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Brain mechanisms underlying social dysfunction in borderline personality disorder and other trauma- associated mental disorders

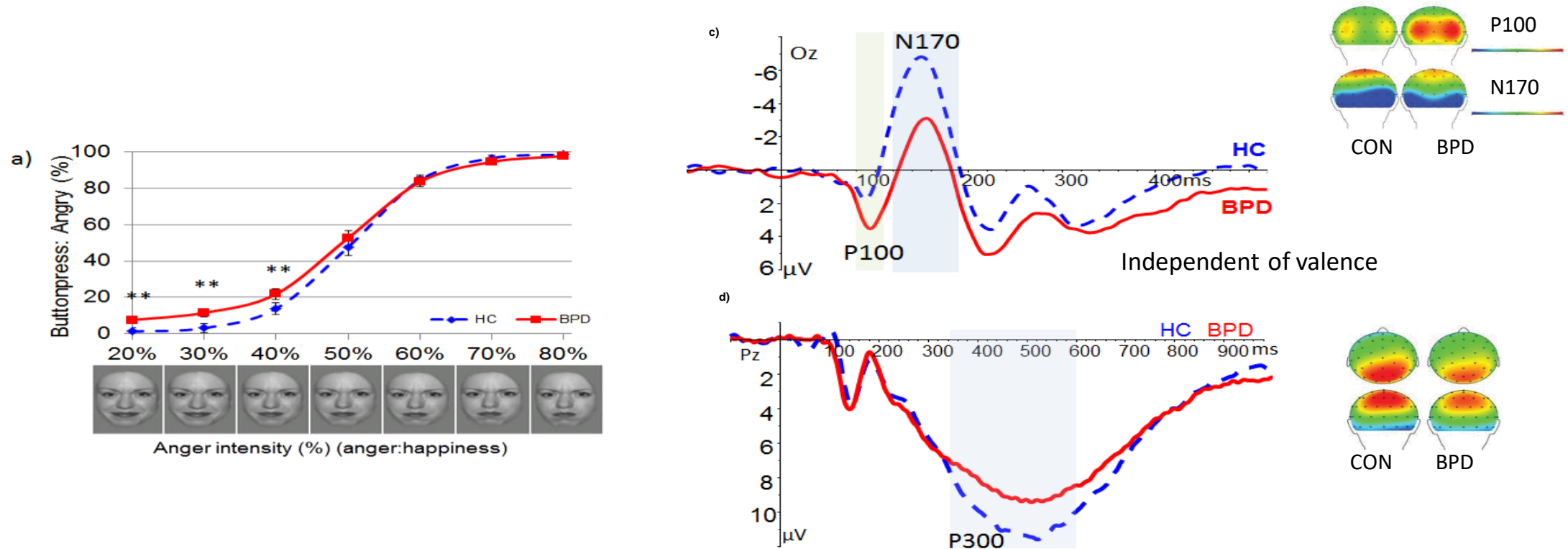
Sabine C. Herpertz, Heidelberg

BIGSPD Conference 2023 in Glasgow

Interpersonal Functional Impairments in Borderline Personality Disorder

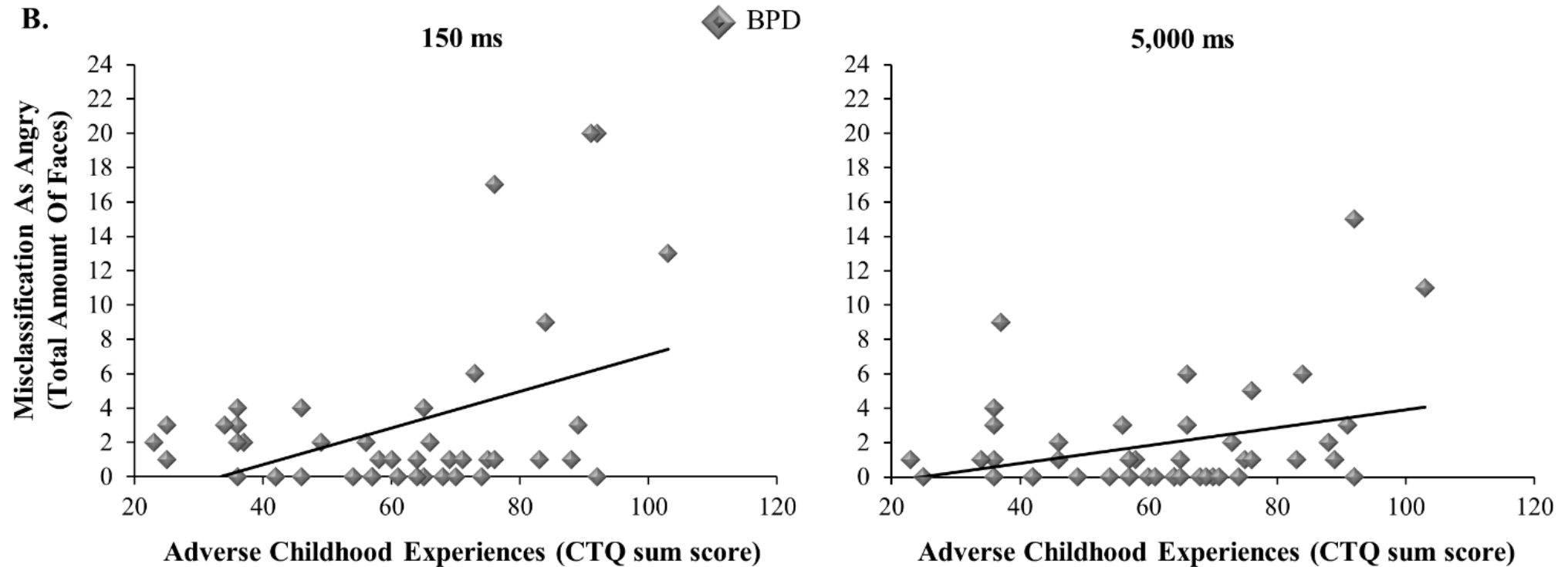
- Hypersensitivity to social threat
 - Tendency to feel belittled or insulted
 - Distorted perception of others, attentional negativity bias, distrust
- Negative affectivity and affect dysregulation in the interpersonal realm
 - Affective lability and poor ability to regulate
 - Frequent or persistent irritability and anger
 - Self-injury as a maladaptive regulatory strategy
 - Reactive aggression
 - Worsening of affect dysregulation under stressful conditions
- Difficulties in social cognition
 - Deficits in the correct interpretation of emotions and intentions of others
 - "Hypermentalization": going in circles, rigid, distorted inferences about mental states of others

