

# Observable-self task in social anxiety disorder and Williams-Beuren syndrome: a fMRI study

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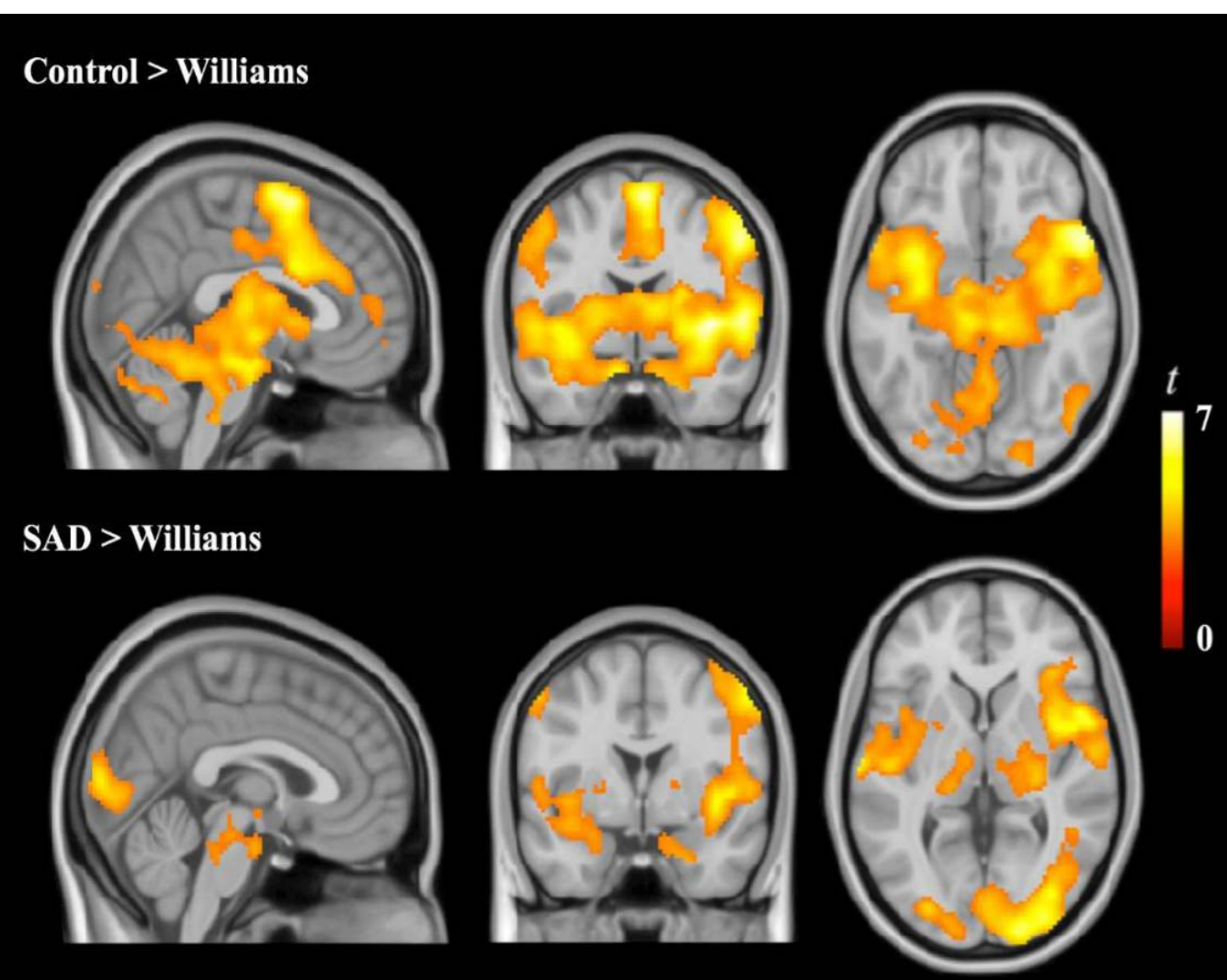
## Introduction

- Social anxiety disorder (SAD) is characterized by an excessive fear of social situations that disrupts normal functioning.
- SAD is associated with changes in regions that underlie inhibition of emotion (prefrontal cortex), contextual processing (hippocampus), integration of multimodal information and self-awareness (medial parietal cortex/precuneus), and perceptual and semantic processing (fusiform gyrus).
- Williams-Beuren syndrome (WBS) is a genetic syndrome that exhibits hypersocial responses towards social situations.
- The comparison of these two phenotypes could identify potential areas of neurobiological research in SAD.

