

SUPPLEMENTARY MATERIAL

Correlated decline of cognitive and motor phenotypes and ADRD pathologies in old age.

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Figure e1. Flow chart of the Rush Memory and Aging Project (MAP) participants included in the current study.

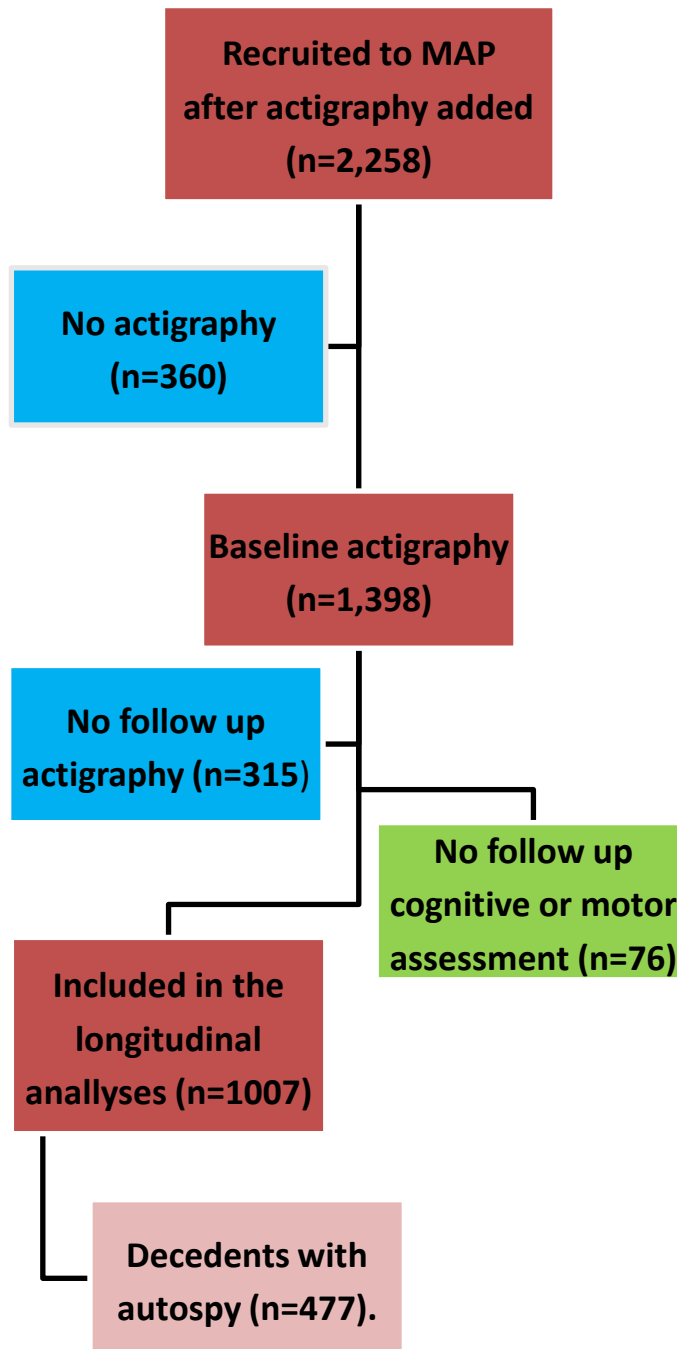
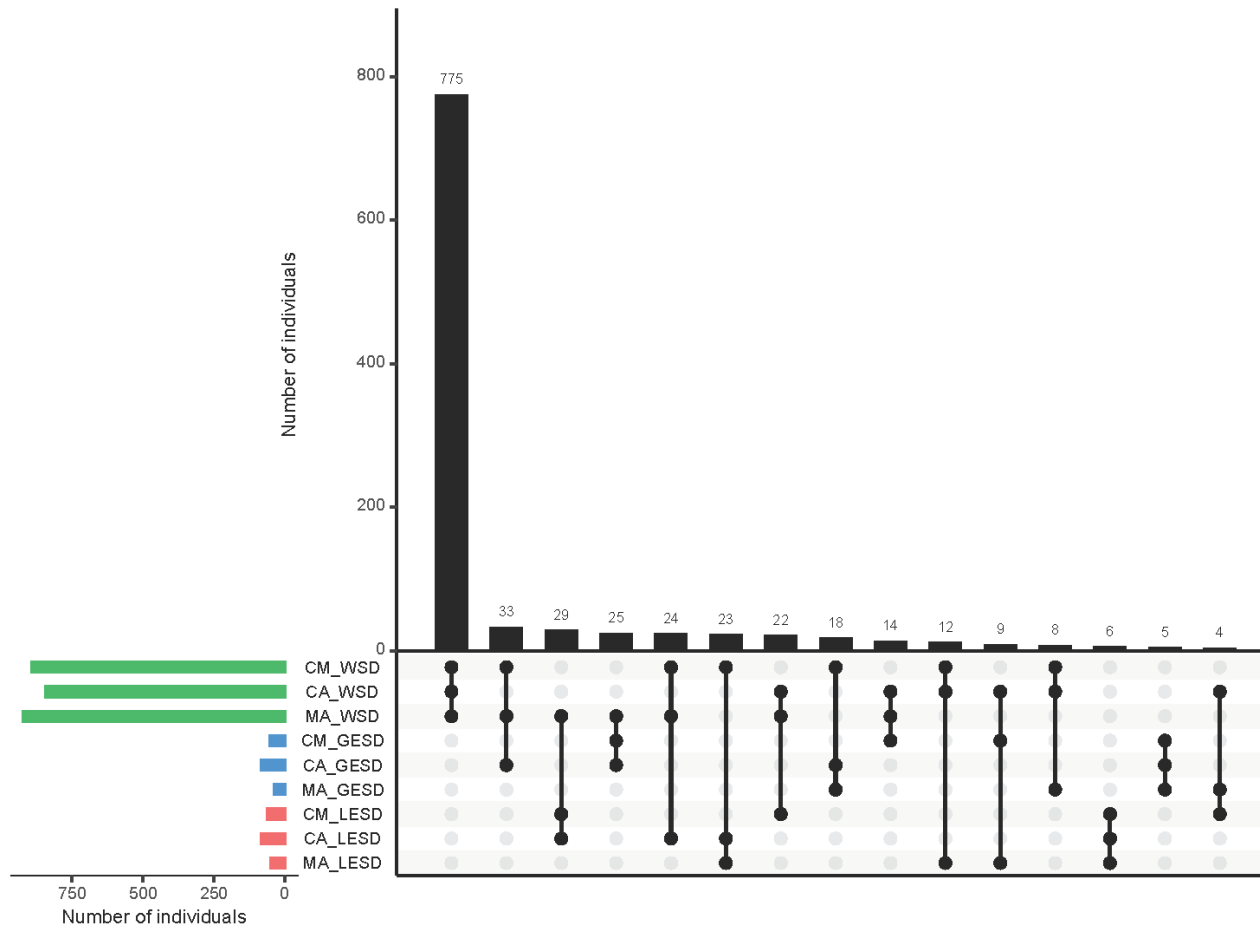