Perceptual Biased Distortion of Social Cues in BPD



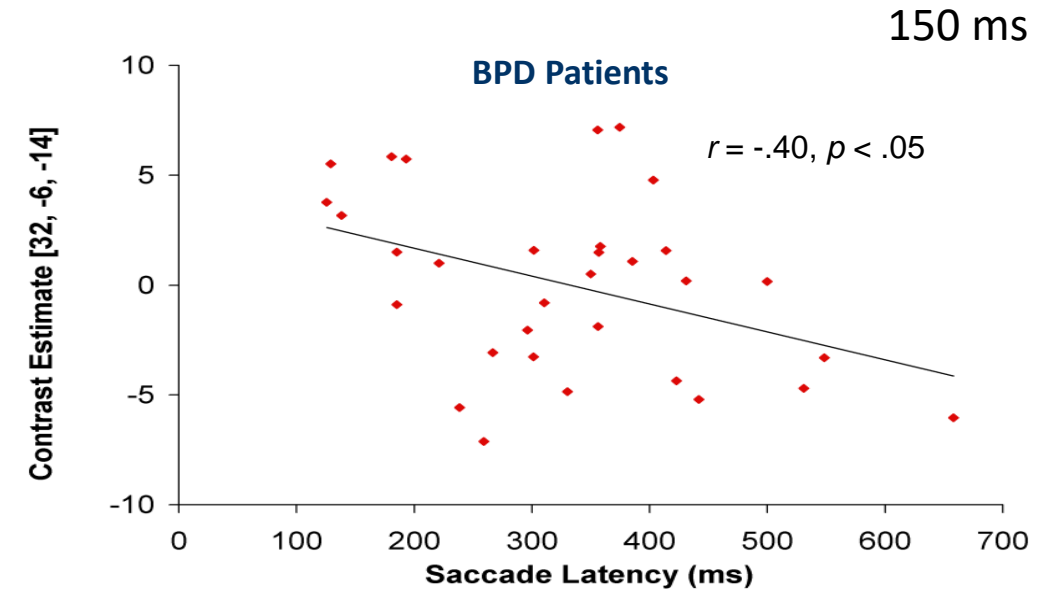
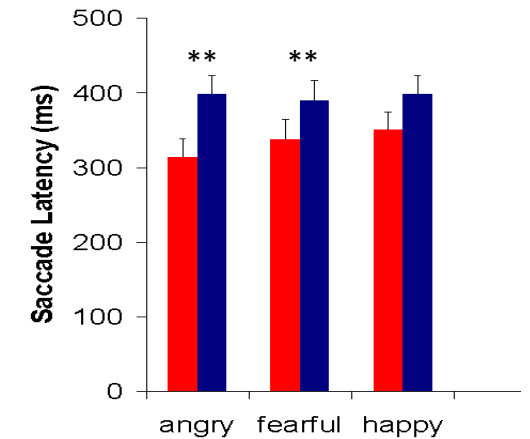
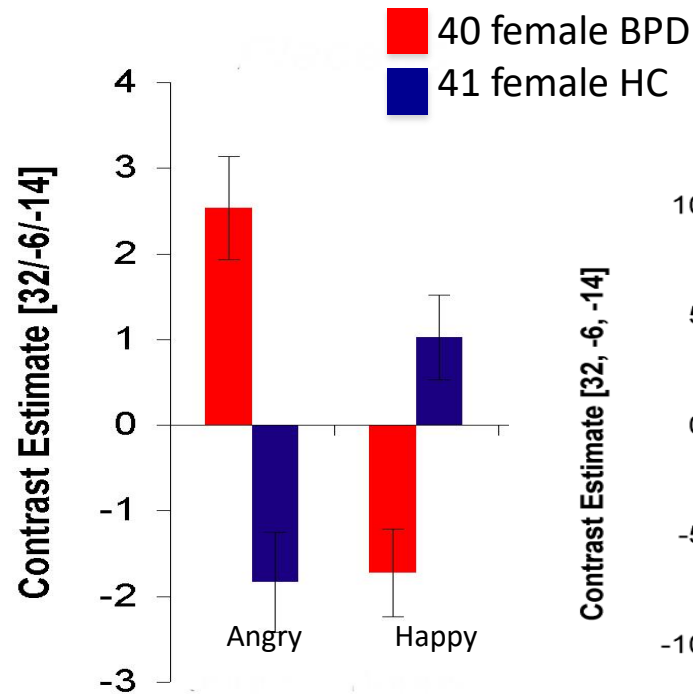
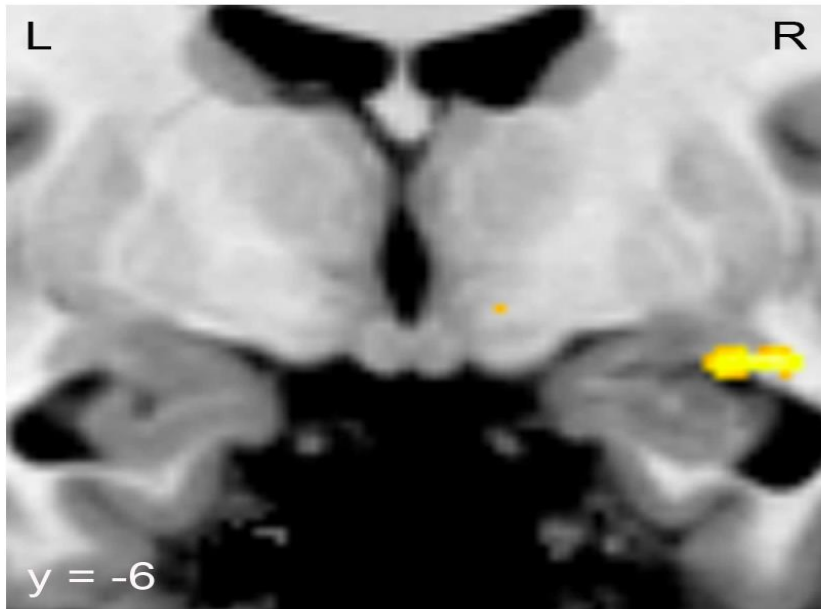
- ➔ Early automatic (extra-)striatal hyperresponsivity (P100), visual cortex
- ➔ Subsequent deficits in structural (N170) and categorical (P300) emotional face processing

