

Comorbid depression and anxiety: *Is the whole more than the sum of its parts?*

A neuroimaging perspective

Marie-José van Tol, PhD

Neuroimaging Center, University Medical Center Groningen

University of Groningen

The Netherlands

m.j.van.tol@umcg.nl



umcg

NEGDA

Nederlandse Studie naar Depressie en Angst

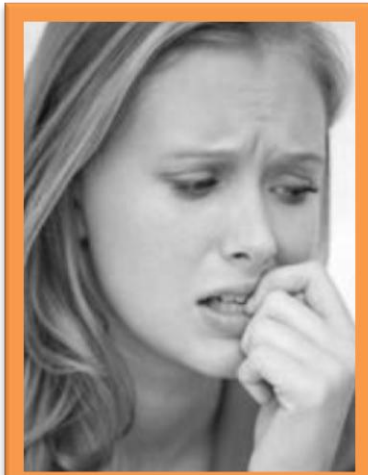
No conflicting interests

Networks

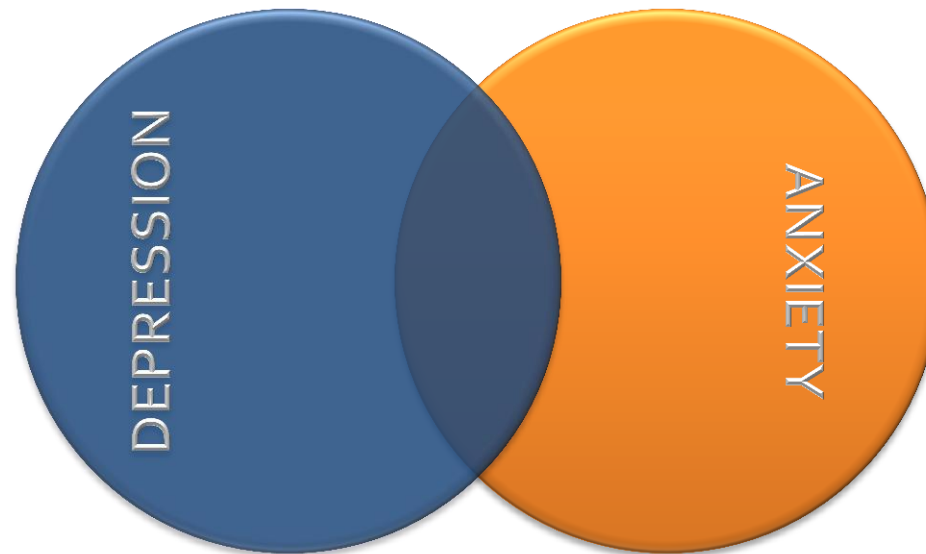
NEUROIMAGING CENTER GRONINGEN



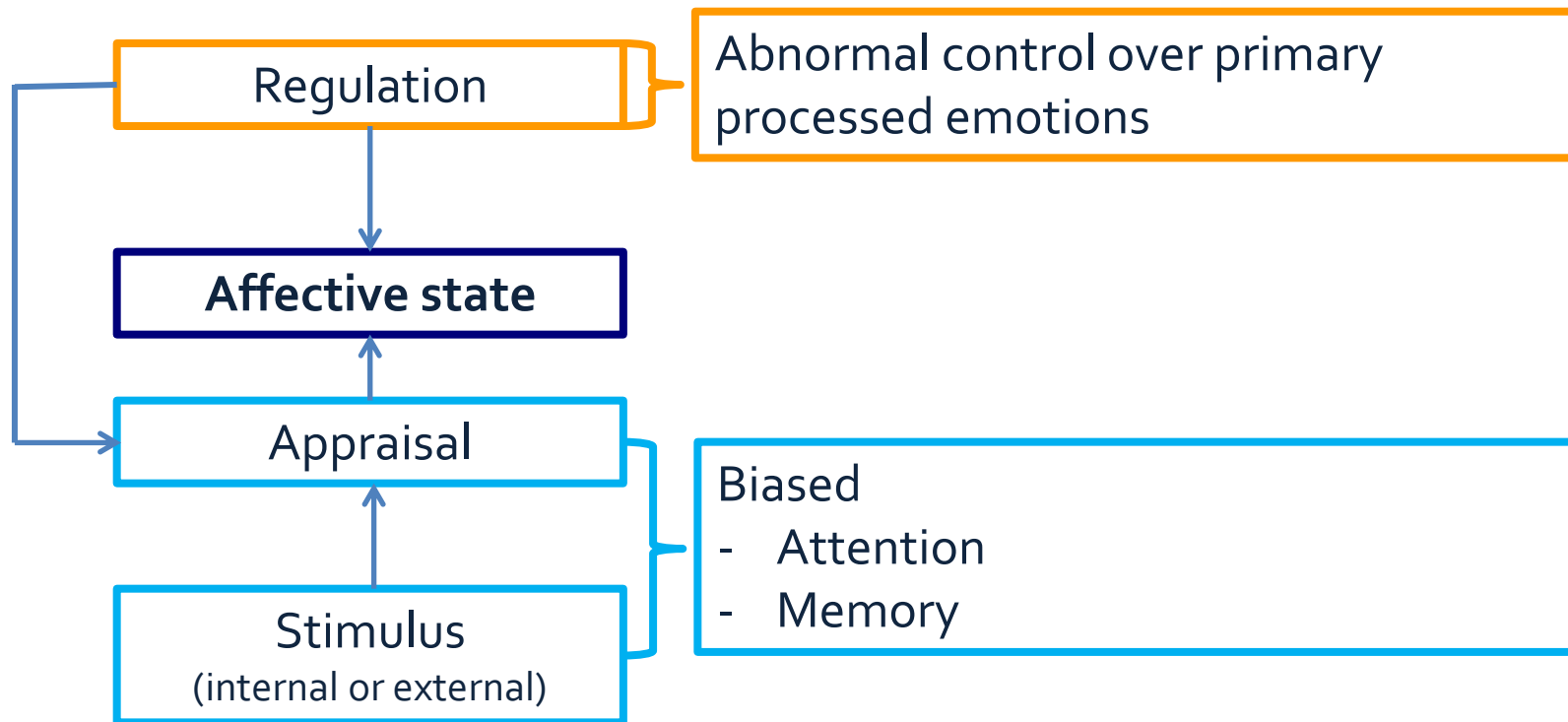
Depression & Anxiety



Depression & Anxiety



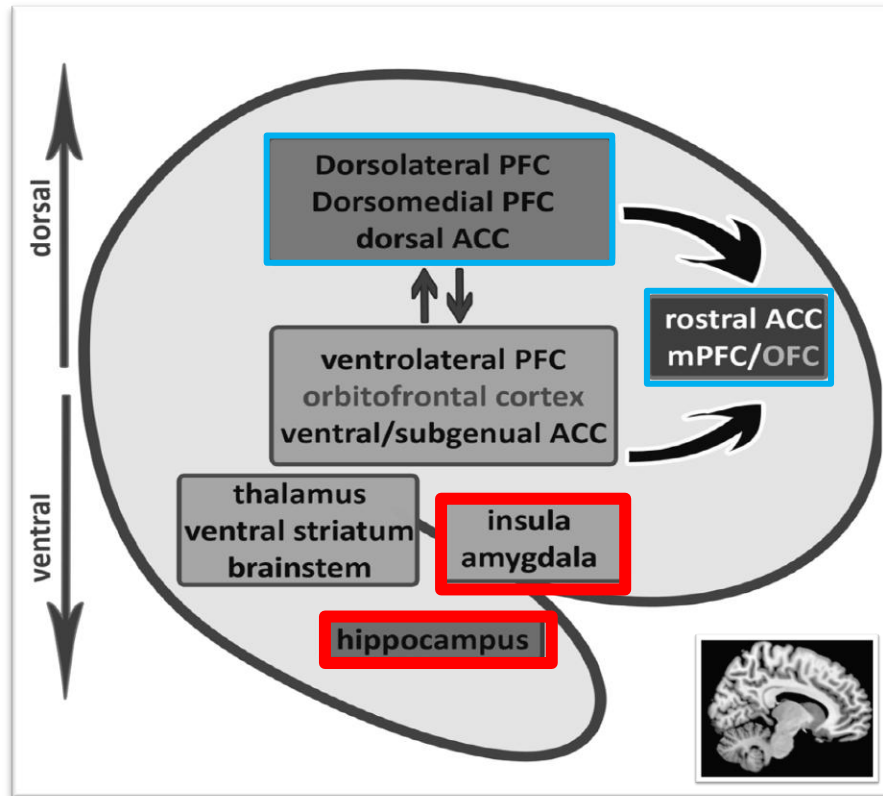
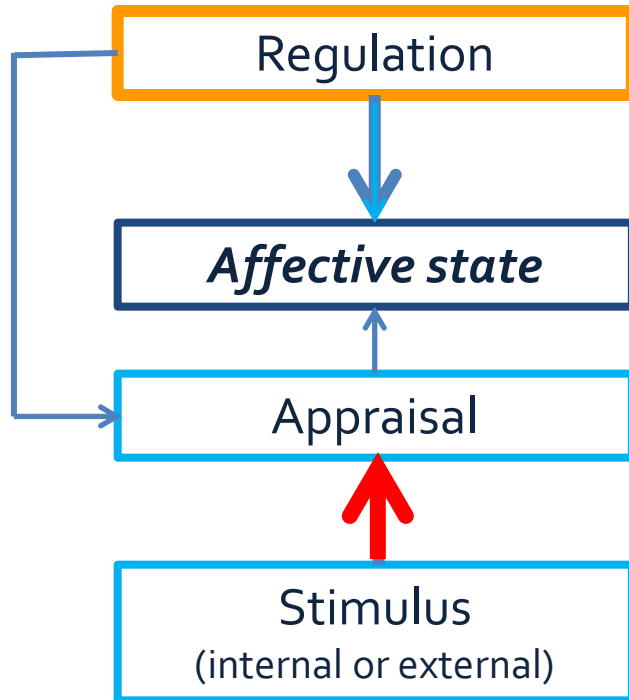
Proposed mechanism of vulnerability



Disner et al., 2010
Peckham et al. 2010
Armstrong & Olatunji, 2012
Bar-Haim et al., 2007

