III. Supplementary Material

To "Stuck in a negative me: fMRI study on the role of disturbed self-views in social feedback processing in borderline personality disorder" by Charlotte C. van Schie, Chui-De Chiu, Serge A.R.B. Rombouts, Willem J. Heiser & Bernet M. Elzinga

Manipulation check interview

Before debriefing participants were asked the following questions which they answered verbally:

1. Wat voor persoon denkt u dat de andere proefpersoon is? (EN: What kind of person do you think the other participant is who gave you feedback?)
2. Heeft de feedback je geraakt? Waarom wel of niet? (EN: Were you affected by the feedback? Why (not)?)
3. Hoe zeker bent u ervan dat er een andere proefpersoon aanwezig is? (EN: How confident are you that another participant was present?)

The first two questions probed whether participants had any doubts about the experimental paradigm without explicitly stating that there was something to doubt. The third question assesses the degree of doubt when any doubt was expressed by the participant. Participants who were convinced by the paradigm answered the first two questions with serious thought and often elaborated on the other participant not understanding them well or very well.

Data Acquisition and preprocessing

The SF task was programmed in E-prime 2.0 and responses were collected through button boxes which were practiced by the participant before performing the task. Responses to the SF task were prepared for analysis using Excel 2010 and IBM SPSS statistics version 23.

MRI images were acquired using a Phillips 3.0 Tesla scanner equipped with a SENSE-8 channel head coil. T2*-weighted echo planar imaging (EPI) was used during the SF task with the following parameters: FOV RL: 220mm, AP: 220mm, FH: 114.68mm; Matrix 80x80, Voxel size RL:2.75mm AP: 2.75mm; Slice thickness 2.75mm; Interslice skip 0.275mm; 38 transverse slices in descending order; TE 30ms, TR 2200ms, Flip Angle 80°. Number of volumes varied (M = 158.3, SD = 16.8) as the SF task was self-paced but did not differ between groups, $F(2,79) = .51$, $p = .601$. For registration purposes a four-volume high resolution T2 weighted EPI and a structural 3D T1 scan were acquired. The parameters for the T2 scan were: FOV RL: 220mm, AP: 220mm, FH: 168mm; Matrix 112x112, Voxel size RL: 1.96mm AP: 1.96mm; Slice thickness 2.0mm; 84 transverse slices; TE 30ms, TR 2200ms, Flip Angle 80°. The parameters for the 3D T1 scan were: FOV RL: 177.33mm, AP: 224mm, FH: 168mm; Matrix 256x256, Voxel size RL: .88mm AP: .87mm; Slice thickness 1.20mm; 140 transverse slices; TE 4.6ms, TR 9.7ms, Flip Angle 8°; Duration 4:55 minutes. Scans were examined by a radiologist.

Preprocessing of fMRI data was performed in Feat v6.00 in FSL 5.0.7. The first 5 volumes were discarded. A high pass filter of 80s was used. Motion was corrected using MCFLIRT with 6 degrees of freedom (dof) and the middle volume as reference volume. No slice time correction was used but temporal derivatives were added in the model. Data were spatially smoothed with FWHM of 5 mm.

Raw and preprocessed data were checked for quality, registration and movement. No participant moved more than 3mm and movement was not related to group, $F(2,79) = .27$, $p = .767$. For higher level analysis data were registered to the MNI152 2mm template. The middle volume was registered to the high resolution T2 image using 6 dof. The Boundary-Based Registration (BBR) algorithm was used for registration to the anatomical T1 scan. A linear 12 dof transformation was used for registration to the MNI template.

Supplementary Table 1.
Medication use among HC, LSE and BPD.

Group	Physical ailments	Psychotropic medication
HC (unique N=3)	Sleep problems (N=1, Lorazepam) Diabetes (N=1, Insulin) Asthma and chronic bronchitis (N=2, Ventolin, Foster) High blood pressure (N=1, Valsartan) Thyroid (N=1, Thyrax)	None
LSE (unique N=4)	Sleep problems (N=1, Temazepam)	Depression (N=2, Fluoxetine, Sertraline) ADHD (N =1, Dexamfetamine)
BPD (unique N=11)	Sleep problems (N=1, Seroquel <25mg) Thyroid (N = 2, Thiamazol, Thyrax) Epilepsy (N=1, Topiramate) Asthma (N=2) Diabetes (N=1)	Depression (N=10, Amitryptiline, Citalopram, Cymbalta, Fluoxetine, Mirtazepine, Paroxetine, Sertraline, Venlafaxine)

Supplementary Table 2.
Model comparisons of models predicting individual valence rating based on predefined valence category and group *(intra-class correlation = .02)*.

