**Supplementary Materials**

*Academic Achievement in KG children*

*Right/left frontal cluster and academic achievement.* Bivariate longitudinal models were fitted for the response monitoring activation in the right frontal (or left frontal, respectively) and (1) vocabulary scores (2) math pack and (3) phonemes pack. The difference in activation in the left frontal cluster at T1 was positively correlated with vocabulary scores at T1. To follow up on this finding, the baseline correlation was constrained to be 0 which led to a significant drop in model fit . Vocabulary scores at T1 also negatively predicted the change in activation in the left frontal cluster, suggesting KG children with better vocabulary performance at T1 showed less change in activation over time. To follow up on this finding, the coupling pathway was constrained to be 0 which led to a significant drop in model fit . Parameter estimates are shown in Supplementary Table 1. The difference in activation at T1 positively predicted phoneme pack scores at T2 (*p*=.002), suggesting KG children who showed a greater difference in activation at T1 also showed better performance on the phonemes pack. To follow up on this finding, the pathway was constrained to be 0 which led to a significant drop in model fit . No other cross-domain parameters were found to be significant in these models.

**Supplementary Table 1.** Bivariate couplings between left frontal activation and vocabulary for KG children.

|  |
| --- |
| **Bivariate Couplings** |
| Intercept covariance  | 65\* (23.07) |
| Vocabulary onto left frontal change  | -1\* (.37) |
| Left frontal change onto vocabulary | -.04 (.03) |
| Change-change covariance  | 2.61 (20.48) |
|  |  |

Standard errors are in parentheses.

\* Asterisks denote significance at *p* <.05 level.

*Comparisons between P1 and KG children*

T-tests were conducted to compare performance between P1 and KG children at the first timepoint (prior to starting school) on a range of cognitive and academic measures including the CDT task, the vocabulary task, the numeracy task, the colour change-detection task (not included in paper) and a grid memory task (not included in paper). Comparisons were also made between P1 and KG children on a battery of parental questionnaires. These questionnaires were selected for their associations with executive function and academic achievement (see references in McKay et al., 2021). The Strengths and Difficulties Questionnaire (Goodman, 1997) assesses children's behavioural and emotional characteristics. The Parenting Daily Hassles scale (Crnic & Booth, 1991; Crnic & Greenberg, 1990) assesses the frequency and impact of events that routinely occur in families with young children. The Confusion, Order and Hubbub Scale (Matheny et al., 1995) measures the amount of noise, confusion and disorganization present in the home. The Parenting Stress Index (Abidin et al., 2013) assesses the degree of stress in the parent–child relationship. Lastly, a socioeconomic scale that assessed income, education and parental aspirations was also included. We found no significant differences between P1 and KG children on any of the variables.

