
	Median	0.199	0.249	0.197	0.150	0.117
	Mean	0.189	0.275	0.224	0.177	0.135
	3rd Quintile	0.229	0.337	0.306	0.224	0.187
	Maximum	0.552	0.819	0.628	0.674	0.717
	Standard deviation	0.062	0.127	0.107	0.097	0.095
Imputation 9	Minimum	0.033	0.060	0.036	0.013	0.001
	1st Quintile	0.144	0.183	0.135	0.107	0.063
	Median	0.194	0.251	0.197	0.152	0.115
	Mean	0.188	0.276	0.223	0.178	0.134
	3rd Quintile	0.233	0.339	0.311	0.224	0.181
	Maximum	0.583	0.815	0.593	0.703	0.771
	Standard deviation	0.069	0.122	0.107	0.100	0.096
Imputation 10	Minimum	0.041	0.052	0.043	0.011	0.002
	1st Quintile	0.148	0.178	0.138	0.105	0.061
	Median	0.198	0.253	0.199	0.154	0.122
	Mean	0.189	0.275	0.224	0.177	0.135
	3rd Quintile	0.231	0.340	0.310	0.224	0.188
	Maximum	0.579	0.817	0.545	0.674	0.767
	Standard deviation	0.066	0.127	0.104	0.098	0.093
Imputation 11	Minimum	0.034	0.047	0.029	0.011	0.001
	1st Quintile	0.151	0.183	0.137	0.105	0.068
	Median	0.200	0.253	0.202	0.152	0.116
	Mean	0.189	0.276	0.223	0.177	0.135
	3rd Quintile	0.229	0.338	0.312	0.226	0.182

	Maximum	0.635	0.834	0.606	0.646	0.860
	Standard deviation	0.067	0.126	0.105	0.097	0.093
Imputation 12	Minimum	0.037	0.061	0.031	0.011	0.000
	1st Quintile	0.140	0.182	0.133	0.104	0.062
	Median	0.192	0.257	0.199	0.152	0.116
	Mean	0.188	0.276	0.224	0.178	0.135
	3rd Quintile	0.236	0.348	0.311	0.226	0.183
	Maximum	0.674	0.798	0.551	0.716	0.759
	Standard deviation	0.071	0.124	0.107	0.100	0.098
Imputation 13	Minimum	0.044	0.074	0.039	0.006	0.001
	1st Quintile	0.145	0.177	0.137	0.106	0.058
	Median	0.199	0.254	0.201	0.152	0.116
	Mean	0.189	0.276	0.224	0.177	0.135
	3rd Quintile	0.231	0.342	0.309	0.227	0.187
	Maximum	0.462	0.797	0.574	0.704	0.899
	Standard deviation	0.061	0.125	0.107	0.099	0.099
Imputation 14	Minimum	0.038	0.055	0.037	0.003	0.000
	1st Quintile	0.153	0.176	0.134	0.097	0.059
	Median	0.201	0.255	0.196	0.149	0.119
	Mean	0.189	0.275	0.223	0.177	0.136
	3rd Quintile	0.233	0.348	0.311	0.231	0.187
	Maximum	0.511	0.809	0.592	0.788	0.808
	Standard deviation	0.063	0.124	0.107	0.107	0.101
Imputation 15	Minimum	0.035	0.066	0.029	0.016	0.001
	1st Quintile	0.143	0.180	0.138	0.110	0.062
	Median	0.198	0.263	0.200	0.151	0.116
	Mean	0.189	0.277	0.223	0.177	0.135
	3rd Quintile	0.234	0.347	0.312	0.222	0.188
	Maximum	0.513	0.791	0.655	0.619	0.766
	Standard deviation	0.066	0.123	0.106	0.091	0.092
Imputation 16	Minimum	0.016	0.062	0.035	0.004	0.001
	1st Quintile	0.139	0.184	0.139	0.099	0.061
	Median	0.193	0.252	0.196	0.150	0.115
	Mean	0.188	0.276	0.224	0.177	0.136
	3rd Quintile	0.233	0.341	0.311	0.223	0.182
	Maximum	0.671	0.780	0.567	0.778	0.851
	Standard deviation	0.071	0.125	0.107	0.105	0.099