Proposed mechanisms

NEUROIMAGING CENTER GRONINGEN



Adapted from M.L. Phillips et al., 2003 & H. Mayberg, 1997.

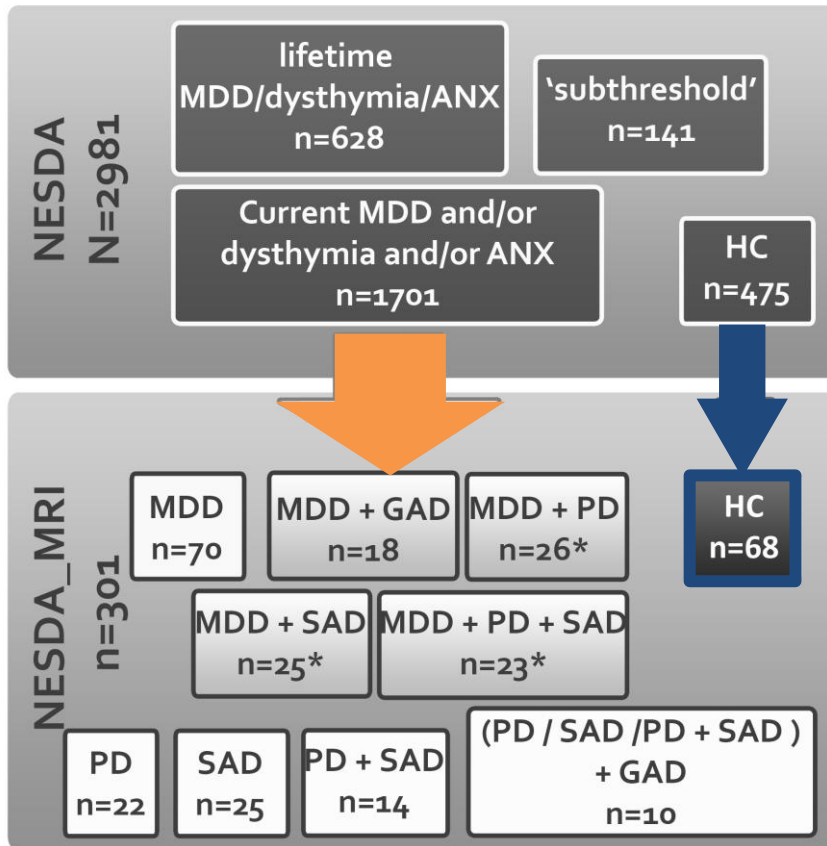
Supported by

D. Arnone et al. 2012, structural meta-analysis

J.P. Hamilton et al. 2012, functional meta-analysis

NESDA NeuroImaging study

NEUROIMAGING CENTER GRONINGEN



N=70

MDD

N= 82

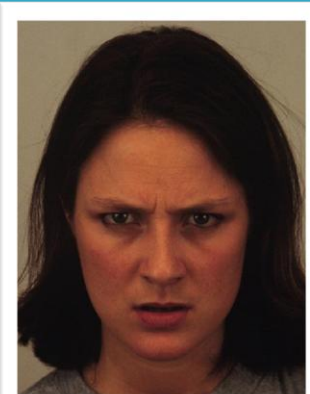
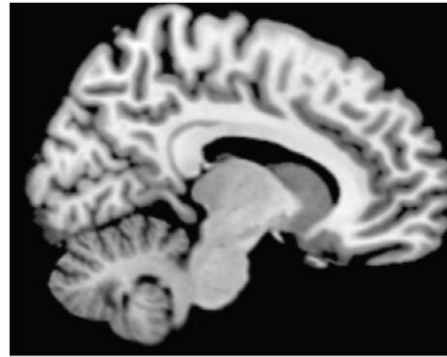
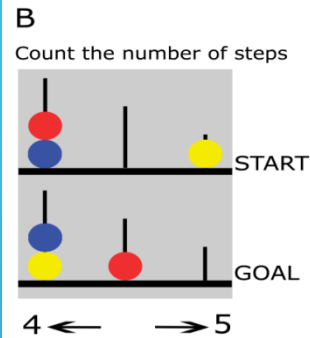
MDD +
ANX

N=71

ANX

NESDA NeuroImaging study

NEUROIMAGING CENTER GRONINGEN



party

<< negative << neutral >> positive >>

HC

MDD

MDD +
ANX

ANX

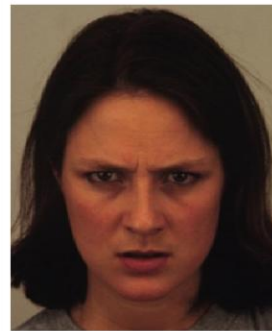
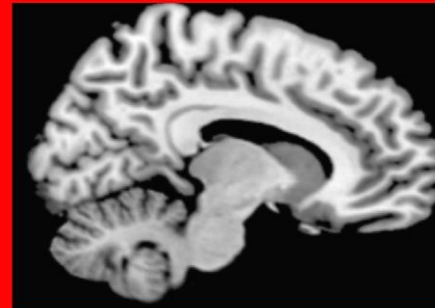
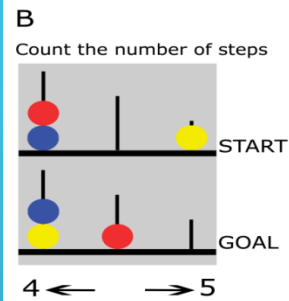
Baseline

