**Table S1** Negative moderation effects of cognitive reserve proxies within TILDA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Brain Structure** | **Cognition** | **Cognitive Reserve Proxy** | **n** | ***ΔR*2** | ***β*** |
| Cx Thickness | Epi Mem | Occu + CogStim + Ex | 279 | .034 | -.340\*\* |
| Cx Thickness | Epi Mem | Occu + CogStim + Leisure + Ex | 279 | .032 | -.335\*\* |
| Cx Thickness | Epi Mem | Occu + Leisure + Ex | 279 | .030 | -.310\*\* |
| Cx Thickness | Epi Mem | CogStim + Ex | 279 | .029 | -.286\*\* |
| Cx Thickness | Epi Mem | Leisure + Ex | 279 | .026 | -.245\*\* |
| Cx Thickness | Epi Mem | CogStim + Leisure + Ex | 279 | .025 | -.258\*\* |
| Cx Thickness | Epi Mem | Occu + Ex | 279 | .022 | -.242\*\* |
| Cx Thickness | Epi Mem | Edu + Occu + CogStim + Ex | 279 | .021 | -.270\*\* |
| Cx Thickness | Epi Mem | Occu + CogStim | 279 | .021 | -.214\* |
| Cx Thickness | Epi Mem | Edu + Occu + CogStim + Leisure + Ex | 279 | .020 | -.265\* |
| Cx Thickness | Epi Mem | Edu + Occu + Leisure + Ex | 279 | .019 | -.255\* |
| Cx Thickness | Epi Mem | Ex | 279 | .018 | -.200\* |
| Cx Thickness | Epi Mem | Occu + CogStim + Leisure | 279 | .018 | -.204\* |
| Cx Thickness | Epi Mem | Occu + Social + CogStim + Leisure + Ex | 279 | .015 | -.233\* |
| GM Volume | Epi Mem | CogStim + Ex | 313 | .015 | -.176\* |
| Cx Thickness | Epi Mem | Edu + Occu + Ex | 279 | .015 | -.205\* |
| Cx Thickness | Glob Cog | Edu + Leisure + Ex | 277 | .015 | -.198\* |
| Cx Thickness | Glob Cog | CogStim + Leisure + Ex | 277 | .014 | -.185\* |
| Cx Thickness | Glob Cog | Leisure + Ex | 277 | .014 | -.175\* |
| Cx Thickness | Epi Mem | Occu + Social + CogStim + Ex | 279 | .014 | -.227\* |
| Cx Thickness | Epi Mem | Occu + Verbal IQ + CogStim + Leisure + Ex | 279 | .013 | -.223\* |
| Cx Thickness | Glob Cog | Edu | 277 | .013 | -.113\* |
| Cx Thickness | Glob Cog | Edu + CogStim + Leisure + Ex | 277 | .013 | -.187\* |
| Cx Thickness | Epi Mem | Occu + Verbal IQ + CogStim + Ex | 279 | .012 | -.212\* |
| Cx Thickness | Glob Cog | Edu + Occu + CogStim + Leisure + Ex | 277 | .012 | -.195\* |
| GM Volume | Exec Func | Edu + CogStim + Ex | 311 | .011 | -.179\* |
| Cx Thickness | Glob Cog | Edu + Leisure | 277 | .011 | -.131\* |
| Cx Thickness | Glob Cog | Leisure | 277 | .011 | -.103\* |
| Cx Thickness | Glob Cog | Edu + Occu + Leisure + Ex | 277 | .011 | -.189\* |
| Cx Thickness | Glob Cog | Occu + CogStim + Leisure + Ex | 277 | .011 | -.191\* |
| GM Volume | Glob Cog | Edu + CogStim + Ex | 311 | .010 | -.161\* |

*Note: \* = p < .05, \*\* = p < .01 Cx Thickness = Mean Cortical Thickness, GM Volume = Grey Matter Volume, Epi Mem = Episodic Memory, Glob Cog = Global Cognition, Exec Func = Executive Function, Occu = Occupational Complexity, CogStim = Cognitively Stimulating Activities, Ex = Exercise, Leisure = Leisure Activities, Edu = Educational Attainment, Social = Social Engagement, Verbal IQ = Verbal Intelligence.*