Table e1. Demographics and the rates of change of all three phenotypes

This table shows the interaction of age, sex and education with the annual rates of change for all three phenotypes. Each cell shows the [Estimate, (Standard Error) and p-Value for the interaction term of a demographic covariate with the time. This single term is from the single trivariate model summarized in Table 1A in the text. Increasing age but not sex was strongly associated with more rapid decline in the rate of all three phenotypes. There is a weak association of education with the rate of change of daily physical activity.

Model Term	Cognition	Motor abilities	Daily physical activity
	Estimate (S.E.) p-Value	Estimate (S.E.) p-Value	Estimate (S.E.) p-Value
Time*Age	-0.005 (0.0005) <0.001	-0.0005 (0.0001) <0.001	-0.004 (0.0006) <0.001
Time*Sex	-0.003 (0.008) 0.730	-0.002 (0.002) 0.374	-0.007 (0.010) 0.470
Time*Education	0.003 (0.001) 0.308	-0.0002 (0.0002) 0.442	0.003 (0.001) 0.022

Table e2. Frequencies of the inter-relationship between the simultaneous rates of change of the three pairs of slopes for each of the participants



Modeling provided correlations for three pairs of slopes including: i) cognitive slope / motor slope (**CM**), ii) cognitive slope/daily physical activity slope (**CA**) and iii) motor slope/daily physical activity slope (**MA**). We employed a previous approach to compare the simultaneous rates of decline for the three pairs of slopes. Slope measures were standardized. We compared the rates of decline for each of the pairs of slopes. Slopes were *congruent* if the pair of slopes was within 1 SD of one another (**WSD**), or discrepant if the pair of slopes was greater than +1SD of one another (**GESD**) or if the pair of slopes was less than -1 SD of one another (**LESD**). Each individual might show a different combination i.e., congruent or discrepant for each of the 3 pairs of slopes. The bar chart in the lower left corner shows the frequencies of the varied combinations congruent or discrepant slopes between the three pairs of slopes.

Table e3. Data used to create 3D figure and Figure e2 showing the patterns of motor decline in adults with slow and fast cognitive decline.

We used the data shown in the middle row of Figure 1 and stratified the rates of decline for each of the three phenotypes based on whether their slope was above or below the its median rate of decline. These data are shown in 3D figures that match the middle row of Figure 1. The 3D plot is shown from a different angle to match each of the three panels in Figure 1 that show the relationship of the 3 pairs of slopes.