Facial Recognition Bias and Early Trauma in BPD



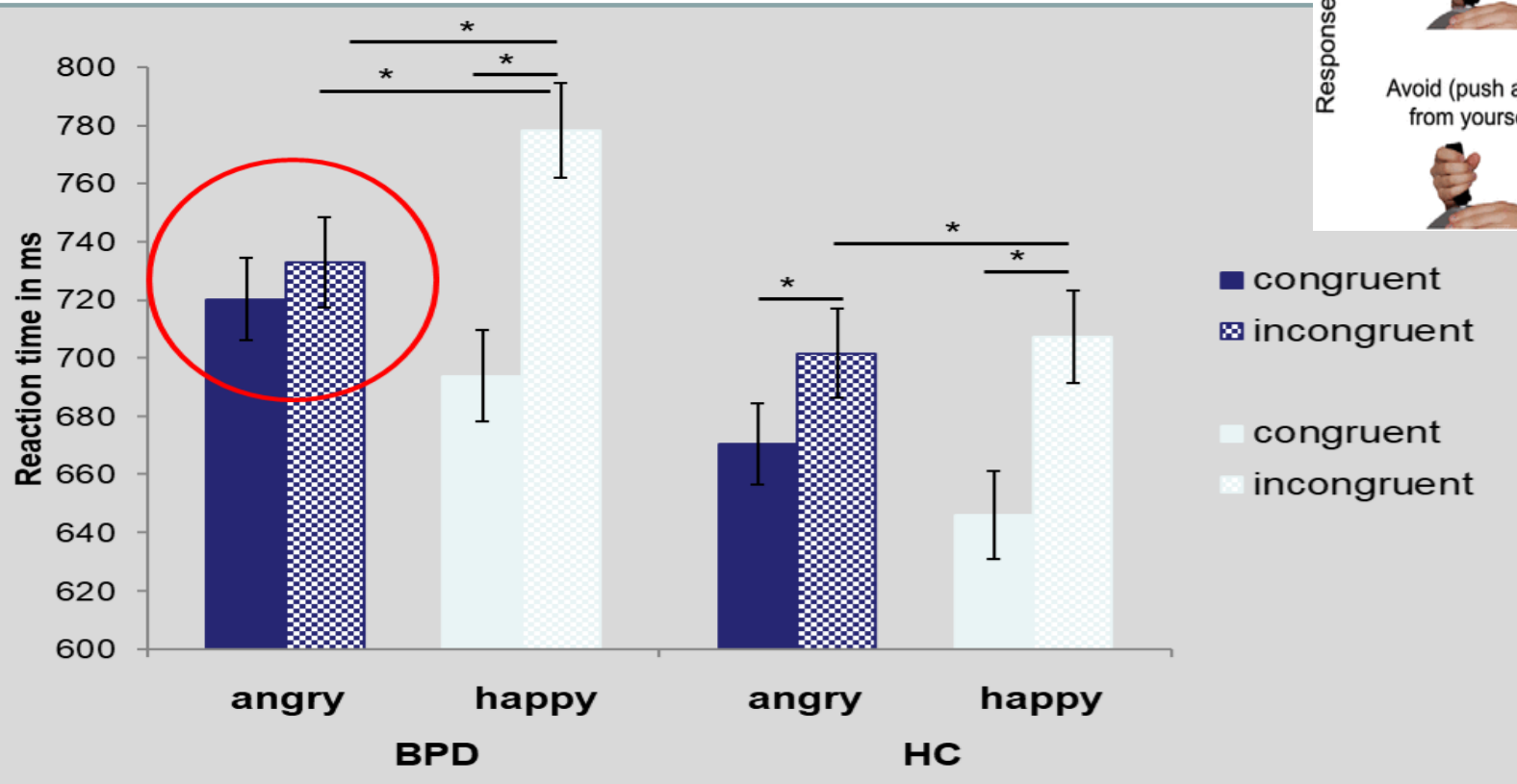
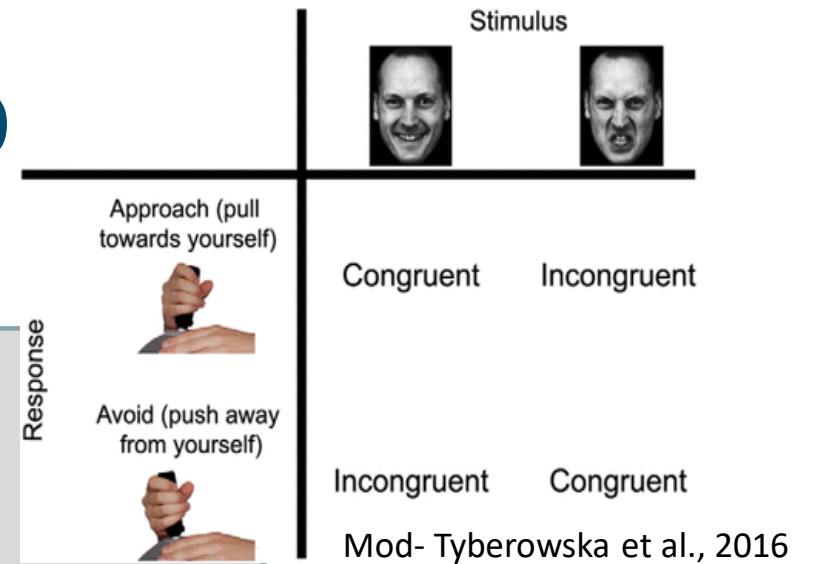
➤ Positive association between anger bias and childhood trauma

