Supplementary material

Acute oxytocin effects in inferring others' beliefs and social emotions in people at clinical high risk for psychosis

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Supplementary Figure 1. All 10 different stories presented during the task.



Supplementary table 1. Spearman correlations among performance measures within and between task conditions

	PLA_control_RT	PLA_belief_RT	PLA_social_RT	OT_control_RT	OT_belief_RT	OT_social_RT	PLA_control_ACC	PLA_belief_ACC	PLA_social_ACC	OT_control_ACC	OT_belief_ACC	OT_social_ACC
PLA_control_RT	r=1.000	r=,765**, p=0.000	r=,678**, p=0.000	r=,770**, p=0.000	r=,501**, p=0.008	r=,568**, p=0.002	r=-0.338, p=0.085	r=-,433*, p=0.024	r=-0.089, p=0.660	r=-,413*, p=0.032	r=-0.343, p=0.080	r=-0.259, p=0.193
PLA_belief_RT	r=,765**, p=0.000	r=1.000	r=,782**, p=0.000	r=,490**, p=0.009	r=,397*, p=0.040	r=0.328, p=0.094	r=-,402*, p=0.038	r=-,453*, p=0.018	r=-0.199, p=0.320	r=-0.265, p=0.181	r=-0.154, p=0.444	r=-0.254, p=0.201
PLA_social_RT	r=,678**, p=0.000	r=,782**, p=0.000	r=1.000	r=,574**, p=0.002	r=,459*, p=0.016	r=,427*, p=0.026	r=-0.355, p=0.070	r=-0.300, p=0.129	r=-0.365, p=0.061	r=-0.120, p=0.552	r=0.002, p=0.991	r=-0.136, p=0.500
OT_control_RT	r=,770**, p=0.000	r=,490**, p=0.009	r=,574**, p=0.002	r=1.000	r=,787**, p=0.000	r=,762**, p=0.000	r=-0.182, p=0.364	r=-0.224, p=0.261	r=0.022, p=0.914	r=-0.287, p=0.146	r=-0.378, p=0.052	r=-0.052, p=0.798
OT_belief_RT	r=,501**, p=0.008	r=,397*, p=0.040	r=,459*, p=0.016	r=,787**, p=0.000	r=1.000	r=,832**, p=0.000	r=-0.155, p=0.441	r=-0.028, p=0.890	r=0.006, p=0.976	r=-0.181, p=0.365	r=-,409*, p=0.034	r=-0.071, p=0.727
OT_social_RT	r=,568**, p=0.002	r=0.328, p=0.094	r=,427*, p=0.026	r=,762**, p=0.000	r=,832**, p=0.000	r=1.000	r=-0.067, p=0.740	r=0.134, p=0.505	r=0.185, p=0.355	r=-0.067, p=0.738	r=-0.266, p=0.180	r=0.027, p=0.895
PLA_control_ACC	r=-0.338, p=0.085	r=-,402*, p=0.038	r=-0.355, p=0.070	r=-0.182, p=0.364	r=-0.155, p=0.441	r=-0.067, p=0.740	r=1.000	r=,495**, p=0.009	r=,432*, p=0.024	r=,474*, p=0.012	r=0.370, p=0.058	r=0.094, p=0.640
PLA_belief_ACC	r=-,433*, p=0.024	r=-,453*, p=0.018	r=-0.300, p=0.129	r=-0.224, p=0.261	r=-0.028, p=0.890	r=0.134, p=0.505	r=,495**, p=0.009	r=1.000	r=0.363, p=0.063	r=,605**, p=0.001	r=0.311, p=0.114	r=0.162, p=0.419
PLA_social_ACC	r=-0.089, p=0.660	r=-0.199, p=0.320	r=-0.365, p=0.061	r=0.022, p=0.914	r=0.006, p=0.976	r=0.185, p=0.355	r=,432*, p=0.024	r=0.363, p=0.063	r=1.000	r=0.196, p=0.327	r=0.231, p=0.246	r=0.219, p=0.273
OT_control_ACC	r=-,413*, p=0.032	r=-0.265, p=0.181	r=-0.120, p=0.552	r=-0.287, p=0.146	r=-0.181, p=0.365	r=-0.067, p=0.738	r=,474*, p=0.012	r=,605**, p=0.001	r=0.196, p=0.327	r=1.000	r=,699**, p=0.000	r=0.316, p=0.108
OT_belief_ACC	r=-0.343, p=0.080	r=-0.154, p=0.444	r=0.002, p=0.991	r=-0.378, p=0.052	r=-,409*, p=0.034	r=-0.266, p=0.180	r=0.370, p=0.058	r=0.311, p=0.114	r=0.231, p=0.246	r=,699**, p=0.000	r=1.000	r=0.296, p=0.133
OT_social_ACC	r=-0.259,	r=-0.254,	r=-0.136,	r=-0.052,	r=-0.071,	r=0.027,	r=0.094,	r=0.162,	r=0.219,	r=0.316,	r=0.296,	r=1.000