## Methods

- Case-control study of 20 subjects with SAD, 20 subjects with WBS and 20 healthy controls (both sexes, 18–60 years).
- SAD was diagnosed with the Liebowitz Social Anxiety Scale, and WBS by showing a heterozygous deletion at 7q11.23.
- Participants were examined using functional MRI during an observable self-task, which involved presenting participants with pre-recorded video sequences of themselves performing a verbal task, in a session during which the examiners acted as the audience and rated their performance.
- Images were obtained using a 1.5 T Signa Excite system.
- First level (single-subject) SPM contrast images were estimated comparing the "self" condition with the "other" condition.
- Resulting first-level contrast images were then carried forward to subsequent second-level random-effects (group) analyses.
- One-sample t-statistic maps were calculated to obtain task-related activations and deactivations, and two-sample t-test were performed to map between-group differences.

## Results: Regions with significant task-evoked activation



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	Activation in WBS		Activation in Controls		Activation in SAD				
	MNI coordinates		MNI coordinates		MNI coordinates				
	x	y z	T	x	y z	T			
<b>Extrastriate Visual Cortex</b>	52	-70 0	5.1	36	-82 0	7.8	34	-84 18	10.4
<b>Primary Visual Cortex</b>	-	-	-	-	4	-92 6	6.3		
<b>Inferior Frontal gyrus</b>	-	-	-	44	34 4	10.4	42	30 4	7.1
<b>Medial Frontal Cortex</b>	-	-	-	6	2 62	13.4	12	4 60	4.8
<b>Anterior Cingulate Cortex</b>	-	-	-	0	10 28	10.0	0	8 36	6.2
<b>Insula</b>	-	-	-	34	16 014:6	9.7	38	10 -6	5.8
				11:9	12:8				
<b>Basal ganglia</b>	-	-	-	22	2 4	7.1	24	8 0	5.2
<b>Brainstem</b>	-	-	-	8	-20 -6	7.6	6	-14 -10	5.2
<b>Cerebellum</b>	-	-	-	36	-58 -30	5.5	38	-58 -24	6.0
<b>Thalamus</b>	-	-	-	6	-18 0	6.9	10	-18 0	6.4
<b>Amygdala</b>	-	-	-	22	-2 -18	4.4	-24	0 -14	5.3

WBS: Williams-Beuren syndrome; SAD: Social Anxiety disorder; MNI: Montreal Neurological Institute. Statistics correspond to a threshold of  $P_{FWE} < 0.05$  Family Wise Error-corrected.

## Results: Between-group task-related activation differences

	WBS < Control			WBS < SAD		
	Cluster size (ml)	coordinates x y z	T	Cluster size (ml)	coordinates x y z	T
<b>Insula</b>	415.6*	40 2 0	7.1	170.1*	42 2 0	5.1
	*	-42 -14 8	6.5	¥	-38 6 -4	3.8
<b>Medial Frontal Cortex/SMA</b>	*	6 6 62	6.9	-	-	-
<b>Anterior Cingulate Cortex</b>	*	-6 12 30	5.8	-	-	-
<b>Superior Temporal Cortex</b>	*	-48 -14 4	6.3	¥	52 8 0	5.2
	*	56 2 2	6.1	¥	-64 -14 4	5.1
<b>Sensorimotor Cortex</b>	*	52 -14 38	5.5	¥	56 4 48	5.1
	*	-46 -16 38	4.6	3.0	-54 -4 52	4.8
<b>Putamen</b>	*	30 -18 4	5.7	-	-	-
<b>Thalamus</b>	*	-10 -12 0	4.5	¥	12 -18 -2	3.0
<b>Cerebellum</b>	*	-26 -66 -26	4.1	¥	26 -58 -24	4.3
<b>Brainstem</b>	*	8 -26 -12	4.6	¥	8 -22 -18	3.6
<b>Primary Visual Cortex</b>	-	-	-	¥	20 -96 4	5.6
<b>Extrastriate Visual Cortex</b>	2.6	-44 -62 2	4.1	¥	36 -80 6	5.6
<b>Ventromedial Prefrontal Cortex</b>	2.9	-4 52 4	4.0	-	-	-
<b>Posterior Cingulate Cortex</b>	-	-	-	2.2	20 -28 40	4.2

	WBS > SAD		
	Cluster size (ml)	coordinates x y z	T
<b>Inferior Parietal Cortex</b>	5.8	52 -62 40	6.1
	3.8	-50 -62 40	4.3
<b>Prefrontal Cortex</b>	3.4	-28 20 52	5.0
	4.9	34 16 58	4.5

WBS: Williams-Beuren syndrome; SAD: social anxiety disorder; MNI: Montreal Neurological Institute. \* and ¥ indicate same cluster. Statistics correspond to a threshold of  $P_{FWE} < 0.05$  Family Wise Error-corrected.

## Conclusions

- SAD subjects showed heightened activation in all areas with the exception of the inferior-parietal and prefrontal cortex areas.
- Lower responses in the dorsal prefrontal and parietal cortices could be related to dysfunction in controlling anxiety in SAD (Pujol et al., 2013).
- Diminished fronto-parietal responses could be linked to distortions in the processing of self recognition (Kim et al, 2016).
- WBS appeared to be "emotionally insensible" towards self-exposition, while SAD subjects appeared as "emotionally hypersensitive".

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