Social Threat Hypersensitivity: Amygdala Response in BPD



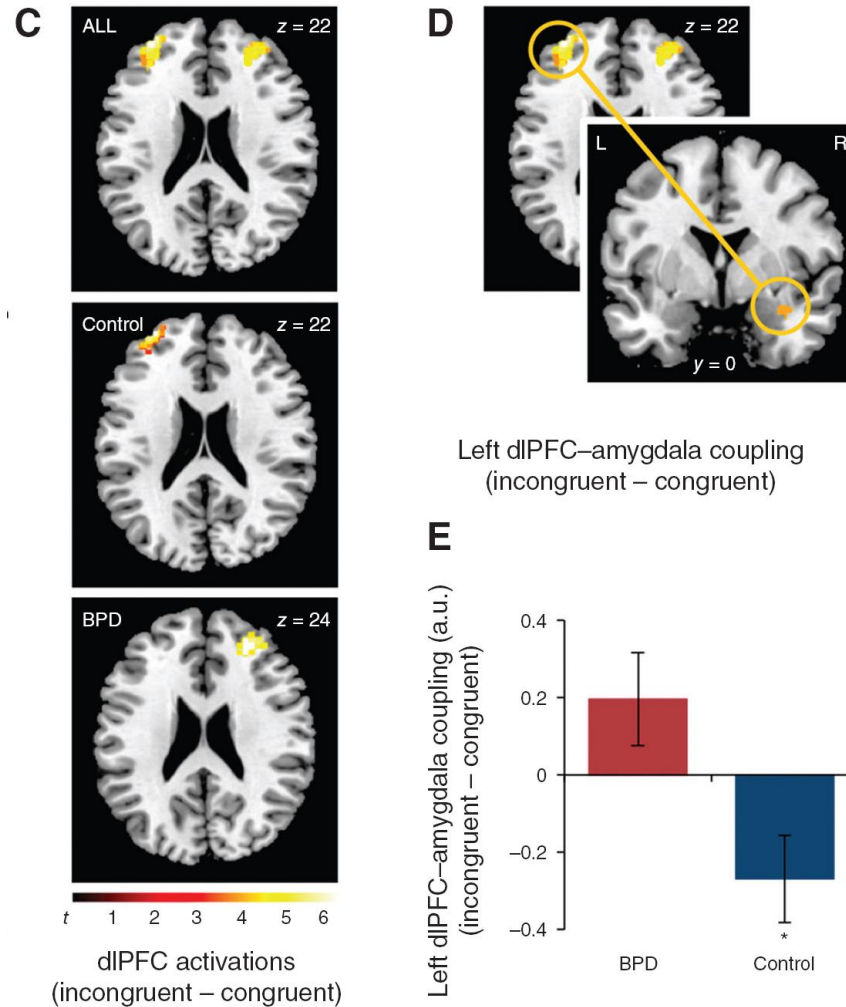
- Faster saccades towards angry eyes are associated with increased amygdala activations in BPD
- ➔ Approach rather than avoidance of social threat cues?

Emotional Action Control in BPD



- No congruency effect in BPD for angry faces (Group x Emotion x Congruency, $p = .005$)
- Patients with BPD do not avoid social threat cues.