	p=0.193	p=0.201	p=0.500	p=0.798	p=0.727	p=0.895	p=0.640	p=0.419	p=0.273	p=0.108	p=0.133	

*Significant correlations; PLA, placebo; OT, oxytocin; RT, reaction time; ACC, accuracy

Supplementary table 2. Brain activation during inferring other's beliefs (belief > control)

Region, Hemisphere	**pFWE Cluster-level**	**Cluster size**	**T**	**Z**	**MNI coordinates (x/y/z)**		
Precuneus, L	0.000	334	8.55	5.79	2	-62	38
Angular gyrus, L			8.35	5.72	-46	-60	32
Inferior parietal gyrus; L			7.51	5.38	-40	-56	52
Inferior parietal gyrus; L			7.51	5.38	-46	-52	38
Middle frontal gyrus, L	0.000	294	8.10	5.62	-30	16	42
Middle frontal gyrus, L			6.93	5.13	-36	10	50
Middle temporal gyrus, R	0.000	161	7.25	5.27	52	-68	14
Middle temporal gyrus, R			7.18	5.24	56	-64	22
Inferior frontal gyrus, L	0.000	109	6.43	4.90	-54	22	26
Inferior frontal gyrus, L			6.32	4.84	-42	22	26
Inferior frontal gyrus, L			5.80	4.58	-32	22	20

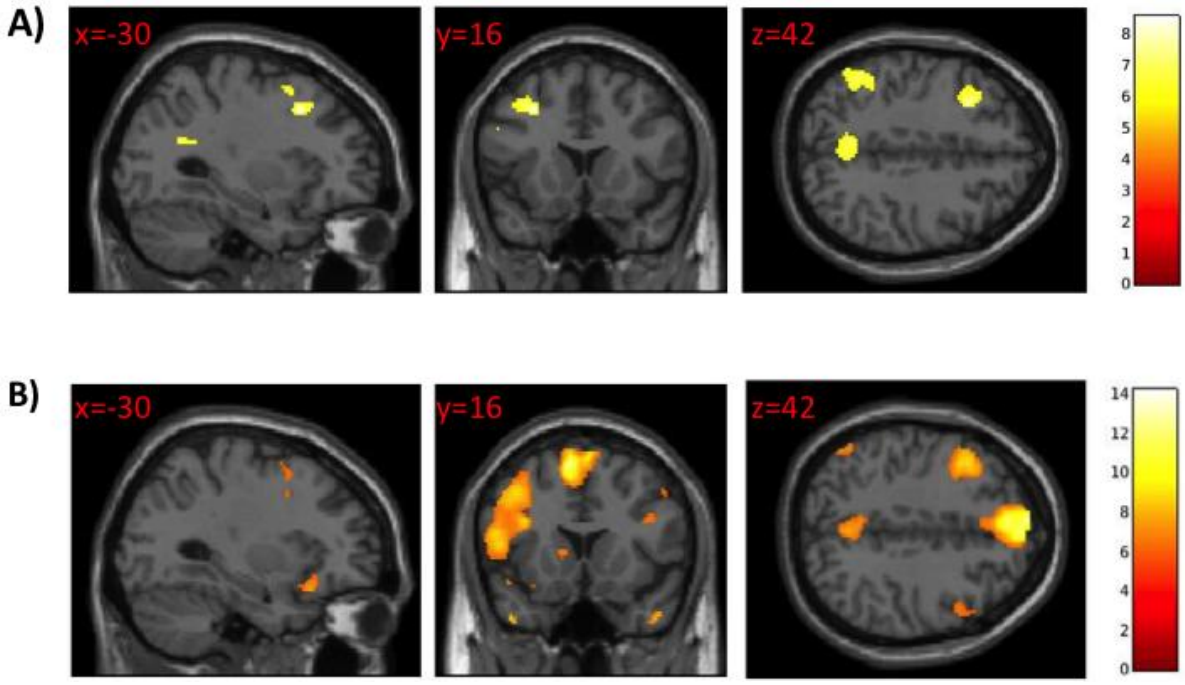
FWE, family-wise error

Supplementary table 3. Brain activation during inferring other's emotions (social emotion > control)