Model of Valence rating of feedback	AIC	BIC	LogLikelihood	χ^2 (*df*), *p*
Null model: random intercepts only	18105	18123	-9049.3	
Model 1: + valence	14159	14190	-7074.5	χ^2 (2) = 3949.6, $p < .001$
Model 2: + group	14161	14204	-7073.3	χ^2 (2) = 2.4, $p = .307$
Model 3: **+ valence* group interaction**	**14160**	**14228**	**-7069.1**	**χ^2 (4) = 8.4,** **$p = .077$**

Supplementary Table 3.

Model parameters of model predicting valence rating based on valence category (Intermediate = reference) and group (BPD = reference) (Model 3). Significance level (* < .001, ** < .01, * <.05, ^ < .10) based on chi-square test of model comparisons.**

Model parameter	Estimate (*b)*	Std. error	t-value
Intercept (Valence – Intermediate)	0.15	0.13	1.18
Valence - Negative	-2.48	0.12	-20.98***
Valence - Positive	3.03	0.12	25.58***
Group – HC	0.21	0.17	1.22
Group – LSE	-0.11	0.19	-0.55
Interaction			
Negative valence*HC	-0.43	0.16	-2.69^
Interaction			
Positive valence*HC	-0.14	0.16	-0.92
Interaction			
Negative valence*LSE	-0.30	0.17	-1.73
Interaction			
Positive valence*LSE	0.00	0.17	0.01

Supplementary Table 4.

Model comparisons of models predicting applicability ratings based on valence category and group *(intra-class correlation = .04).*

Model of Applicability rating of feedback	AIC	BIC	LogLikelihood	χ^2 (*df*), *p*
Null model:	15707	15726	-7850.5	
random intercepts only				
Model 1:	14112	14143	-7051.2	χ^2 (2) = 1598.6,
+ valence				*p* < .001
Model 2:	14113	14157	-7049.7	χ^2 (2) = 3.0,
+ group				*p* = .227
Model 3:	**14015**	**14083**	**-6996.6**	**χ^2 (4) = 106.2,**
+ valence* group interaction				***p* < .001**

Supplementary Table 5.

Model parameters of model predicting applicability ratings based on valence category (intermediate = reference) and group (BPD = reference) (Model 3). Significance level (* < .001, ** < .01, * <.05, ^ < .10) based on chi-square test of model comparisons.**

Model parameter	Estimate (*b)*	Std. error	t-value
Intercept (Valence – Intermediate)	1.02	0.12	8.44
Valence - Negative	-1.91	0.12	-16.06***

Valence - Positive	0.07	0.12	0.58
Group – HC	-0.40	0.16	-2.50***[1]
Group – LSE	-0.15	0.18	-0.83
Interaction			
Negative valence*HC	-0.53	0.16	-3.36***
Interaction			
Positive valence*HC	1.07	0.16	6.74***
Interaction			
Negative valence*LSE	-0.43	0.17	-2.43***
Interaction			
Positive valence*LSE	0.63	0.18	3.61***

Supplementary Table 6.
Model comparisons of models predicting mood rating by valence category, group and applicability of feedback (intra-class correlation = .12).

Model of Mood after feedback	AIC	BIC	LogLikelihood	χ^2 (*df*), *p*
Null model:	14922	14940	-7457.9	
random intercepts only				
Model 1:	12925	12956	-6457.5	χ^2 (2) = 2000.8,
+ valence				*p* < .001
Model 2:	12918	12961	-6451.8	χ^2 (2) = 11.4,
+ group				*p* = .003
Model 3:	12886	12954	-6431.9	χ^2 (4) = 39.9,
+ valence* group interaction				*p* < .001
Model 4:	12676	12750	-6325.7	χ^2 (1) = 212.2,
+ main effect applicability				*p* < .001
Model 5:	**12669**	**12768**	**-6318.3**	***χ*² (4) = 14.8,**
+ applicability*valence,				***p* = .005**
applicability*group				
Model 6:	12669	12792	-6314.3	χ^2 (4) = 8.0,
+ all three-way interactions				*p* = .090

Supplementary Table 7. Complete neural correlates for group comparisons on contrasts of valence and applicability of feedback, cluster corrected z = 2.3, cluster p < .05. Contrasts without any above threshold clusters are not reported in this table.

Group contrast	Valence contrast	Cluster size	Cluster p-value	Label peak voxels	Voxel test value	MNI coordinates		
					Z	X	Y	Z
HC > BPD	Intermediate	373	0.028	R Lingual gyrus, BA18	3.79	14	-80	-2
				R Occipital fusiform gyrus, BA18	3.73	22	-74	-4

[1] Significance level based on chi-square of full model with valence by group interaction.

