Supporting Information: Bayesian Analysis

*Modeling Approach*

Given the ordered categorical nature of our outcome measure, SERT, we opted to fit a Bayesian ordered logistic regression using the R (R Core Team) and the rstan package (Stan Development Team, 2014). As model inputs, we used IQ (measured by KBIT-2; Kaufman & Kaufman, 2004), age in years, movement artifact measurements, fractional anisotropy (FA) in left uncinate, amygdala, and corticospinal tract as quantified in the main text, all mean-centered and divided by their respective standard deviations to speed sampler convergence and simplify prior specification. We also included all possible interactions between sex, age, and each of the FA measurements.

We modeled SERT score as discretized draws from a cumulative logistic latent variable by estimating five cutpoint parameters. This allows for an inconsistent effect of answering one additional question across the range of items. We sampled our regression parameters from a t-distribution with 4 degrees of freedom, location of 0, and scale of 5/4. The practical result is a non-informative prior with slight regularization of parameter estimates intended to protect against overestimation of effect sizes. The degrees of freedom parameter is motivated by Gelman et al. (2013), while Kruschke (2010) suggests the number of cutpoints divided by 4 as a reasonable default variance parameter for ordered logistic regression. The model was sampled from 4 independent chains with 1000 post-warm-up samples each. Data and R code for this analysis can be found at https://github.com/jchrszcz/papers/tree/master/anderson_workingdraft.

*Results*

We assume an adequate posterior sample based on visual inspection of the traceplots, sufficiently large effective sample sizes for all parameters, and Rhats of approximately 1 (Gelman et al., 2013). Despite our regularization prior, we estimate the interaction between age and left uncinate FA to be reliably negative (Table S1). This suggests that the relationship between uncinate FA and SERT decreases as age increases. We also observe varying distances between the estimated cutpoints, justifying the ordered logistic approach.

**Table S1.** Descriptive statistics for the posterior estimates of the described model. Mean gives the best estimate for each effect, while SE gives the standard error of the mean, or the error due to the sampling process. SD gives the variance of the posterior estimate, as is interpretable as a coefficient standard error in null-hypothesis significance testing. 2.5% and 97.5% give the boundaries on the 95% high-density interval for each parameter.

| **Parameter** | **Mean** | **SE** | **SD** | **2.5%** | **97.5%** |
|---|---|---|---|---|---|
| Intercept | 0.01 | 0.03 | 1.69 | -3.31 | 3.45 |
| FSIQ | 0.76 | 0.01 | 0.36 | 0.07 | 1.49 |
| Rotation | 1.23 | 0.01 | 0.68 | -0.05 | 2.61 |
| Translation | -0.38 | 0.01 | 0.69 | -1.75 | 0.95 |
| Sex | -0.95 | 0.01 | 0.62 | -2.25 | 0.24 |
| Age | 0.83 | 0.01 | 0.43 | -0.02 | 1.68 |
| UF | -0.88 | 0.01 | 0.56 | -2.01 | 0.20 |
| CST | 0.97 | 0.01 | 0.56 | -0.10 | 2.12 |
| Amyg | -0.28 | 0.01 | 0.45 | -1.19 | 0.58 |
| Sex x Age | -0.30 | 0.01 | 0.58 | -1.40 | 0.83 |
| Sex x UF | 0.82 | 0.01 | 0.66 | -0.44 | 2.18 |
| Age x UF | -1.24 | 0.01 | 0.51 | -2.26 | -0.26 |
| Age x CST | 0.42 | 0.01 | 0.48 | -0.52 | 1.35 |
| Sex x CST | -1.15 | 0.01 | 0.76 | -2.73 | 0.33 |
| Age x Amyg | 0.75 | 0.01 | 0.53 | -0.27 | 1.82 |
| Sex x Amyg | 0.39 | 0.01 | 0.68 | -0.91 | 1.78 |
| Sex x Age x UF | 0.59 | 0.01 | 0.69 | -0.76 | 2.00 |
| Sex x Age x CST | 0.54 | 0.01 | 0.79 | -0.91 | 2.12 |
| Sex x Age x Amyg | -0.28 | 0.01 | 0.72 | -1.73 | 1.12 |
| | | | | | |
| SERT3/4 | -6.64 | 0.05 | 2.39 | -11.70 | -2.35 |
| SERT4/5 | -2.67 | 0.03 | 1.80 | -6.32 | 1.06 |
| SERT5/6 | -1.66 | 0.03 | 1.78 | -5.19 | 1.94 |
| SERT6/7 | 0.23 | 0.03 | 1.75 | -3.30 | 3.82 |
| SERT7/8 | 1.50 | 0.03 | 1.75 | -1.96 | 5.04 |

References

Gelman, A., Carlin, J. B., Stern, H. S., Dunson, D. B., Vehtari, A., & Rubin, D. B. (2013). *Bayesian data analysis*. CRC press.

Kruschke, J. (2010). Doing Bayesian data analysis: A tutorial introduction with R. Academic Press.

Stan Development Team (2014). Stan: A C++ Library for Probability and Sampling, Version 2.5.0. URL http://mc-stan.org/.