

## Supplementary Online Content

Liu-Ambrose T, Davis JC, Best JR, et al. Effect of a home-based exercise program on subsequent falls among community-dwelling high-risk older adults after a fall: a randomized clinical trial. *JAMA*. doi:10.1001/jama.2019.5795

**eAppendix.** Supplemental Methods for Multiple Imputation

**eTable 1.** Imputed Data Results for Secondary and Exploratory Outcomes

**eTable 2.** Within- and Between-Condition Differences in Exploratory Outcomes of Cognitive Function From Baseline to Month 12

This supplementary material has been provided by the authors to give readers additional information about their work.

## eAppendix. Supplemental Methods for Multiple Imputation

**Multiple Imputation:** We imputed missing data across all time points and participants using multivariate imputation by chained equations with the R package ‘mice’ (version\_3.3.0).<sup>1</sup> This approach is appropriate when data are missing at random or are missing completely at random.<sup>1</sup> The imputation method for all variables was semi-parametric predictive mean matching, which restricts imputations to the observed values in the data set. Forty imputed data sets were created following 40 iterations of a Gibbs sampler for each imputed data set. Proper convergence of the Gibbs sampler was confirmed by visual inspection of trace plots of imputed variable, which revealed proper mixing and the absence of spikes or systematic trends across iterations. The imputed data were submitted to the same analytic model (negative binomial regression for the primary outcome and linear mixed model for secondary outcomes) as the non-imputed observed data. The results of each analytic model were pooled across the 40 imputed data sets.

The variables used in the imputation algorithm

<b>Variables without missing data used for prediction of imputed values on other variables</b>	<b>Variables with missing data that were both imputed and were used for prediction of imputed values on other variables</b>
<ol style="list-style-type: none"> <li>1. Participant Sex</li> <li>2. Baseline Age</li> <li>3. Baseline Height</li> <li>4. Baseline Physiological Profile Assessment</li> <li>5. Baseline Geriatric Depression Scale</li> <li>6. Baseline Mini-Mental State Examination</li> <li>7. Baseline Montreal Cognitive Assessment</li> <li>8. Baseline Short Physical Performance Battery</li> <li>9. Baseline Gait Speed</li> </ol>	<ol style="list-style-type: none"> <li>1. Baseline Functional Comorbidity Index</li> <li>2. Baseline Instrumental Activities of Daily Living</li> <li>3. Baseline, Month 6, Month 12 Trail Making Parts A and B</li> <li>4. Baseline, Month 6, Month 12 Stroop Tests Parts 1,2,3</li> <li>5. Baseline, Month 6, Month 12 Digit Symbol Substitution Test</li> <li>6. Baseline, Month 6, Month 12 Digit Span Forward and Backward</li> <li>7. Baseline phonetic and semantic fluency</li> <li>8. Baseline, Month 6, Month 12 Timed-Up and Go Test</li> <li>9. Month 6, Month 12 Physiological Profile Assessment</li> <li>10. Month 6, Month 12 Geriatric Depression Scale</li> <li>11. Month 6, Month 12 Gait Speed</li> <li>12. Month 6, Month 12 Short Physical Performance Battery</li> <li>13. Month 12 Mini-Mental State Examination</li> <li>14. Month 12 Montreal Cognitive Assessment</li> <li>15. Month 1-12 self-reported falls</li> </ol>

## REFERENCES

1. van Buuren S. Mice: Multivariate Imputation by Chained Equations in R. *Journal of Statistical Software.* 2011;45(3):1.