2-year follow-up



Volumetry

NEUROIMAGING CENTER GRONINGEN



party

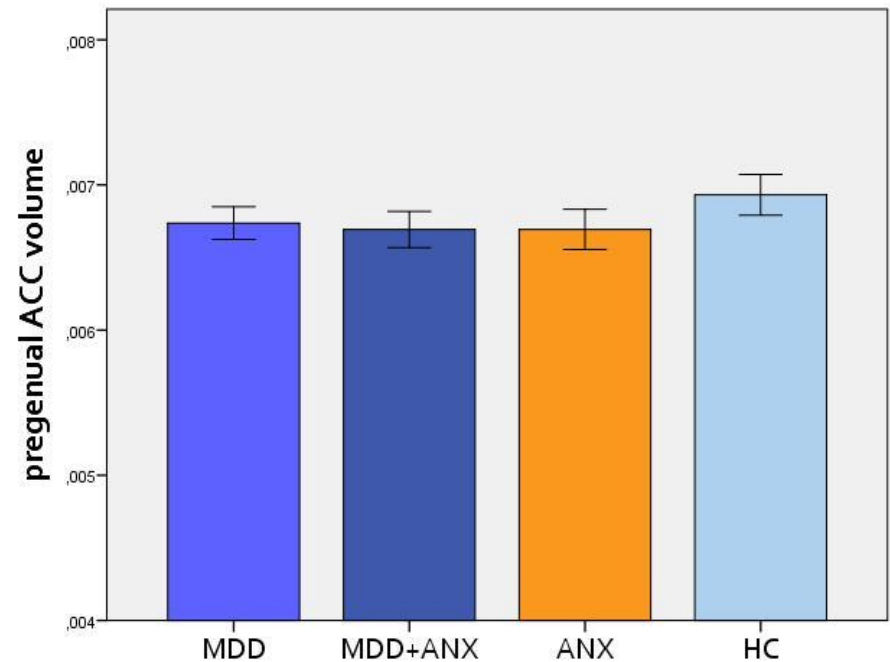
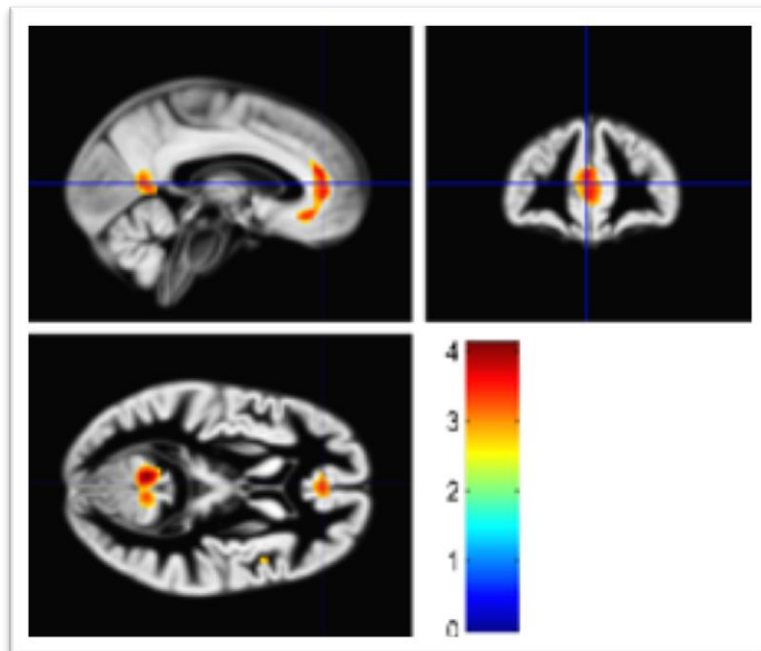
<< negative

<<neutral>>

positive>>

All patients < Healthy Controls

NEUROIMAGING CENTER GRONINGEN



Van Tol et al. 2010, Arch Gen Psychiatry

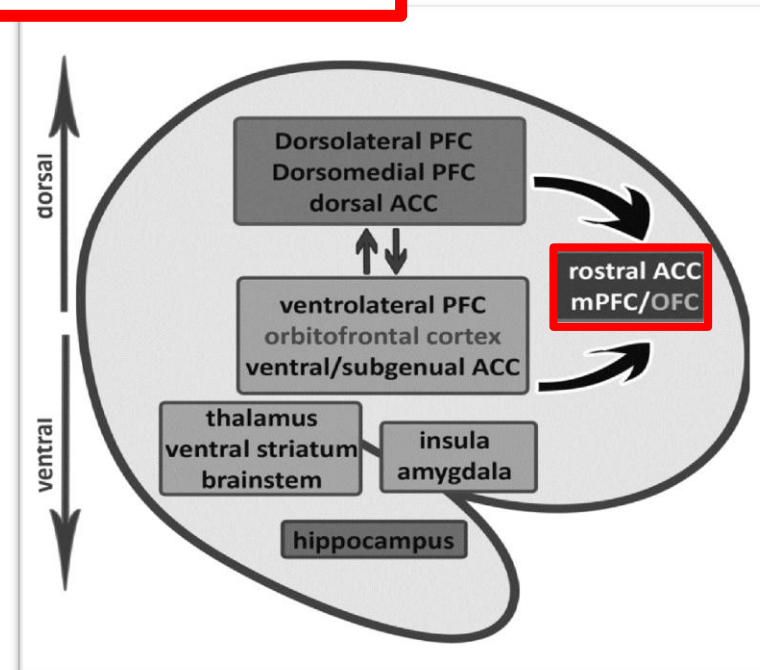
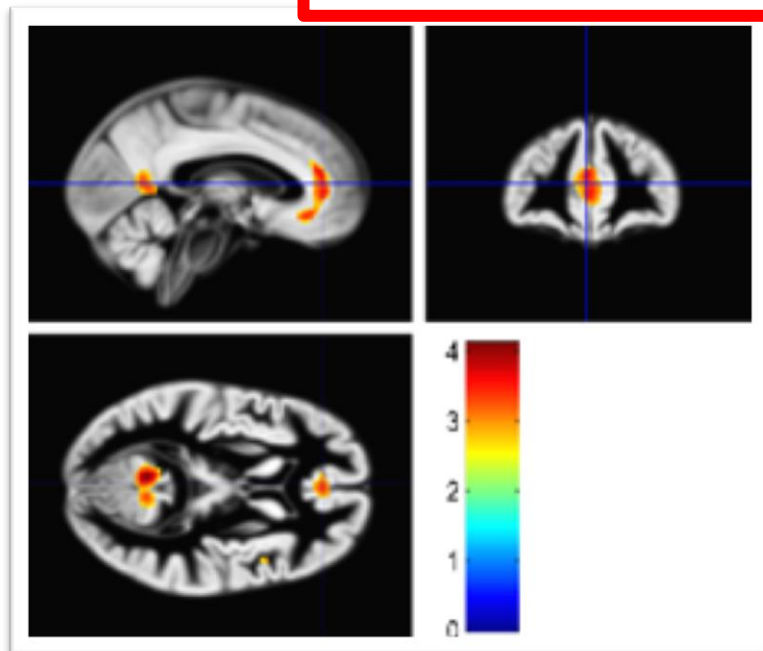
All patients < Healthy Controls

NEUROIMAGING CENTER GRONINGEN



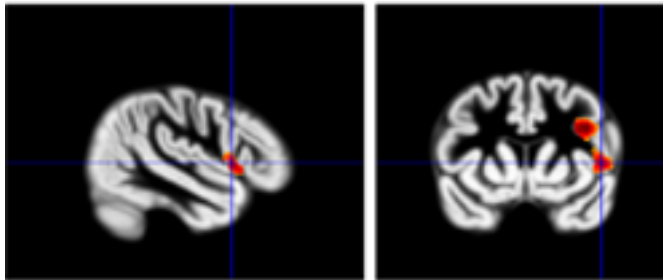
No effects of:

- depression severity
- anxiety severity
- duration & onset of disorder
- medication use