				R Intracalcarine cortex	3.27	22	-74	2
	Negative >							
	Positive	365	0.028	L Lateral occipital cortex	4.00	-10	-68	62
				L Superior Parietal Lobule, BA7	3.20	-26	-54	56
				L Superior Parietal Lobule, BA7	3.08	-32	-56	52
				L Lateral occipital cortex, BA7	3.01	-32	-66	56
				L Superior Parietal Lobule	2.98	-30	-56	48
				L Lateral occipital cortex	2.91	-18	-74	58
	Positive >							
	Negative	378	0.023	R Postcentral gyrus, IPLA, BA3	3.33	62	-12	30
				R Parietal operculum cortex, IPLA, BA40	3.28	56	-24	16
				R Supramarginal gyrus, IPLA	3.24	54	-20	30
				R Supramarginal gyrus, TPJa	3.17	56	-42	16
				R Parietal operculum cortex, IPLA, BA40	2.98	60	-26	20
				R Superior temporal gyrus	2.93	70	-36	4
BPD >	Negative*							
HC	Applicability	383	0.022	R Postcentral gyrus, SPLA, IPLB	3.33	36	-30	56
				R Postcentral gyrus, SPLA, BA5	3.13	36	-36	64
				R Postcentral gyrus, IPLB	3.12	40	-28	52
				R Postcentral gyrus, SPLA, BA40	3.10	36	-34	60
				R Precentral gyrus, BA4	2.88	42	-18	58
				R Postcentral gyrus, IPLB, BA40	2.75	48	-32	60
BPD >								
LSE	Negative	794	< .001	L Temporal pole	3.79	-34	16	-26
				L OFC, BA47	3.56	-18	16	-18
				L Temporal pole, Insula, BA13	3.54	-42	8	-14
				L OFC, BA47	3.40	-28	8	-22
				L Subcallosal cortex	3.31	-8	14	-18
				L OFC	3.24	-20	8	-20
		516	0.004	R Insula, BA13	3.69	40	14	-16
				R Temporal pole	3.66	32	14	-30
				R Frontal pole	3.47	30	36	-16
				R Temporal pole, BA47	3.25	36	16	-24
				R OFC	3.13	28	22	-18
				R Temporal pole	3.02	36	18	-32
		440	0.011	R ACC, BA32	3.48	6	14	38
				L Paracingulate gyrus, BA32	3.33	-6	26	34
				R Paracingulate gyrus	3.01	2	34	32
				ACC	2.61	0	26	20
				L Paracingulate gyrus	2.53	-4	36	38
				R Frontal pole	2.49	12	42	40
		342	0.045	R VI, Culmen	3.68	26	-58	-20
				R VI, Declive	3.22	20	-64	-20
				R Lingual gyrus, Vermis VI	3.15	2	-76	-14
				R Lingual gyrus, VI	3.04	10	-74	-16

				R VI	3.00	12	-74	-20
				R Lingual gyrus, VI	2.86	16	-58	-14
	Intermediate	427	0.013	R Cuneus	3.57	8	-80	32
				L Occipital pole	3.40	-4	-96	20
				L Cuneus, Precuneus, BA19	3.23	-4	-80	36
				L Cuneus	3.07	-6	-86	28
				L Occipital pole	3.07	-4	-98	12
				L Cuneus	2.78	-12	-86	32
		333	0.050	R ACC	3.68	4	16	36
				L ACC, BA32	3.59	-6	26	34
				L Paracingulate gyrus	3.03	-4	36	38
				Paracingulate gyrus	2.61	0	32	32
				R Paracingulate gyrus	2.56	8	36	32
	Positive	1834	< .001	L Temporal pole	4.00	-24	8	-20
				L Insula, BA13	3.89	-40	8	-14
				L OFC, BA34	3.81	-18	6	-18
				R Central opercular cortex	3.71	52	6	2
				L Temporal pole, Parahippocampal gyrus	3.60	-30	2	-22
				L Central opercular cortex	3.58	-48	8	-2
	Negative > Positive	331	0.046	L Precuneus	3.33	-16	-62	24
				L Cuneus	3.30	-12	-82	26
				L Lateral occipital cortex	3.18	-24	-78	32
				L Precuneus, BA31	3.06	-4	-74	34
				L Cuneus	2.96	-20	-68	28
				L Precuneus, BA7	2.94	-8	-72	36
	Intermediate* Applicability	793	<.001	L Paracingulate gyrus	3.54	-10	42	26
				L Frontal pole, BA9	3.33	-2	58	22
				L Superior frontal gyrus	3.32	-8	54	30
				L Superior frontal gyrus, BA9	3.26	-4	52	28
				R Frontal pole	3.19	4	60	26
				R Paracingulate gyrus	3.17	10	54	14
LSE > BPD	Positive > Intermediate	458	0.007	L Lateral occipital cortex	3.24	-38	-66	34
				L Lateral occipital cortex	3.22	-46	-72	18
				L Lateral occipital cortex	3.22	-38	-78	24
				L Lateral occipital cortex	3.20	-32	-74	24
				L Lateral occipital cortex, BA39	3.09	-46	-70	14
				L Lateral occipital cortex	3.00	-42	-64	14
HC > LSE	Negative	354	0.038	R Lingual gyrus, VI, Declive	3.51	12	-72	-16
				R V	3.47	14	-58	-14
				R Lingual gyrus	3.22	2	-74	-2
				R Lingual gyrus	2.95	16	-72	-6
				L Lingual gyrus	2.67	-6	-72	6
				R Intracalcarine cortex	2.47	20	-70	2

