Supplemental Information

Errors and correct trials (collapsed across incongruent and congruent conditions) were contrasted in a random effects analysis using the same model as described for the primary analysis of fMRI data for the MSIT. Second-level, within and between group contrasts were conducted, using the same statistical thresholds as for the primary analyses. Within group analyses revealed that both OCD and healthy control groups activated task control regions for error compared to correct trials (Table S2). However, no group differences in the vMFC or any other area of the brain were observed.

This null result conflicts with the between group difference observed in the vMFC for the contrast of errors against implicit baseline, but can be understood by examining Figure 2D, which shows that the vMFC responded in the same manner to both error and correct incongruent trials relative to fixation (activations for OCD, deactivations for controls). These effects predict null values for the contrast of error and correct trials among subjects with OCD [vMFC activation to errors - (vMFC activation to correct incongruent plus near-zero value for correct congruent trials)] and among healthy controls [vMFC deactivation for errors - (vMFC deactivation to correct incongruent plus near-zero value for correct congruent trials)].

In considering these findings, we have inferred a failure to deactivate the vMFC across both error- and interference-processing functions in OCD, but acknowledge that other interpretations are possible. Since group differences in vMFC activation during error-processing were only observed relative to implicit baseline (i.e., fixation), non-specified task processes – other than errors – may have contributed to this difference. Nevertheless, the contrast of errors against fixation elicited activations for both OCD and healthy control groups (pMFC, bilateral

opercula and parietal cortex; Table S2) in task control regions, consistent with performance monitoring function (1, 2).

Another possible interpretation of these findings derives from conflict theory, which posits that errors represent a special case of interference (i.e., interference between the actual and desired outcome, (3). Since the majority of errors occurred on incongruent trials of the MSIT, the vMFC findings for the error and interference contrasts may both derive from the effects of interference. On the other hand, the larger, more significant vMFC group difference observed for the error (against implicit baseline) than the interference contrast - despite the lower number of error trials - suggests that a more robust vMFC effect for errors may differentiate these functions in OCD. Controlling for the effects of interference in error analyses (e.g., contrasting error and correct responses on congruent trials) would help to discern between these possibilities, however, the low number of congruent errors (only 1 subject with more than 2 congruent errors) precluded this analysis in our sample.

Table S1. Demographics

	OCD	Healthy Control
Age	13.9 +/- 2.6	14.1 +/-2.6
Percent Male	33%	33%
Caucasian	83%	61%
Education	8.6 +/- 2.5	8.6 +/- 2.3
CDI*	8.1 +/- 5.9	2.0 +/- 2.7
MASC*	52.4 +/-20.5	24.8 +/-12.8
Current CYBOCs total	16.1 +/- 7.3	
Lifetime CYBOCs total	28.1 +/- 5.7	
Duration illness (years)	3.0 +/- 1.5	

CDI, Children's Depression Inventory; CYBOCS, Children's Yale-Brown Obsessive Compulsive Scale; MASC, Multidimensional Anxiety Scale for Children; OCD, obsessive compulsive disorder
*Significant difference at $p < 0.05$

Table S2. Activations and deactivations for OCD and healthy youth for error compared with correct trials[a]