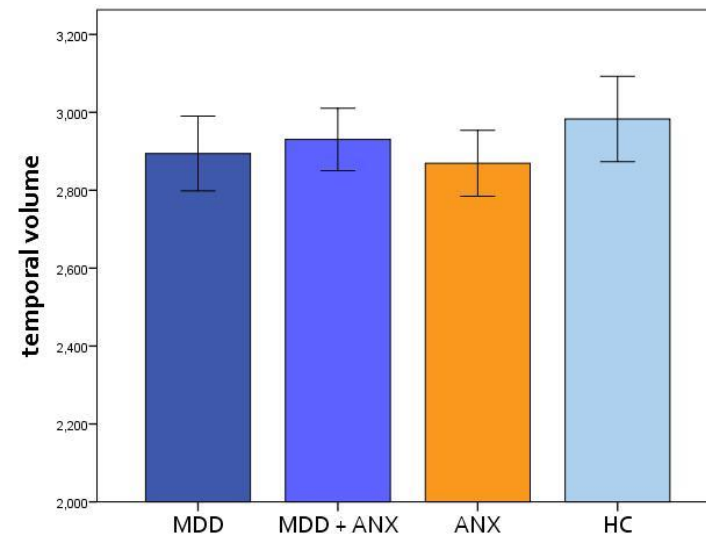
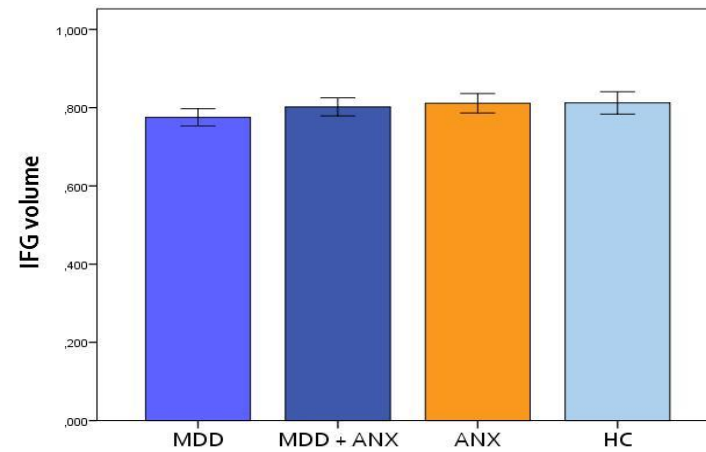
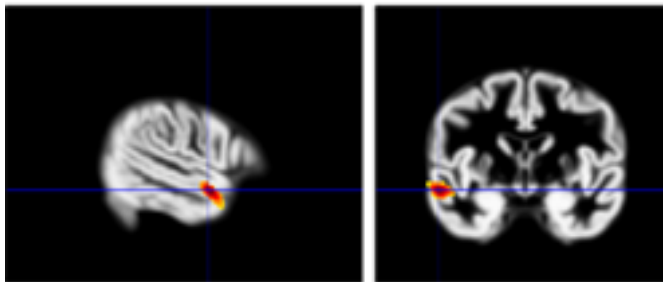


Specific effects

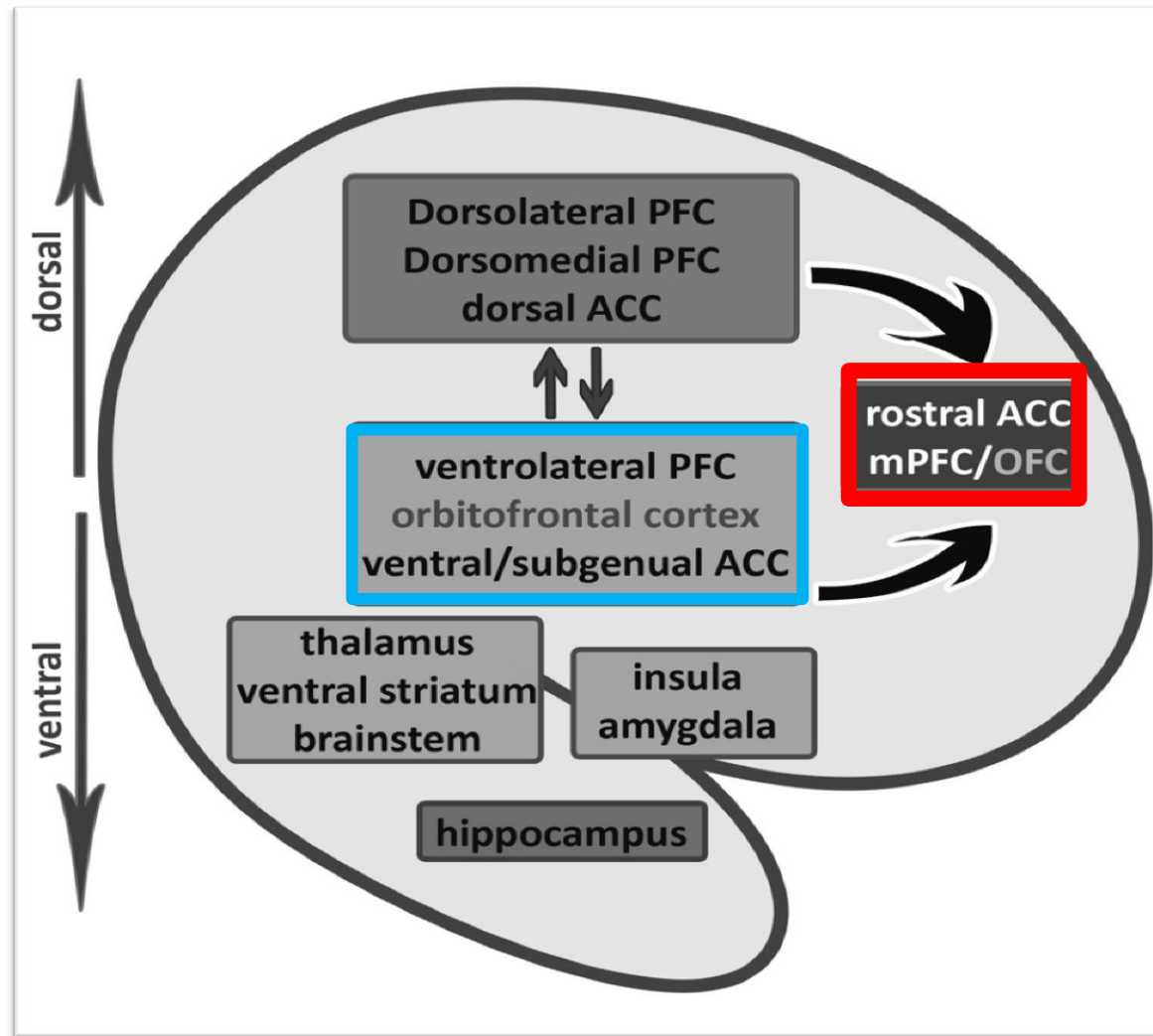
depression



anxiety



Summary: volume abnormalities



Emotional word memory

NEUROIMAGING CENTER GRONINGEN



B
Count the number of steps

START

GOAL

4 ← → 5

party

<< negative <<neutral>> positive>>

party

<< negative

<<neutral>>

positive>>

tumor

<< not seen

<<doubt>>

seen>>

tumor

<< negative

<<neutral>>

positive>>

birthday

<< not seen

<<doubt>>

seen>>

Biased behavior?