**Supplementary Table 2.** Descriptive statistics for P1 and KG children on the cognitive, academic, and parental questionnaire measures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **P1** |  | **KG** |  |
| **Cognitive + Academic Tasks administered at T1** | **Mean** | **SD** | **Mean** | **SD** |
| CDT (go correct - no-go incorrect) | 0.4857 | 0.28878 | 0.4977 | 0.23182 |
| Vocabulary (total score) | 17.4359 | 6.39406 | 19.1282 | 7.24089 |
| Numeracy Symbolic (correct - incorrect) | 13.4474 | 8.96147 | 12.1316 | 8.31531 |
| Numeracy Non-Symbolic (correct - incorrect) | 18.6486 | 8.27048 | 17.6216 | 8.3345 |
| Colour change-detection (Maximum Capacity) | 2.0248 | 0.67161 | 1.9577 | 0.50125 |
| Grid Memory (Item recognition) | 0.9003 | 0.16934 | 0.7987 | 0.27991 |
| Grid Memory (Item location) | 0.3556 | 0.18216 | 0.3463 | 0.20853 |
| **Questionnaires administered at T1** |  |  |  |  |
| SDQ\_Emotional Problems | 0.3817 | 0.26383 | 0.3598 | 0.25268 |
| SDQ\_ConductProblems | 0.4154 | 0.20256 | 0.3719 | 0.2547 |
| SDQ\_Hyperactivity | 0.5531 | 0.21751 | 0.528 | 0.2839 |
| SDQ\_PeerProblems | 0.1815 | 0.22942 | 0.2242 | 0.26267 |
| SDQ\_Prosocial | 0.9654 | 0.07375 | 0.9475 | 0.10007 |
| SDQ\_Difficulties | 0.8859 | 0.20573 | 0.8747 | 0.25152 |
| SDQ\_Externalising | 0.7231 | 0.19535 | 0.679 | 0.30613 |
| SDQ\_Internalising | 0.4617 | 0.30539 | 0.4972 | 0.26752 |
| SDQ\_Impact | 0.0205 | 0.09039 | 0.027 | 0.09868 |
| PDH\_Frequency | 1.5828 | 0.06529 | 1.6019 | 0.05751 |
| PDH\_Intensity | 1.5976 | 0.11329 | 1.5826 | 0.08807 |
| PDH\_ChallengingBehaviour | 1.2196 | 0.14145 | 1.2021 | 0.0989 |
| PDH\_ParentingTasks | 1.194 | 0.10806 | 1.1806 | 0.10999 |
| CHAOS\_Total | 0.5406 | 0.30905 | 0.4965 | 0.2866 |
| PSI\_ChildDomain\_Hyperactivity | 1.2994 | 0.09626 | 1.3119 | 0.09199 |
| PSI\_ChildDomain\_ReinforcesParent | 0.9786 | 0.09902 | 0.9828 | 0.10031 |
| PSI\_ChildDomain\_Mood | 1.0653 | 0.1221 | 1.0599 | 0.12533 |
| PSI\_ChildDomain\_Acceptability | 1.0293 | 0.09827 | 1.0257 | 0.10506 |
| PSI\_ChildDomain\_Adaptability | 1.322 | 0.08581 | 1.3413 | 0.08975 |
| PSI\_ChildDomain\_Demandingness | 1.2488 | 0.10823 | 1.2395 | 0.12003 |
| PSI\_ParentDomain\_Competence | 1.4127 | 0.07257 | 1.4259 | 0.08708 |
| PSI\_ParentDomain\_Attachement | 1.0282 | 0.10288 | 1.0433 | 0.09399 |
| PSI\_ParentDomain\_RoleRestriction | 1.2515 | 0.11298 | 1.2602 | 0.11009 |
| PSI\_ParentDomain\_Depression | 1.2796 | 0.12175 | 1.3142 | 0.11353 |
| PSI\_ParentDomain\_ParentingPartnerRelationship | 1.244 | 0.11438 | 1.2254 | 0.12171 |
| PSI\_ParentDomain\_Isolation | 1.1255 | 0.11911 | 1.1085 | 0.11984 |
| PSI\_ParentDomain\_Health | 1.0466 | 0.12981 | 1.0317 | 0.11984 |
| PSI\_LifeStress | 0.6675 | 0.46314 | 0.6291 | 0.5304 |
| PSI\_ChildDomain\_Total | 1.9374 | 0.07641 | 1.9425 | 0.08249 |
| PSI\_ParentDomain\_Total | 2.0463 | 0.0769 | 2.0514 | 0.0821 |
| PSI\_Total | 2.2952 | 0.07063 | 2.3003 | 0.07679 |
| SES\_ParentalEducation | 0.9265 | 0.11851 | 0.9481 | 0.07793 |
| SES\_SpouseEducation | 0.9055 | 0.15443 | 0.8893 | 0.20136 |
| SES\_ParentAnnualIncome | 0.5967 | 0.16317 | 0.6107 | 0.18685 |
| SES\_SpouseAnnualIncome | 0.687 | 0.1501 | 0.7313 | 0.16649 |