	342	0.045	R OFC	3.89	44	18	-10
			R OFC	3.40	28	20	-18
			R Insula	2.99	44	6	-6
			R OFC, Insula, BA13	2.95	38	24	-4
			R Temporal pole	2.90	48	10	-12
			R Insula	2.77	32	10	-6
Intermediate	335	0.048	R Lingual gyrus, VI, Declive	3.61	14	-70	-14
			R Lingual gyrus	3.14	16	-70	-6
			R Lingual gyrus	3.00	8	-72	-4
			R Lingual gyrus, VI	3.00	20	-62	-12
			R Lingual gyrus	2.94	2	-74	-2
			R Lingual gyrus, BA18	2.77	-6	-76	2
Positive	1265	< .001	R Insula	3.62	42	-8	2
			R Insula	3.61	38	-8	-2
			R Central opercular cortex	3.54	52	4	0
			R Temporal pole	3.53	46	10	-14
			R Putamen	3.53	24	0	-6
			R Amygdala	3.46	24	2	-14
	778	< .001	L Lingual gyrus	4.08	-4	-74	-8
			L Lingual gyrus	3.76	0	-72	0
			R Occipital fusiform gyrus, Lingual gyrus	3.65	22	-64	-12
			L Lingual gyrus	3.57	-2	-68	0
			L Lingual gyrus, V	3.54	-10	-62	-8
			L Lingual gyrus	3.43	-2	-72	-4
	761	< .001	R ACC	3.94	6	-10	42
			R PCC	3.81	8	-18	44
			L Precuneus	3.65	-10	-42	48
			R Precentral gyrus	3.49	14	-18	44
			R Juxtapositional lobule	3.45	12	-12	52
			L ACC, BA24	3.42	-2	0	46
	453	0.008	R Thalamus	3.42	4	-22	-4
			R Hippocampus	3.20	28	-24	-14
			L Thalamus	3.18	-6	-22	-2
			R Hippocampus	3.17	28	-28	-14
			L Thalamus	3.10	-12	-24	6
			R Parahippocampal gyrus	3.05	20	-26	-16
	342	0.040	L Temporal fusiform cortex	3.40	-34	-26	-22
			L Middle temporal gyrus	3.32	-66	-16	-14
			L Middle temporal gyrus, BA20	3.30	-54	-10	-24
			L Middle temporal gyrus,	3.06	-52	-2	-28
			L Middle temporal gyrus, BA21	3.04	-66	-20	-10
			L Middle temporal gyrus, BA21	3.04	-68	-26	-10
Applicability	554	0.002	L Lateral occipital cortex, BA39	3.67	-52	-64	32
			L Lateral occipital cortex, BA39	3.65	-52	-64	28
			L Lateral occipital cortex, BA39	3.41	-52	-68	24

				L Angular gyrus, BA39	3.23	-48	-60	22
				L Angular gyrus, BA22	3.21	-58	-58	18
				L Lateral occipital cortex, BA39	3.19	-50	-68	36
	Positive* Applicability	554	0.002	L Supramarginal gyrus, BA40	3.59	-62	-44	26
				L Supramarginal gyrus	3.56	-62	-46	30
				L Supramarginal gyrus, Angular gyrus	3.42	-60	-52	24
				L Lateral occipital cortex	3.39	-46	-72	20
				L Lateral occipital cortex	3.32	-50	-68	22
				L Lateral occipital cortex	3.17	-38	-70	12
LSE > HC	Positive	405	0.016	-	3.78	-26	-4	30
				-	3.08	-22	-22	30
				L Middle frontal gyrus	3.07	-32	0	40
				L Cingulate gyrus	3.03	-18	-16	36
				L Superior frontal gyrus	2.96	-24	-2	42
				L Pallidum	2.80	-18	-4	2