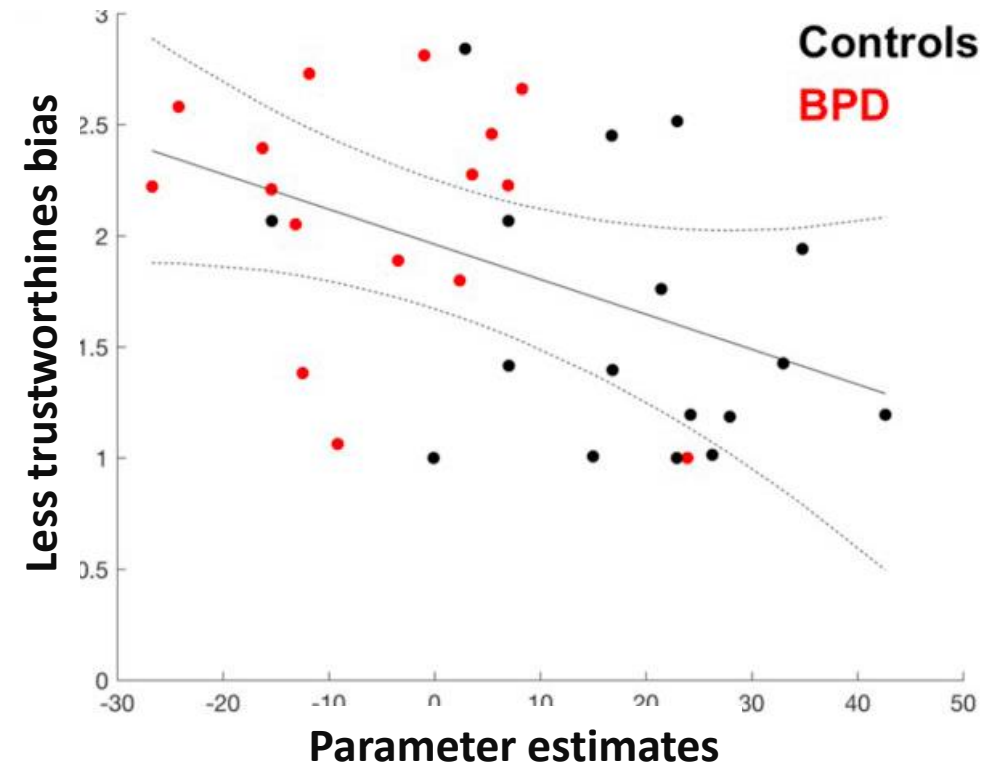
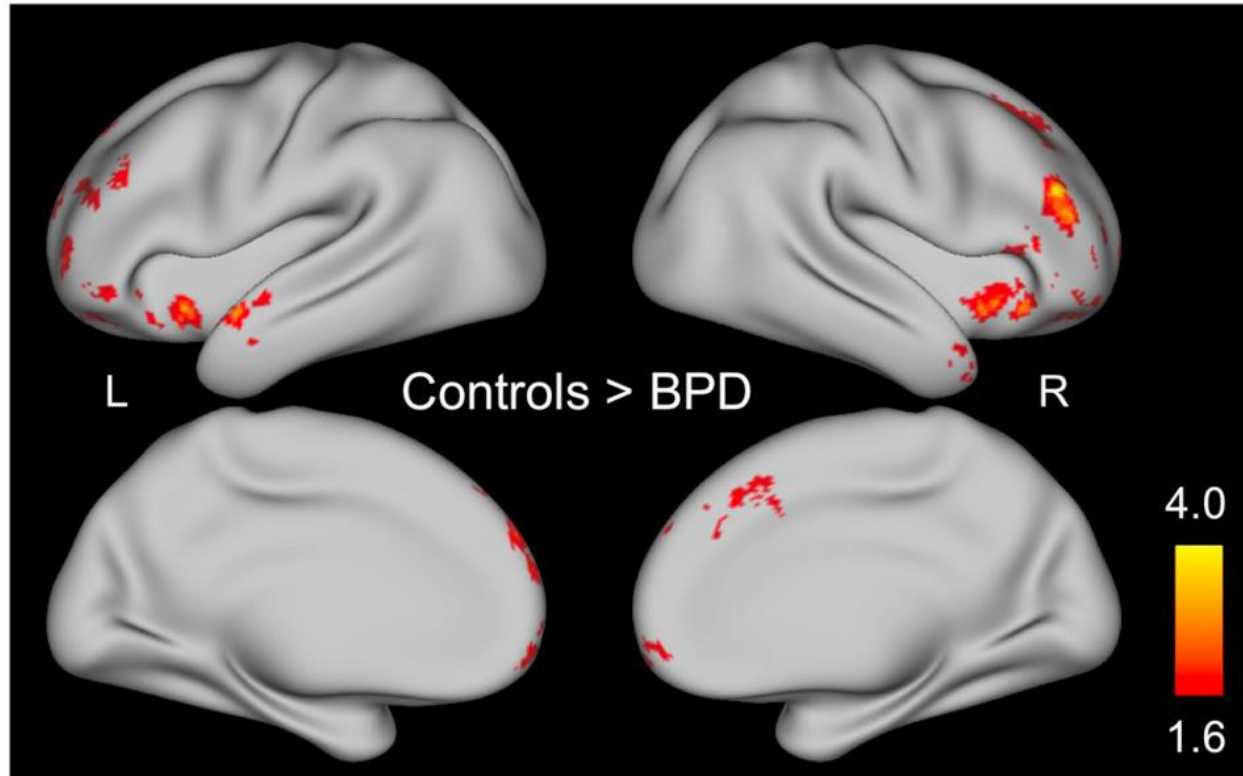
Emotional Action Control in BPD



- DLPFC activity involved in emotional action control
- HC: The higher dlPFC activity the lower amygdalar activity
- BPD: Negative coupling was absent.