**eTable 1.** Imputed Data Results for Secondary and Exploratory Outcomes

Outcome	Between-Group Difference for Change From Baseline to Month 12 Exercise minus Usual Care	
	Estimated Diff (95% CI)	P value
<i>Secondary Physical Performance Outcomes</i>		
Physiological Profile Assessment, z-score <sup>a</sup>	0.03 (-0.21 to 0.27)	.71
Timed Up and Go, sec <sup>a</sup>	0.16 (-1.41 to 1.73)	.76
Short Physical Performance Battery (max 12 points) <sup>b</sup>	0.05 (-0.37 to 0.46)	.68
<i>Exploratory Cognitive Outcomes</i>		
Digit Symbol Substitution Test (max 84 points) <sup>b</sup>	0.50 (-0.43 to 1.43)	.34
Trail Making Test Part B Minus Part A, sec <sup>a</sup>	-11.20 (-43.21 to 20.81)	.51
Stroop Test Part 3 Minus Part 2, sec <sup>a</sup>	3.44 (-4.53 to 11.42)	.44
Digit Span Forward (max 14 points) <sup>b</sup>	-0.07 (-0.44 to 0.30)	.68
Digit Span Backward (max 14 points) <sup>b</sup>	-0.12 (-0.45 to 0.21)	.52

<sup>a</sup> For these measures, a negative difference score between the two groups indicate that the improvements were greater in the exercise group.

<sup>b</sup> For these measures, a positive difference score between the two groups indicate that the improvements were greater in the exercise group.

**eTable 2.** Within- and Between-Condition Differences in Exploratory Outcomes of Cognitive Function From Baseline to Month 12

Outcome	Exercise			Usual Care			Exercise minus Usual Care	
	Pre (SD)	Post (SD)	Estimated Diff <sup>c</sup> (95% CI)	Pre (SD)	Post (SD)	Estimated Diff <sup>c</sup> (95% CI)	Estimated Diff <sup>c</sup> (95% CI)	P value
Digit Symbol Substitution Test (max 84 points) <sup>a</sup>	21.4 (6.6) n=168	21.8 (7.6) n=123	0.8 (0.1, 1.6)	21.4 (6.8) n=169	21.5 (6.8) n=133	-0.2 (-1.0, 0.5)	1.1 (0.02, 2.1)	.05
Trail Making Test Part B Minus Part A, sec <sup>b</sup>  <i>Median [IQR]</i>	131.7 (180.3)  80.8 [49.6 to 137.9] n=170	131.2 (141.9)  86.8 [44.7 to 166.9] n=128	13.4 (-9.5, 36.3)	100.9 (105.0)  69.4 [38.9 to 128.9] n=172	119.1 (120.9)  78.0 [41.5 to 150.0] n=135	19.9 (-2.7, 42.6)	-6.5 (-37.7, 24.6)	.68
Stroop Test Part 3 Minus Part 2, sec <sup>b</sup>  <i>Median [IQR]</i>	77.4 (42.9)  69.2 [48.3 to 94.6] n=169	76.5 (52.1)  63.4 [48.1 to 87.9] n=124	3.5 (-2.8, 9.8)	78.4 (40.5)  66.3 [49.6 to 96.8] n=170	76.1 (43.7)  63.2 [47.7 to 88.4] n=134	0.7 (-5.6, 6.9)	2.8 (-5.8, 11.4)	.52
Digit Span Forward (max 14 points) <sup>a</sup>	7.0 (2.1) n=168	7.1 (2.0) n=127	0.2 (-0.1, 0.5)	7.0 (2.1) n=169	7.2 (1.9) n=135	0.3 (-0.03, 0.6)	-0.1 (-0.5, 0.3)	.78
Digit Span Backward (max 14 points) <sup>a</sup>	3.3 (1.7) n=168	3.3 (1.6) n=127	-0.05 (-0.3, 0.2)	3.4 (2.0) n=169	3.5 (2.0) n=135	0.08 (-0.2, 0.3)	-0.1 (-0.5, 0.2)	.49

<sup>a</sup> For these measures, a positive difference score between the two groups indicate that the improvements were greater in the exercise group.

<sup>b</sup> For these measures, a negative difference score between the two groups indicate that the improvements were greater in the exercise group.

<sup>c</sup> Estimated differences were calculated using linear mixed models (LMM), which provides estimates for missing data.