		OCD			Healthy	
Region (Brodmann Area)	**Cluster**	**Coordinates**	**Z-Score[b]**	**Cluster**	**Coordinates**	**Z-Score[b]**
Activations						
pMFC (32/6/8/9)	1384	9, 24, 24	5.26	*	3, -9, 36	4.66
		0, 27, 30	4.84		-3, 30, 42	4.65
rACC (32/24)		0, 33, 18	4.51		0, 39, 18	4.41
Bilateral Anterior Opercula (47/13/45)	664	39, 24, -18	5.02		45, 18, 27	4.02
		39, 15, 3	4.19	378	33, 21, -3	4.27
		45, 12 -9	4.19		39, 15, -12	4.18
	435	-30, 27, -3	4.71	*	-42, 15, 20	3.88
		-36, 21, -6	4.51	271	-30, 30, 3	4.20
Right Middle Frontal Gyrus (9/8/6)				*	42, 24 33	4.68
Left Middle Frontal Gyrus (9/45)	123	-24, 29, 27	3.41		-33,39,30	4.41
		-30, 48, 12	3.22		-51, 18, 18	4.28
Right Parietal (40/7)	348	48, -51, 54	4.36	495	39, -66, 48	4.20
		63, -45, 30	4.25		51, -48, 42	3.73
Left Parietal (40/7)				272	-36, -57, 42	4.08
					-36, -60 60	3.66
Right Occipital (18)	411	0, -84, 12	4.20	71	15, -60, 0	3.58
		15, -69, -3	4.63		9, -81, -3	3.57
Right Temporal Lobe (21)	71	66, -42, -6	3.40	75	54, -27, -6	3.73
		54, -21, -9	3.18			
Posterior Cingulate (23)	477	3, -24, 30	4.48			
Right Precuneus (31)				*	15, -42, 42	4.44
Midbrain	322	6, -24, -21	4.28	488	-9, -27, -6	4.24
Deactivations: Fix > Error						
		None			None	

OCD, obsessive compulsive disorder; pMFC, posterior medial frontal cortex, rACC, rostral anterior cingulate cortex

[a] Collapsed across incongruent and congruent conditions

[b] $p_{FDR} < 0.05$, whole brain search

*A large cluster (k = 4068) spanned the pMFC, bilateral anterior opercula, bilateral middle frontal gyri and into right precuneus.