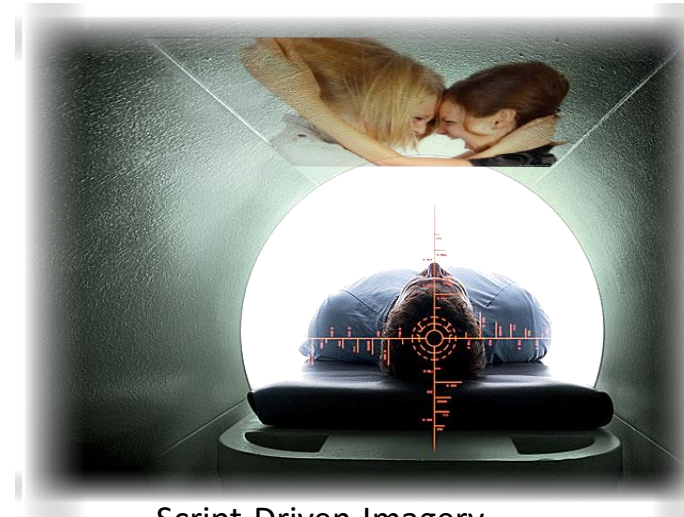
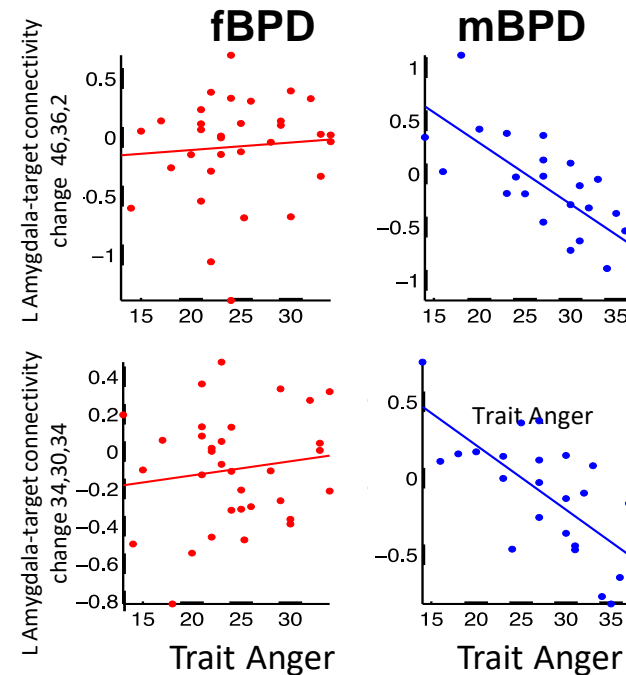
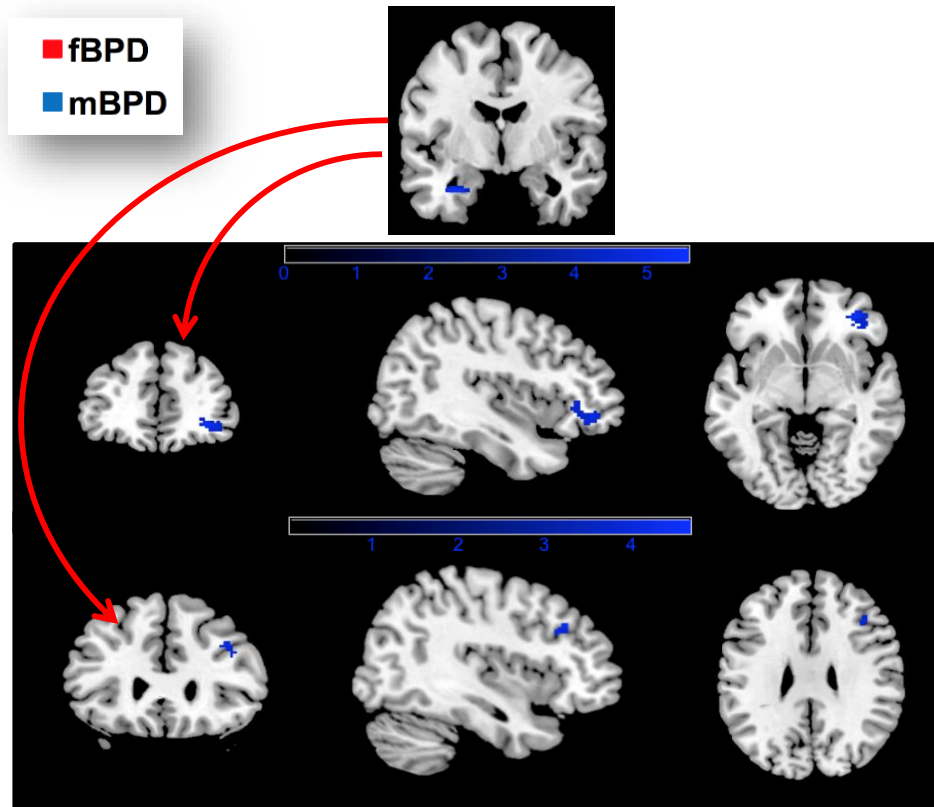
- Deficit in cognitive control of emotional action tendencies

Perception of Trustworthiness of Facial Stimuli



- Threat hypersensitivity / distrust is also a matter of prefrontal dysfunctioning, processing probalistic reasoning.

Emotional Dysregulation, Anger, and Aggression in BPD



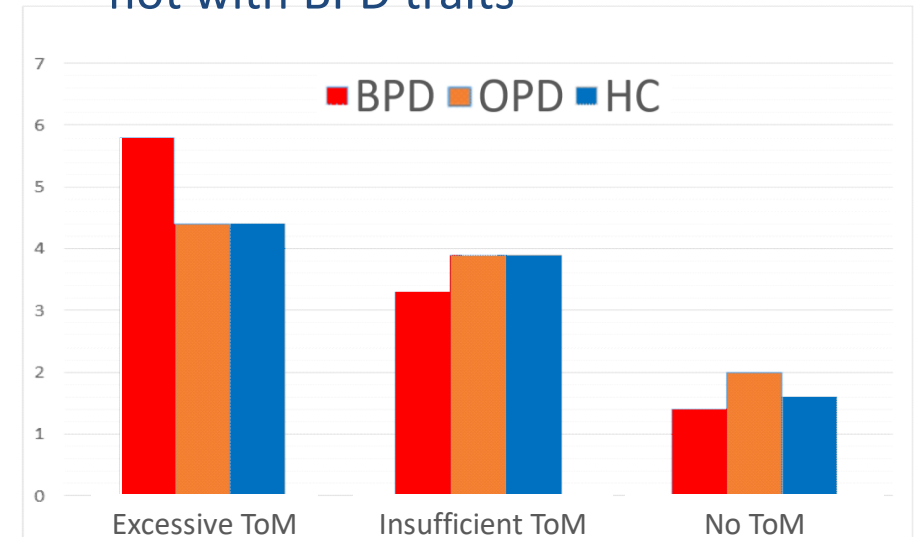
Script-Driven Imagery

- Anger induction phase
- **Aggressive behaviour phase**

- Trait anger modulates präfronto-amygdalar connectivity
- Highly sex-sensitive: positively in ♀, negatively in ♂.
- High effort of top-down adjustment of behavior in ♀ BPD

