

Taylor et al: Allelic variation in dopamine D2 receptor gene is associated with attentional impulsiveness on the Barratt Impulsiveness Scale (BIS-11).

Supplementary Information

Genetic association analysis

Permutation methods are considered the gold standard for multiple comparison correction because they provide unbiased control for type 1 error while maintaining statistical power (Berry et al. 2011). Furthermore, permutation methods make no assumption about the shape of the underlying population distribution, and thus are ideally suited for analysing BIS scores which commonly show skewed distributions. Accordingly, a permutation-based analysis was performed separately for each BIS-11 first- and second-order subscale using Matlab (v. 2008a; <http://www.mathworks.com/products/>). Full details of this method are provided in the Supplement (see also Cummins et al. 2014; Sham and Purcell, 2014 for further details on ‘full-scale’ permutation methods). In order to calculate permutation-based p values, each individual’s index (the profile made up of their BIS subscale and covariate scores) was randomly shuffled relative to the genetic data, before the unstandardised beta value was calculated for each SNP under a single-step additive regression model that included age, gender and cohort as covariates. The largest absolute test statistic (beta) across the SNPs was then recorded for each of 100,000 shuffled configurations of the data. The single-step permuted p -value for any given marker was then calculated as the fraction of maximal beta values that were greater than or equal to the absolute value of the test statistic for the actual (unshuffled) data. Given the high degree of correlation between the BIS measures, a correction was not made for the number of BIS scales examined. However our permutation method entailed that the family wise error rate for examining the association between a BIS subscale and all SNPs was $\alpha_{\text{FWE}} = .05$

Supplementary Table

Supplementary Table 1: Differences in BIS-11 scores between ascertainment sites in Brisbane and Melbourne, Australia.

	Brisbane (N=333)	Melbourne (N=304)		
	<i>M (SD)</i>	<i>M (SD)</i>	<i>t</i>	Sig. (<i>p</i>)
First-order Factors				
Attention	10.45 (2.79)	10.41 (2.61)	0.15	0.88
Cognitive Instability	6.19 (1.73)	6.11 (1.61)	0.63	0.53
Motor Impulsiveness	15.42 (3.15)	14.58 (3.26)	3.30	0.001*
Perseverance	7.33 (1.70)	7.37 (1.76)	-0.232	0.82
Cognitive Complexity	10.72 (2.44)	10.42 (2.28)	1.60	0.11
Self-control	12.61 (3.07)	12.42 (3.29)	0.75	0.45
Second-order Factors				
Attentional Impulsiveness	16.64 (3.84)	16.52 (3.56)	0.40	0.69
Motor Impulsiveness	22.75 (3.69)	21.94 (4.10)	2.61	0.01
Non-planning Impulsiveness	23.32 (4.55)	22.84 (4.68)	1.34	0.18
Total Score	62.72 (9.67)	61.30 (9.85)	1.83	0.07

M: Mean; *SD*: Standard Deviation; *t*: *t*-statistic using an independent samples *t*-test; Sig. (*p*): Statistical significance (*p*-value); * significant after Bonferroni correction for number of comparisons