NEUROIMAGING CENTER GRONINGEN



- Patients classified less words as positive
 - Patients take longer time to classify positive words
- > strongest effects in MDD patients

All patients < Healthy Controls

No effects of:

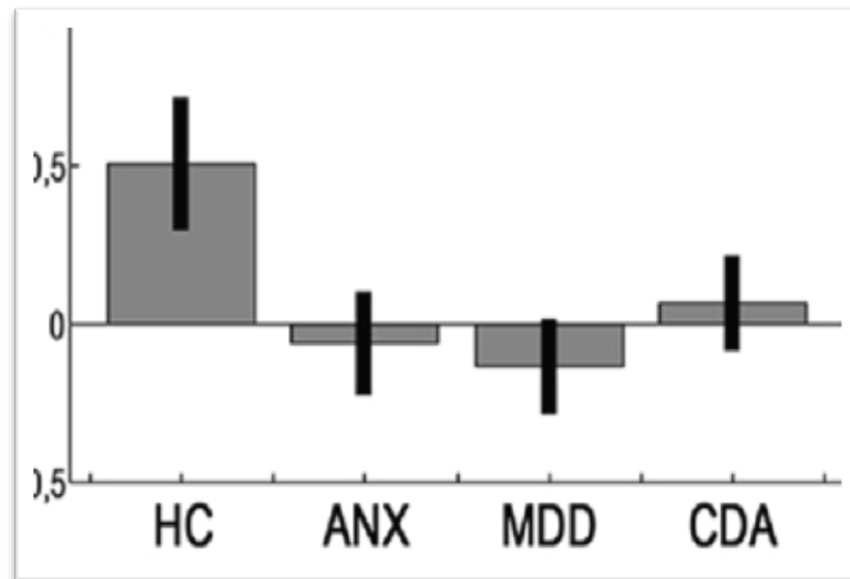
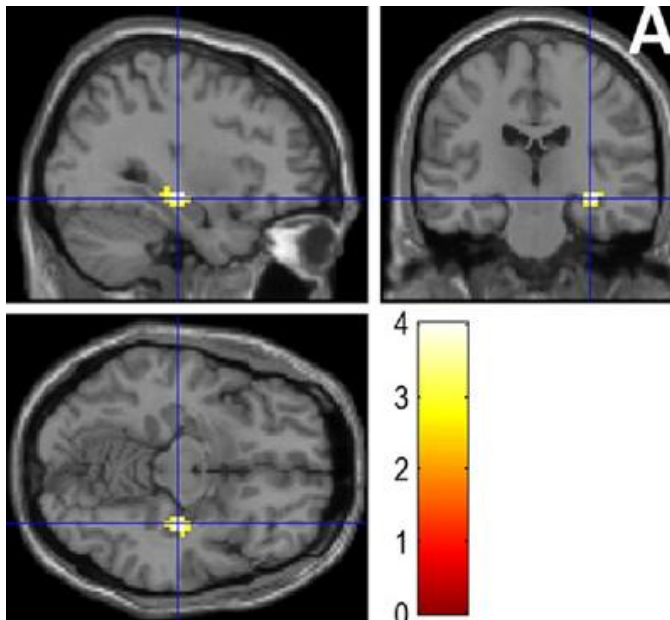
- depression severity
- anxiety severity
- duration & onset of disorder
- medication use

party

<< negative

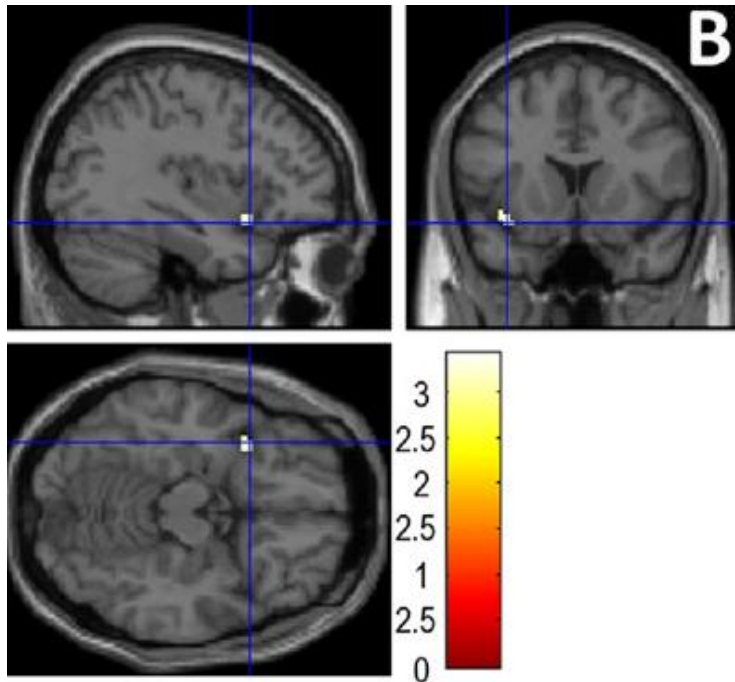
<< neutral >>

positive >>



Specific to depression

NEUROIMAGING CENTER GRONINGEN



tumor

<< negative

<<neutral>>

positive>>

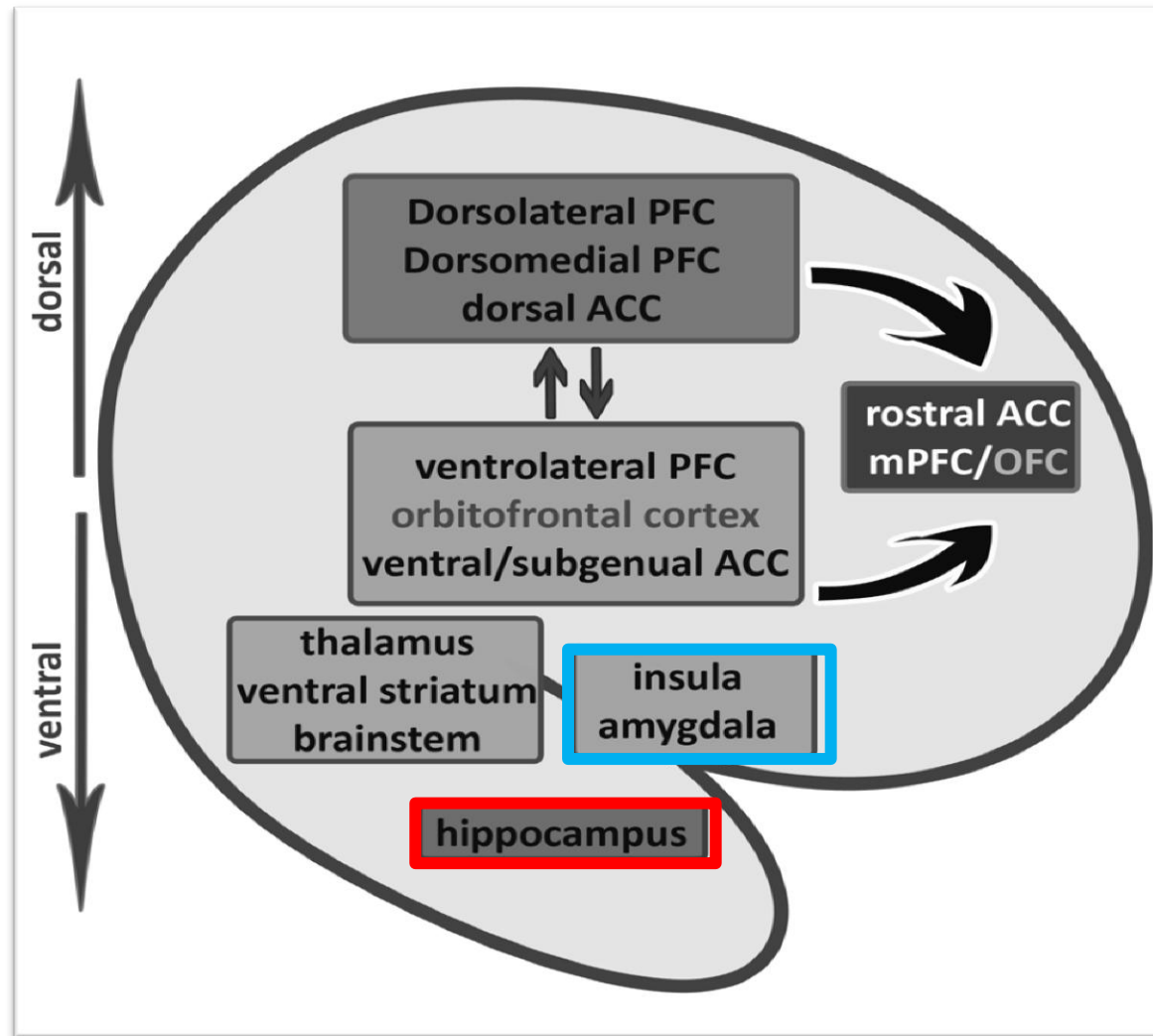
Primary emotional effects are depression severity dependent