Theory of Mind (ToM) in BPD

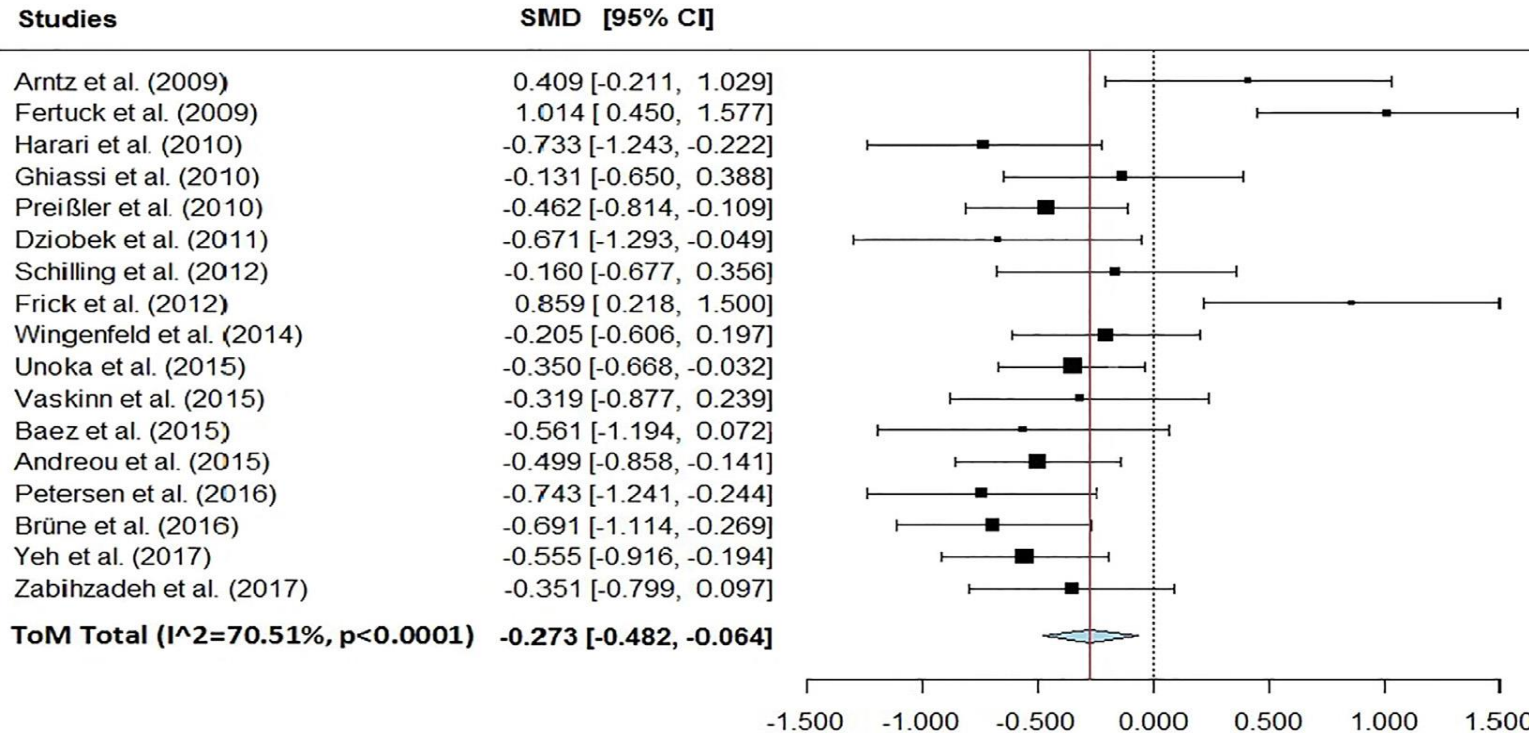
- Excessive ToM correlated with interpersonal dysfunctioning in BPD ($R = .29, p < .04$)
- Excessive ToM correlated with symptom distress and PD psychopathology in general ($R = .29$), not with BPD traits



Task: Movie for the Assessment of Social Cognition (MASC)



Normann-Eide et al. 2019



- Overall ToM is reduced in patients with BPD (cognitive and affective ToM)