	Minimum	0.048	0.053	0.046	0.009	0.000
	1st Quintile	0.155	0.182	0.132	0.104	0.060
	Median	0.202	0.256	0.197	0.150	0.116
Imputation 17	Mean	0.189	0.276	0.224	0.177	0.136
	3rd Quintile	0.228	0.337	0.313	0.226	0.186
	Maximum	0.461	0.785	0.526	0.727	0.795
	Standard deviation	0.060	0.123	0.106	0.102	0.101
	Minimum	0.045	0.045	0.035	0.004	0.000
	1st Quintile	0.148	0.181	0.138	0.098	0.060
	Median	0.200	0.251	0.201	0.152	0.116
Imputation 18	Mean	0.189	0.275	0.224	0.177	0.135
	3rd Quintile	0.231	0.331	0.309	0.224	0.184
	Maximum	0.590	0.823	0.565	0.779	0.888
	Standard deviation	0.063	0.127	0.107	0.105	0.098
	Minimum	0.040	0.060	0.032	0.006	0.002
	1st Quintile	0.151	0.177	0.136	0.101	0.065
	Median	0.198	0.259	0.194	0.148	0.121
Imputation 19	Mean	0.189	0.276	0.223	0.178	0.135
	3rd Quintile	0.231	0.344	0.308	0.228	0.187
	Maximum	0.561	0.788	0.607	0.809	0.790
	Standard deviation	0.064	0.124	0.107	0.105	0.091
	Minimum	0.039	0.047	0.030	0.006	0.001
	1st Quintile	0.145	0.178	0.135	0.103	0.064
	Median	0.197	0.258	0.197	0.150	0.118
Imputation 20	Mean	0.189	0.276	0.224	0.177	0.135
	3rd Quintile	0.230	0.347	0.313	0.225	0.185
	Maximum	0.581	0.813	0.584	0.741	0.727
	Standard deviation	0.067	0.127	0.106	0.102	0.094

Appendix 4:

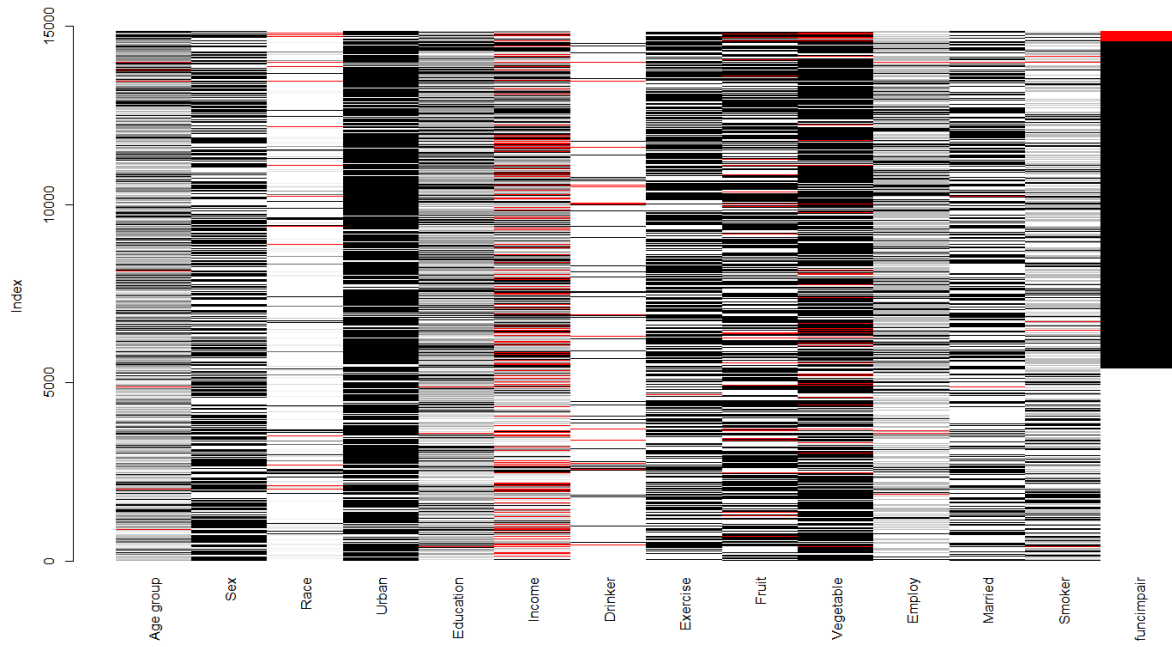Table 1: Classification Diagnostics of the 5-class LCA Model

Predicted class	AvePP	OCC
Age associated	0.62	5.64
Severely impaired	0.70	13.89
Minimal chronic conditions	0.74	8.07
Obesity/diabetes	0.60	6.80
Respiratory/depression	0.61	6.80

Figure 1: Boxplot of Estimated Propensity Scores in the Five Groups on the 20 Imputed Data

Appendix 5: Missing Pattern of Variables for Research Question 2

Note: darker colour indicates higher values; red color indicates missing; data are sorted by cognitive-related functional impairment.