umcg

Summary: emotional memory

NEUROIMAGING CENTER GRONINGEN



COMMON

MDD
SPECIFIC

Cognitive control

NEUROIMAGING CENTER GRONINGEN



B
Count the number of steps

START

GOAL

4 ← → 5

party

<< negative <<neutral>> positive>>

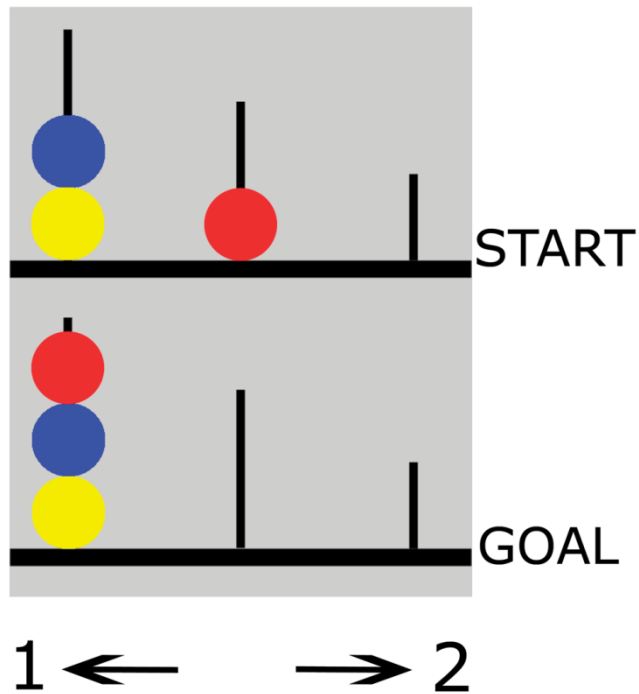
Cognitive control

NEUROIMAGING CENTER GRONINGEN



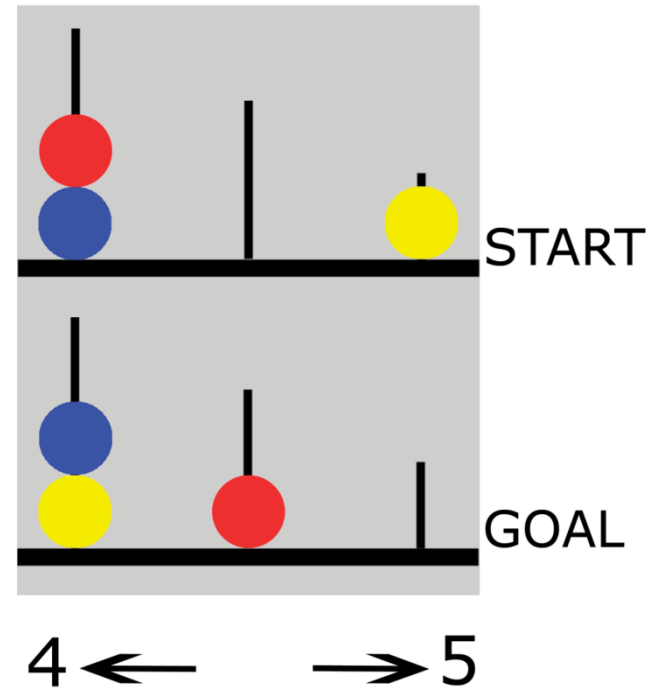
A

Count the number of steps



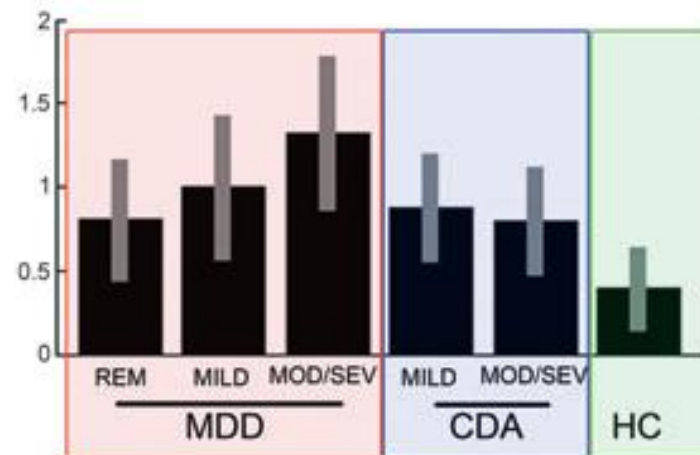
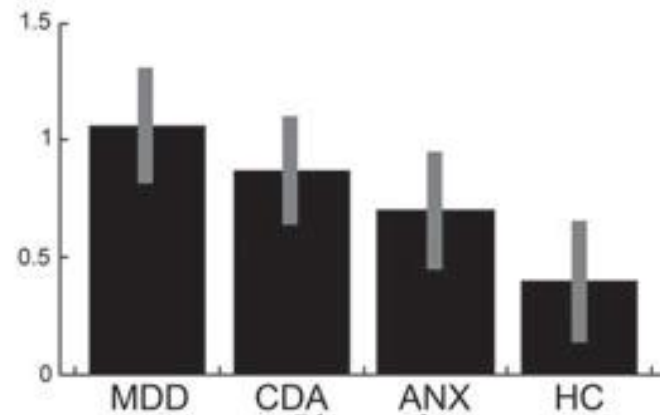
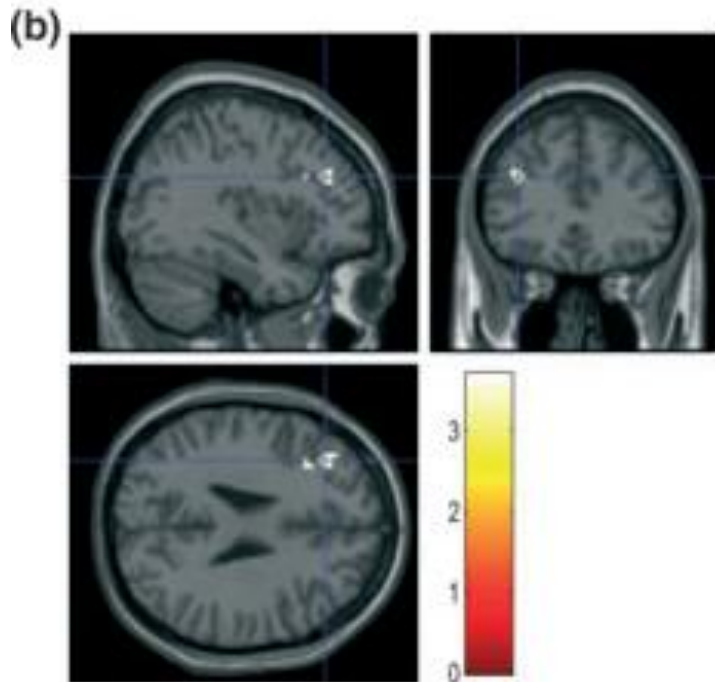
B