**Supplementary Table 3.** T-test results for comparisons between the P1 and KG children on the cognitive, academic, and parental questionnaire measures.

|  |  |  |  |
| --- | --- | --- | --- |
| **Cognitive + Academic Tasks administered at T1** | ***t*** | ***df*** | ***p*** |
| CDT (go correct - no-go incorrect) | -0.202 | 77 | 0.84 |
| Wechsler\_vocab\_T1 | -1.094 | 76 | 0.277 |
| Numeracy Symbolic (correct - incorrect) | 0.663 | 74 | 0.509 |
| Numeracy Non-Symbolic (correct - incorrect) | 0.532 | 72 | 0.596 |
| Colour change-detection (Maximum Capacity) | 0.487 | 72 | 0.628 |
| Grid Memory (Item recognition) | 1.932 | 75 | 0.057 |
| Grid Memory (Item location) | 0.209 | 75 | 0.835 |
| **Questionnaires administered at T1** |  |  |  |
| SDQ\_Emotional Problems | 0.376 | 77 | 0.708 |
| SDQ\_ConductProblems | 0.838 | 77 | 0.404 |
| SDQ\_Hyperactivity | 0.441 | 77 | 0.661 |
| SDQ\_PeerProblems | -0.769 | 77 | 0.444 |
| SDQ\_Prosocial | 0.9 | 77 | 0.371 |
| SDQ\_Difficulties | 0.216 | 77 | 0.83 |
| SDQ\_Externalising | 0.76 | 77 | 0.449 |
| SDQ\_Internalising | -0.549 | 77 | 0.585 |
| SDQ\_Impact | -0.303 | 76 | 0.763 |
| PDH\_Frequency | -1.383 | 77 | 0.171 |
| PDH\_Intensity | 0.656 | 77 | 0.514 |
| PDH\_ChallengingBehaviour | 0.64 | 77 | 0.524 |
| PDH\_ParentingTasks | 0.545 | 77 | 0.587 |
| CHAOS\_Total | 0.658 | 77 | 0.512 |
| PSI\_ChildDomain\_Hyperactivity | -0.594 | 77 | 0.555 |
| PSI\_ChildDomain\_ReinforcesParent | -0.19 | 77 | 0.85 |
| PSI\_ChildDomain\_Mood | 0.194 | 77 | 0.847 |
| PSI\_ChildDomain\_Acceptability | 0.156 | 77 | 0.876 |
| PSI\_ChildDomain\_Adaptability | -0.973 | 77 | 0.334 |
| PSI\_ChildDomain\_Demandingness | 0.361 | 77 | 0.719 |
| PSI\_ParentDomain\_Competence | -0.729 | 77 | 0.468 |
| PSI\_ParentDomain\_Attachement | -0.68 | 77 | 0.499 |
| PSI\_ParentDomain\_RoleRestriction | -0.345 | 77 | 0.731 |
| PSI\_ParentDomain\_Depression | -1.309 | 77 | 0.194 |
| PSI\_ParentDomain\_ParentingPartnerRelationship | 0.701 | 77 | 0.486 |
| PSI\_ParentDomain\_Isolation | 0.633 | 77 | 0.529 |
| PSI\_ParentDomain\_Health | 0.532 | 77 | 0.596 |
| PSI\_LifeStress | 0.342 | 77 | 0.733 |
| PSI\_ChildDomain\_Total | -0.282 | 77 | 0.779 |
| PSI\_ParentDomain\_Total | -0.282 | 77 | 0.778 |
| PSI\_Total | -0.306 | 77 | 0.761 |
| SES\_ParentalEducation | -0.944 | 75 | 0.348 |
| SES\_SpouseEducation | 0.389 | 72 | 0.698 |
| SES\_ParentAnnualIncome | -0.347 | 73 | 0.73 |
| SES\_SpouseAnnualIncome | -1.218 | 74 | 0.227 |