**Table S2** Positive moderation effects of cognitive reserve proxies within both datasets

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Dataset** | **Brain Structure** | **Cognition** | **Cognitive Reserve Proxy** | **n** | ***ΔR*2** | ***β*** |
| TILDA | HC Volume | Verb Flu | Occu + Ex | 313 | .019 | .227\* |
| GM Volume | Proc Speed | Occu | 313 | .018 | .148\* |
| GM Volume | Verb Flu | Occu + Ex | 313 | .017 | .214\* |
| Cx Thickness | Verb Flu | Occu + Social + Ex | 279 | .015 | .235\* |
| HC Volume | Verb Flu | Occu + Social + Ex | 313 | .015 | .243\* |
| HC Volume | Verb Flu | Ex | 313 | .014 | .192\* |
| GM Vol | Verb Flu | Occu + Social + Ex | 313 | .014 | .231\* |
| HC Volume | Verb Flu | Social + Ex | 313 | .014 | .208\* |
| CR/RANN | HC Volume | Glob Cog | Occu + Verbal IQ | 234 | .030 | .215\*\* |
| HC Volume | Epi Mem | Occu + Ex | 234 | .026 | .232\* |
| HC Volume | Glob Cog | Occu + Verbal IQ + Ex | 234 | .026 | .266\*\* |
| HC Volume | Glob Cog | Occu | 234 | .025 | .155\* |
| HC Volume | Epi Mem | Occu + Verbal IQ + Ex | 234 | .025 | .263\* |
| HC Volume | Epi Mem | Occu | 234 | .024 | .151\* |
| HC Volume | Exec Func | Occu + Verbal IQ | 234 | .018 | .168\* |

*Note: \* = p < .05, \*\* = p < .01. HC Volume = Hippocampal Volume, GM Volume = Grey Matter Volume, Cx Thickness = Mean Cortical Thickness, Verb Flu = Verbal Fluency, Proc Speed = Processing Speed, Glob Cog = Global Cognition, Epi Mem = Episodic Memory, Exec Func = Executive Function, Occu = Occupational Complexity, Ex = Exercise, Social = Social Engagement, Verbal IQ = Verbal Intelligence.*

|  |  |  |
| --- | --- | --- |
|  | **TILDA** | **CR/RANN** |
| Glob Cog ~ Intell | Hipp Vol,  Age, Sex  Mean Δ*R2* = .168 |  | partial_regression_plot_intell |
| Glob Cog ~ Intell | GM Vol,  Age, Sex  Mean Δ*R2* = .159 | C:\Users\boyler1\AppData\Local\Microsoft\Windows\INetCache\Content.Word\partial_regression_plot_intell.png | partial_regression_plot_intell |
| Glob Cog ~ Intell | Cx Th,  Age, Sex  Mean Δ*R2* = .147 |  | partial_regression_plot_intell |
| Exec Func ~ Intell  | Hipp Vol,  Age, Sex  Mean Δ*R2* = .146 | C:\Users\boyler1\AppData\Local\Microsoft\Windows\INetCache\Content.Word\partial_regression_plot_intell.png | partial_regression_plot_intell |
| Exec Func ~ Intell  | GM Vol,  Age, Sex  Mean Δ*R2* = .142 | C:\Users\boyler1\AppData\Local\Microsoft\Windows\INetCache\Content.Word\partial_regression_plot_intell.png | partial_regression_plot_intell |
|  | **TILDA** | **CR/RANN** |
| Glob Cog ~ Edu\_Intell | Hipp Vol,  Age, Sex  Mean Δ*R2* = .136 | partial_regression_plot_edu_intell | partial_regression_plot_edu_intell |
| Glob Cog ~ Edu\_Intell | GM Vol,  Age, Sex  Mean Δ*R2* = .127 | partial_regression_plot_edu_intell | partial_regression_plot_edu_intell |
| Exec Func ~ Edu\_Intell | Hipp Vol,  Age, Sex  Mean Δ*R2* = .123 | partial_regression_plot_edu_intell | partial_regression_plot_edu_intell |
| Glob Cog ~ Edu\_Intell | Cx Th,  Age, Sex  Mean Δ*R2* = .121 | partial_regression_plot_edu_intell | partial_regression_plot_edu_intell |
| Exec Func ~ Intell | Cx Th,  Age, Sex  Mean Δ*R2* = .120 | partial_regression_plot_intell | partial_regression_plot_intell |

**Figure S1:** Association between proxies and cognition, adjusting for brain structure, age, and sex*. Plots are shown for the 10 largest mean R2 change across both datasets for proxies with significant effects. Glob Cog = Global Cognition, Exec Func = Executive Function, Intell = Premorbid Intelligence, Edu\_Intell = Composite of Education and Premorbid Intelligence, Hipp Vol = Hippocampal Volume, GM Vol = Grey Matter Volume, Cx Th = Mean Cortical Thickness*