Count the number of steps

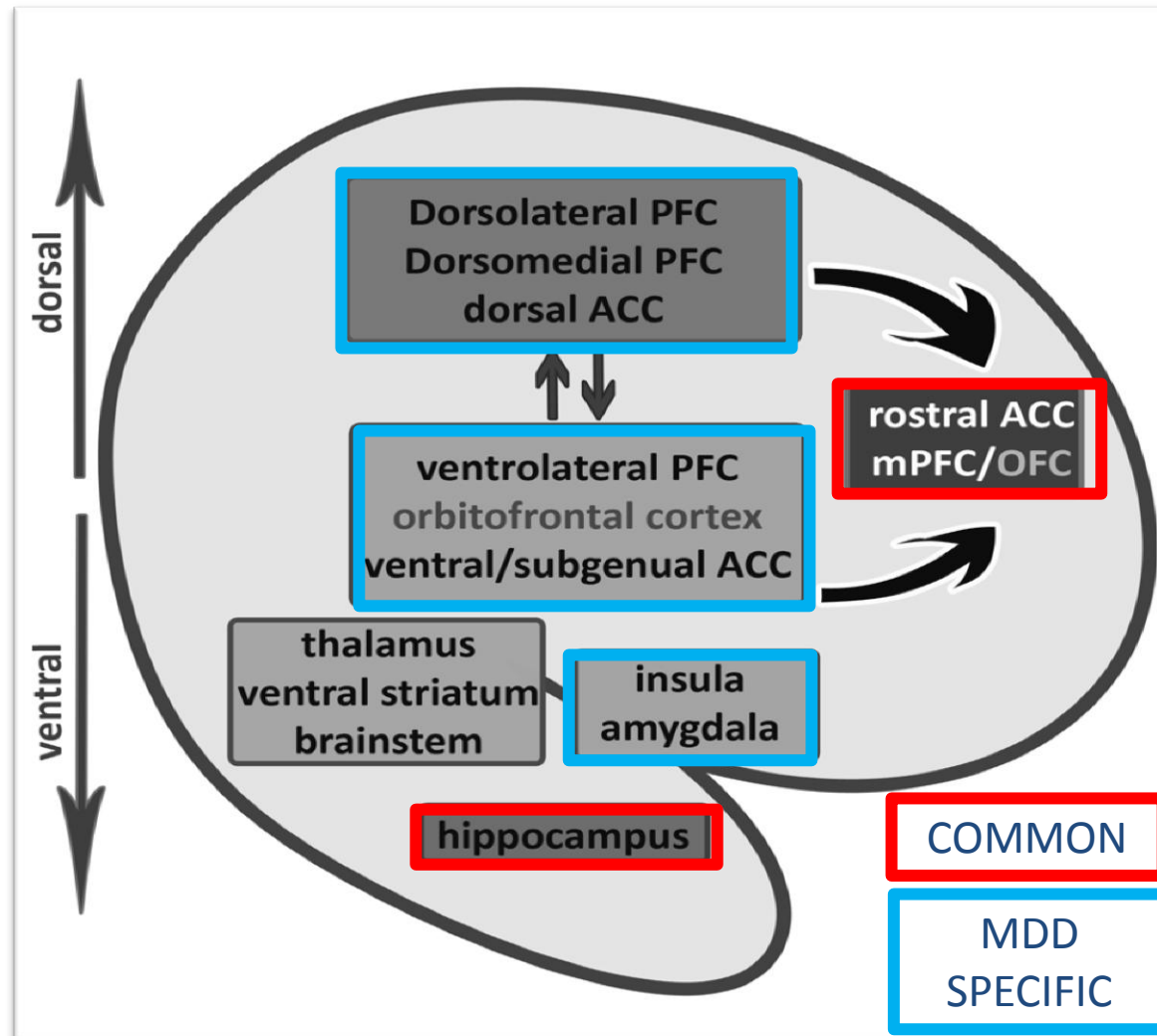


Depression specific effect

NEUROIMAGING CENTER GRONINGEN



Summary of results



Is the whole more

NEUROIMAGING CENTER GRONINGEN



MDD patients are vulnerable for abnormal emotion regulation on 'both sides': primary emotion processing and regulation capacities;

Patients with primarily anxiety disorders do share abnormalities in the region responsible for integration and positive memory encoding, but no specific effects;

Contrary to expectations and clinical characteristics: Brain abnormalities are not more abnormal in patients with both depression and anxiety, but seem partly dependent on depression severity

Discussion

NEUROIMAGING CENTER GRONINGEN



- No effects of medication use
- For negative emotion processing and cognitive functioning in patients with depression: severity matters
- For structure and positive processing, severity does not matter
- Anxiety severity did not largely affect results, nor did anxious component of depressive symptomatology

Tasks not sensitive enough to anxiety?

Severity ranges from remitted to severely anxious/depressed

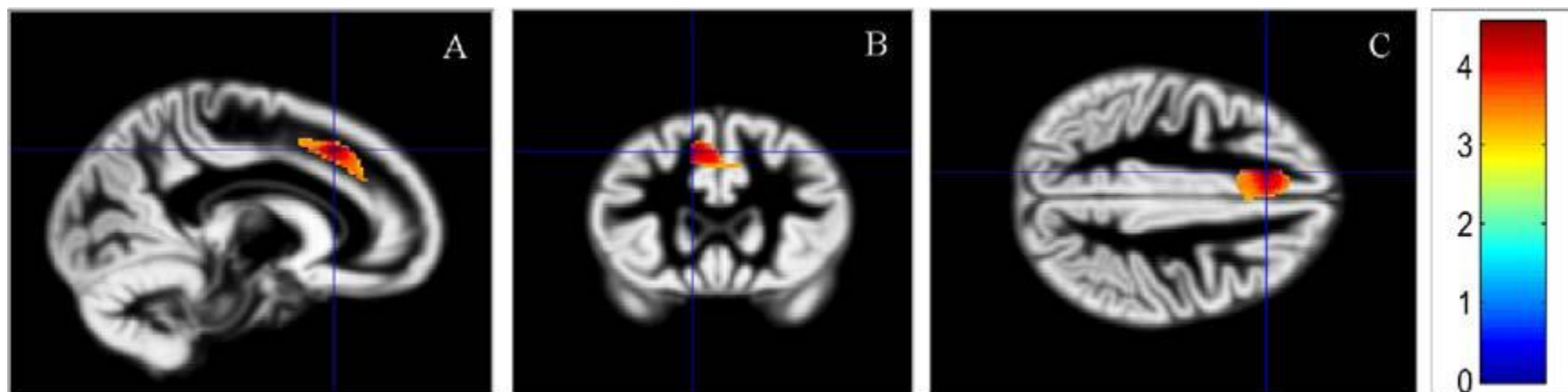
--> Too mild?

Other factors?

NEUROIMAGING CENTER GRONINGEN



Childhood emotional maltreatment affected patients and controls similarly



Van Harmelen & van Tol et al., 2010, Biol Psychiatry
Van Harmelen, van Tol et al., 2014, SCAN



Thank you for your attention!

Thanks to:

NEUROIMAGING CENTER GRONINGEN

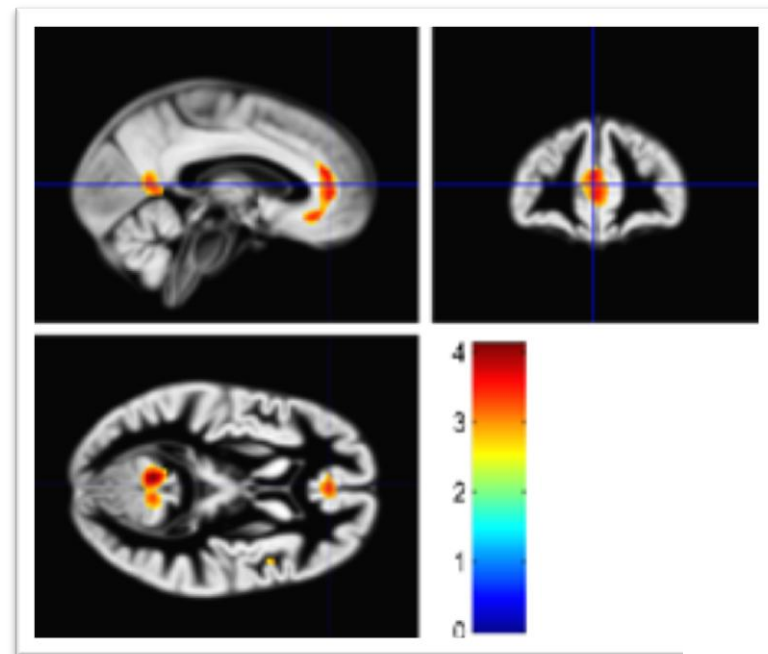
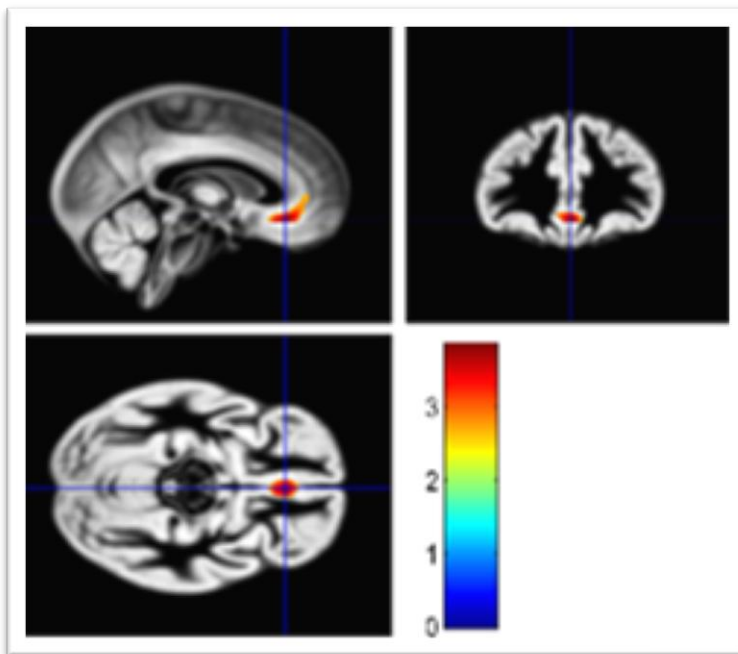




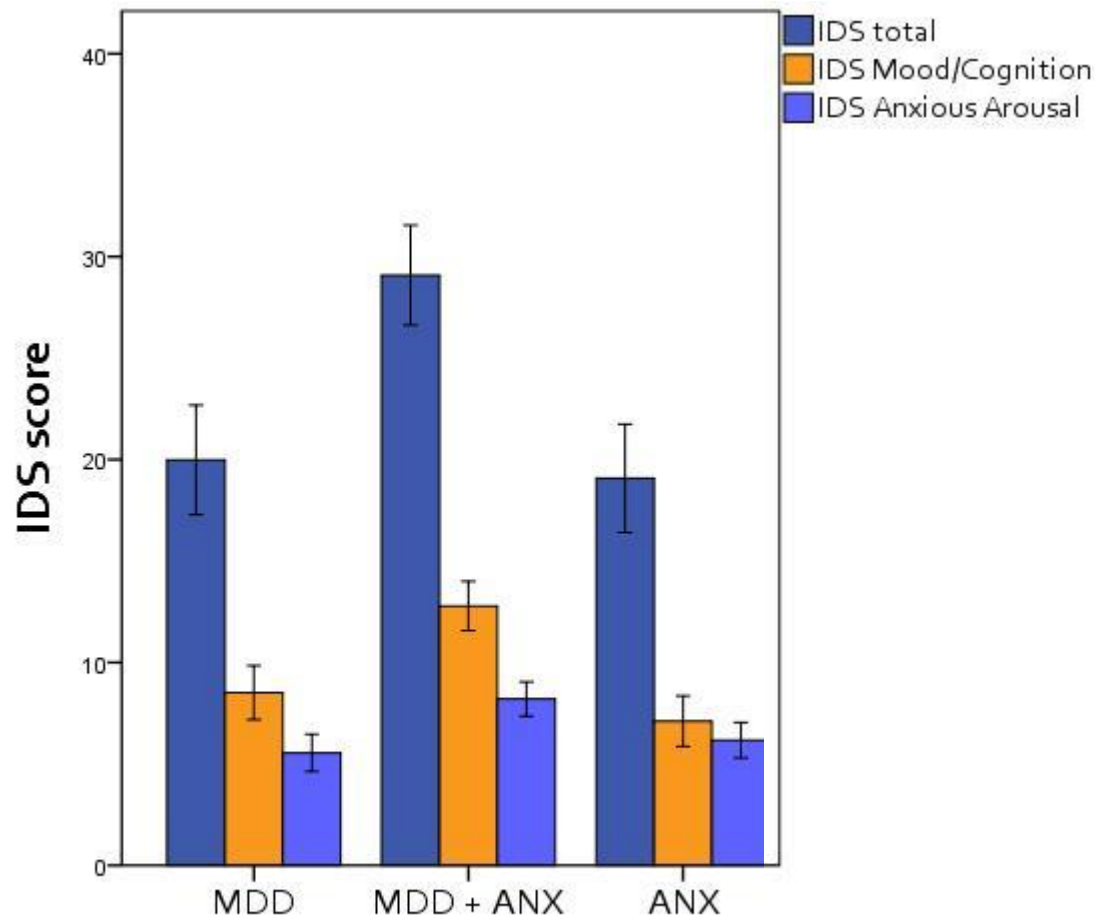


Early onset MDD <18 vs. late onset MDD

Independent of comorbid anxiety or current severity



Dimensions of Depression & Anxiety



Clinical characteristics of the total sample (N=289)

		MDD	CDA	ANX	HC	<i>p</i>
N		68	88	68	65	
gender	male/female; N	24/44	29/59	18/50	24/41	.59
scan site	amc/lumc/umcg; N	18/26/24	28/35/25	21/20/27	27/26/12	.97
handedness	left/right; N	6/62	6/82	5/63	5/60	.14
SSRI use	yes/no; N	18/50	40/48	21/47	0/65	.03
age	in years; mean \pm sd	37.16 \pm 10.24	37.27 \pm 10.64	35.96 \pm 9.45	40.54 \pm 9.71	.07
education	in years; mean \pm sd	12.67 \pm 2.91	11.62 \pm 3.13	13.11 \pm 3.21	14.28 \pm 2.86	<.001
MADRS	total score; mean \pm sd	13.01 \pm 9.18	19.94 \pm 9.16	10.93 \pm 8.66	1.05 \pm 1.86	<.001
	range	0 – 39	0 – 49	0 – 35	0 – 7	
	rem/mild/mod_sev; N	24/25/19	9/35/43	-	-	<.001
IDS T1	total score; mean \pm sd	27.68 \pm 9.96	33.02 \pm 11.51	22.79 \pm 11.91	5.14 \pm 3.51	<.001
IDS T2	total score; mean \pm sd	19.85 \pm 11.86	29.49 \pm 11.16	19.26 \pm 10.81	3.79 \pm 3.58	<.001
	range	1 – 57	5 – 57	4 – 49	0 – 17	
BAI T1	total score; mean \pm sd	11.68 \pm 8.86	18.41 \pm 9.10	15.22 \pm 9.9	1.89 \pm 3.11	<.001
BAI T2	total score; mean \pm sd	8.95 \pm 8.2	18.23 \pm 8.97	14.12 \pm 9.60	2.19 \pm 2.57	<.001
	range	0 – 50	1 – 46	0 – 42	0 – 10	
FQ	total score; mean \pm sd	21.1 \pm 15.39	36.35 \pm 19.09	37.17 \pm 20.48	9.05 \pm 7.71	<.001
	range	0 – 79	6 – 88	3 – 84	0 – 29	
interval	in days; mean \pm sd	71.4 \pm 59.1	57.9 \pm 49.5	69.9 \pm 33.2	63.7 \pm 28.8	.22
recurrence MDD	single/recurrent episode; N	29/39	39/49	-	-	