Region, Hemisphere	pFWE, Cluster-level	Cluster size	T	Z	MNI coordinates (x, y, z)		
Inferior frontal gyrus, L	0.000	3088	14.20	7.36	-56	24	16
Inferior frontal gyrus, L			12.18	6.90	-48	42	-2
Inferior frontal gyrus, L			11.84	6.81	-46	36	-14
Middle temporal gyrus, R	0.000	3731	13.95	7.31	56	-56	16
Middle temporal gyrus, R			12.93	7.08	48	-60	10
Inferior temporal gyrus, R			12.07	6.87	48	-68	-4
Superior frontal gyrus, L	0.000	3233	13.73	7.26	-6	54	28
Supplementary Motor Area, L			13.42	7.19	-8	18	58
Superior frontal gyrus, L			12.97	7.09	-6	54	40
Middle temporal gyrus, L	0.000	4039	12.17	6.90	-60	-54	8
Angular gyrus, L			12.11	6.88	-52	-60	26
Middle temporal gyrus, L			12.07	6.87	-48	14	-34
Inferior frontal gyrus, R	0.000	979	10.84	6.54	56	26	2
Inferior frontal gyrus, R			9.99	6.29	46	30	-10
Inferior frontal gyrus, R			7.28	5.29	56	24	20
Precuneus, L	0.000	781	10.09	6.32	-2	-60	32
Cerebellum, R	0.000	133	7.84	5.52	12	-78	-34
Cerebellum, R			6.83	5.08	28	-78	-36
Cerebellum, R			5.96	4.66	32	-70	-32
Caudate, L	0.000	246	7.37	5.32	-14	4	12
Caudate, L			6.94	5.13	-10	14	6
Middle frontal gyrus, R	0.000	136	6.86	5.10	50	24	40
Middle frontal gyrus, R			6.75	5.05	48	10	46
Cerebellum, R	0.003	27	6.67	5.01	-18	-76	-36
Caudate, R	0.003	30	6.21	4.78	16	6	12

FWE, family-wise error

Supplementary Figure 2. Brain activation (effect of condition) during inferring other's beliefs and social emotions after placebo



A) Belief > control and **B)** social emotion > control. Results are displayed at a threshold of $p < 0.05$ family-wise error (FWE) corrected across the whole brain. Colour bars indicate t values.

Supplementary table 4. Treatment effects during inferring other's beliefs (belief > control)

Region, Hemisphere	pFWE, Cluster-level	Cluster size	T	Z	MNI coordinates (x, y, z)		
PLA > OT							
Superior frontal gyrus, R	0.698	51	4.60	3.84	22	-2	64
Thalamus, R	0.835	32	4.50	3.77	26	-20	14
Superior frontal gyrus, L	0.876	26	4.00	3.45	-18	8	48
Insula, L	0.727	47	3.96	3.42	-36	-8	2
Supramarginal gyrus, L	0.895	23	3.94	3.41	-50	-22	34
Postcentral gyrus, L	0.913	20	3.90	3.38	-44	-14	5
PLA < OT							
Posterior cingulate cortex, L	0.757	43	4.63	3.85	-16	-40	30
Precuneus, R	0.814	35	4.52	3.78	14	-44	30
Superior frontal gyrus, R	0.807	36	4.41	3.71	14	64	24
Superior frontal gyrus, R			4.07	3.50	10	58	34

FWE, family-wise error

Supplementary table 5. Treatment effects (OT > placebo) during inferring others' social emotion (social emotion > control)

Region, Hemisphere	pFWE, Cluster-level	Cluster size pFWE	T value	Z value	MNI coordinates (x/y/z)		
Superior occipital lobe, L	0.742	45	5.64	4.42	-14	-88	32
Midcingulate cortex, L	0.550	73	5.26	4.22	-20	0	36
Cuneus, R	0.887	24	4.58	3.82	14	-84	38
Superior temporal pole, L	0.905	21	4.17	3.56	-48	10	-20
Caudate, L	0.685	53	4.03	3.47	-18	-24	30
Superior frontal gyrus, R	0.911	20	3.66	3.22	34	56	20

FWE, family-wise error