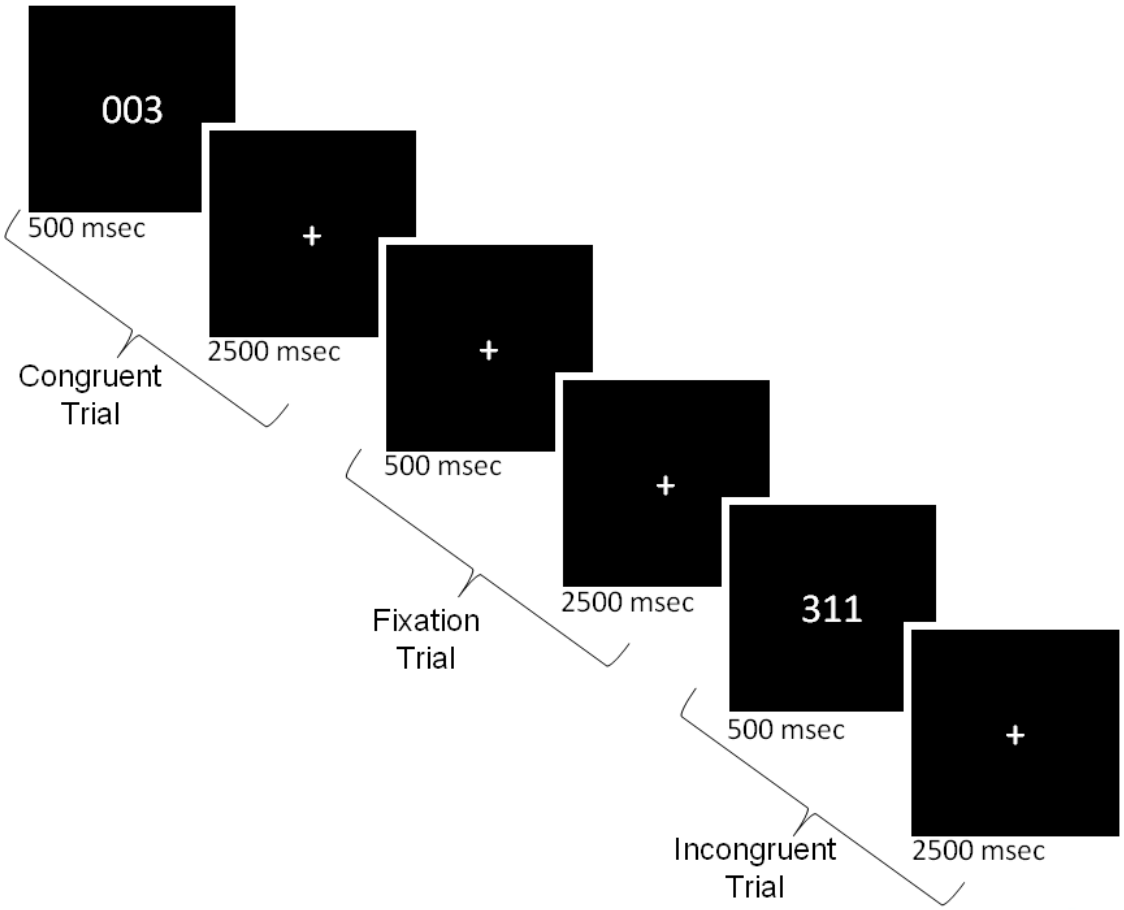

Figure S1. The event–related version of the Multi-Source Interference Task included 120 incongruent, 120 congruent and 60 fixation trials over 5 runs. Incongruent, congruent and fixation stimuli were 500 msec each, followed by a 2500 msec fixation cross to comprise a trial.

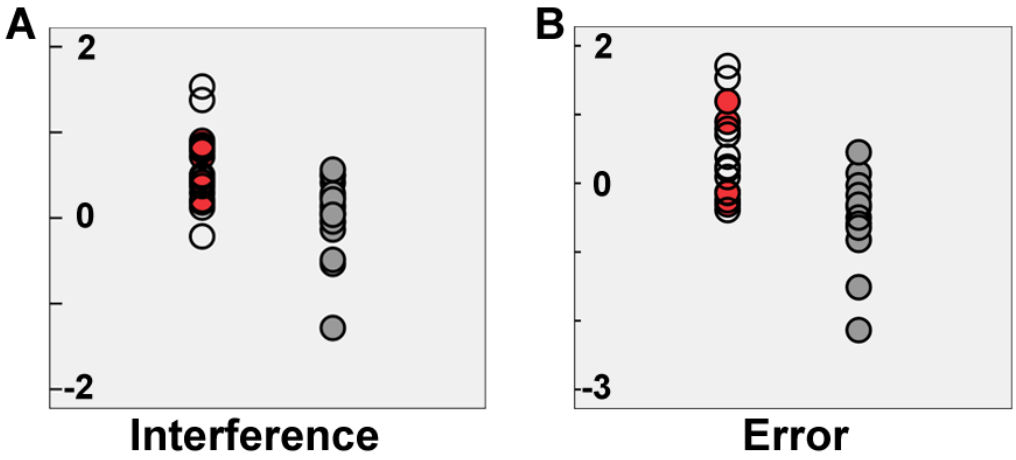

Figure S2. Extracted values from interference-related activation in the dorsal anterior cingulate cortex **(A)** and error-related activation in the ventral medial frontal cortex **(B)** shows OCD patients in open circles (medicated) and red circles (unmedicated) on the left, and control subjects in gray circles on the right.

1. Polli FE, Barton JJ, Cain MS, Thakkar KN, Rauch SL, Manoach DS (2005): Rostral and dorsal anterior cingulate cortex make dissociable contributions during antisaccade error commission. *Proc Natl Acad Sci U S A*. 102:15700-15705.
2. Hajcak G, Franklin ME, Foa EB, Simons RF (2008): Increased error-related brain activity in pediatric obsessive-compulsive disorder before and after treatment. *Am J Psychiatry*. 165:116-123.
3. Botvinick MM, Cohen JD, Carter CS (2004): Conflict monitoring and anterior cingulate cortex: an update. *Trends Cogn Sci*. 8: 539-546.