Figure 2 was constructed to more easily visualize the relationship of the slopes of cognitive and motor decline. For illustrative purposes, above the median was considered slow decline and below the median was considered fast decline. To account for possible differences in the rates of decline of the two motor phenotypes, we defined an intermediate pattern of motor decline. Fast motor decline (blue) was present if both the slopes of both motor phenotypes were below the median; slow motor decline was present if slopes of both motor phenotypes were above the median (green); intermediate motor decline was present if one motor phenotype was below the median and the other motor phenotype was above the median rate of decline (scarlet). The pie chart in Figure 2 was constructed based on the frequencies shown in this table to show the percentages of slow, intermediate and fast motor decline in adults with fast or slow cognitive decline.

eTable 3		Data used for 3D plots (eFigure 1)			Date for Figure 2	
Groups	N	Cognitive Slope	Motor Slope	Daily activity Slope	Cognitive Decline	Motor Decline
1	310	below	below	below	Fast	Fast
2	26	below	above	below	Fast	Intermediate
3	36	below	below	above	Fast	Intermediate
4	43	below	above	above	Fast	Slow
5	94	above	below	below	Slow	Fast
6	72	above	above	below	Slow	Intermediate
7	64	above	below	above	Slow	Intermediate
8	362	above	above	above	Slow	Slow

Figure e2. 3D visualization of the correlated slopes to assess discrepant pairs of slopes

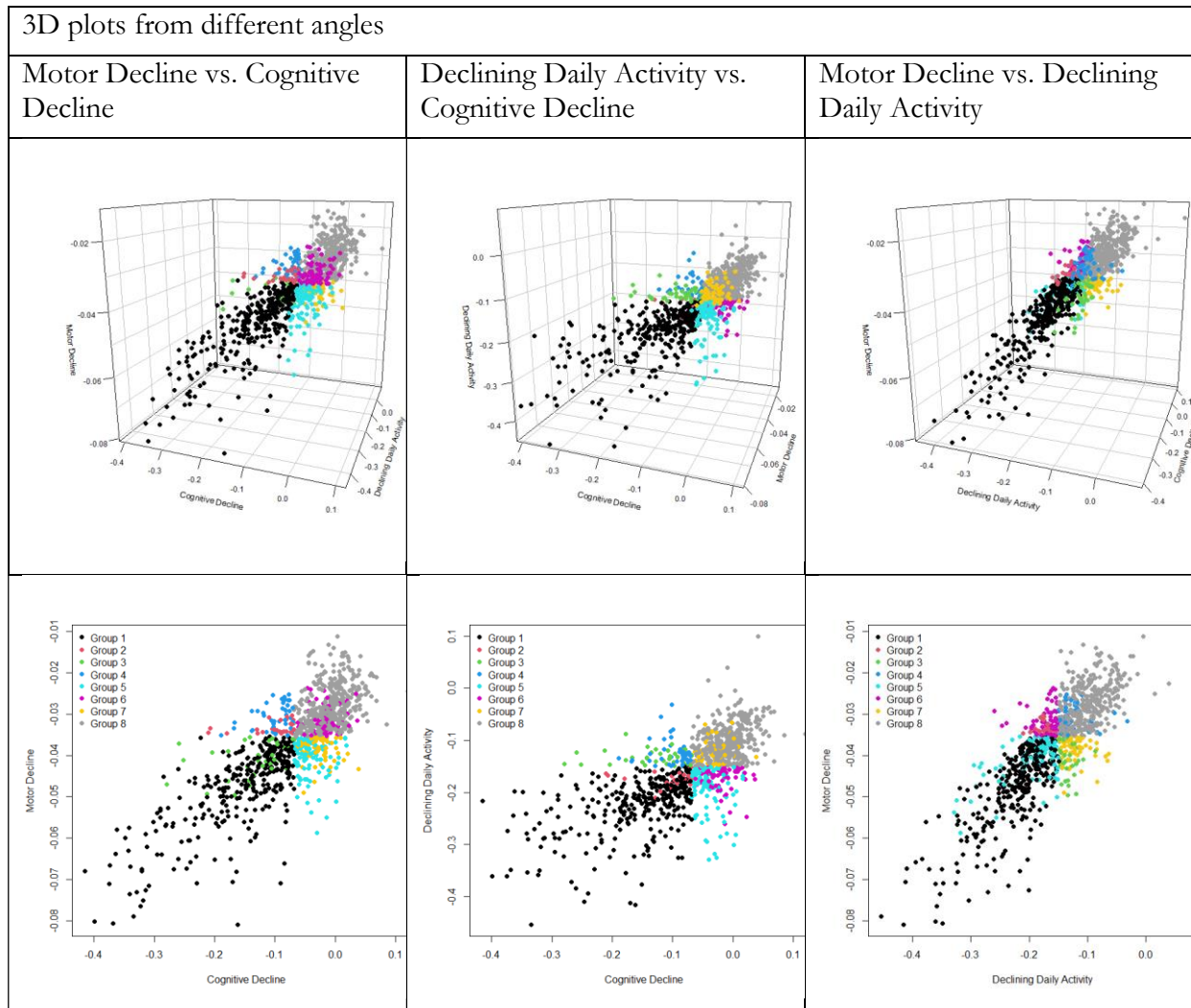


Table e4. Frequencies the Varied Combinations of Brain Pathologies