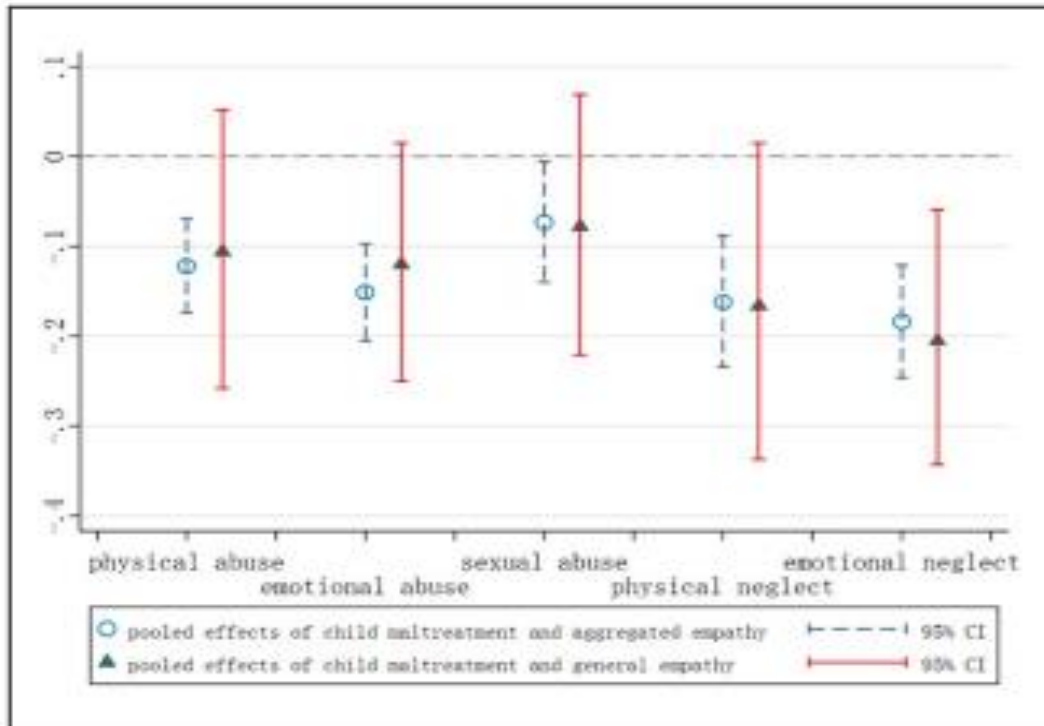
SHARED BRAIN MECHANISMS IN TRAUMA-ASSOCIATED MENTAL DISORDERS

Shared mechanisms of early-stress related mental disorders

- Social threat hypersensitivity, “limbic irritability” (Teicher et al. 2016 , Teicher & Samson, 2013)
- Emotion dysregulation: poor reappraisal capacity, preference for distraction and suppression (Sauer et al. 2016); prefronto-limbic dysfunctioning in the context of social stress. (Feldker et al. 2017, Gunderson et al. 2018).
- Early life trauma in close interaction with abnormal attachment inhibits the individual development of social cognition (ToM, mentalization) (Hassel et al., 2011).
- Poor social reward experiences may have impact on reward processing (Seitz et al. 2023).





Childhood Trauma and Empathy

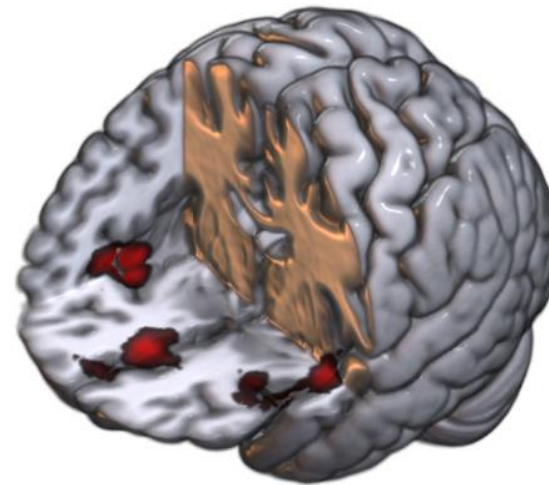
Meta-analysis: N=24 studies with N=22.580 participants



- Abused and neglected children find it difficult to understand others' mental states or resonate with other's distress
- Empathic response is formed by the security provided by sensitive caregivers, while abused and neglected children fail to gain the psychological safety needed.

Social Reward Experiences & Maternal Antipathy

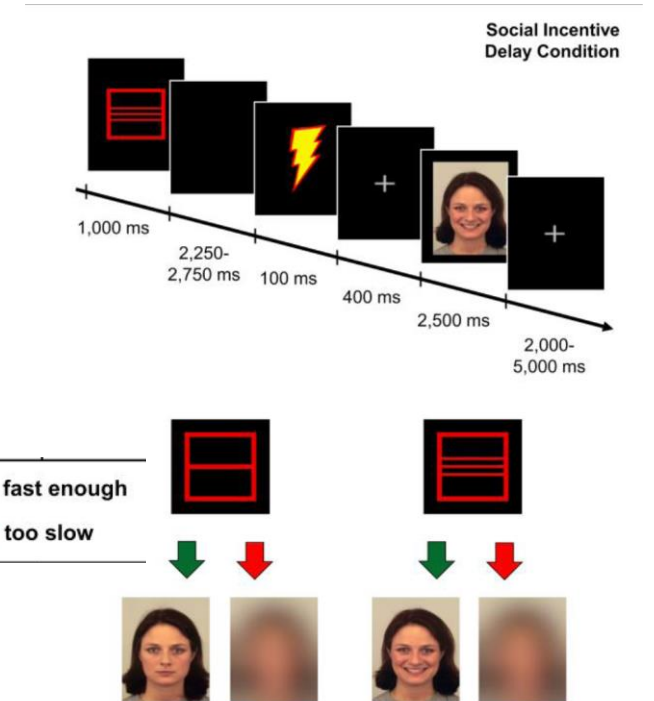
	33 subjects with SSD 26 ♀, 7 ♂ $M_{Alter} = 31.0$
	28 subjects with PTSD 24 ♀, 4 ♂ $M_{Alter} = 32.0$
	35 Personen mit MD 24 ♀, 11 ♂ $M_{Alter} = 31.7$
	34 healthy controls HC 28 ♀, 6 ♂ $M_{Alter} = 29.3$



Whole brain



Region of interest

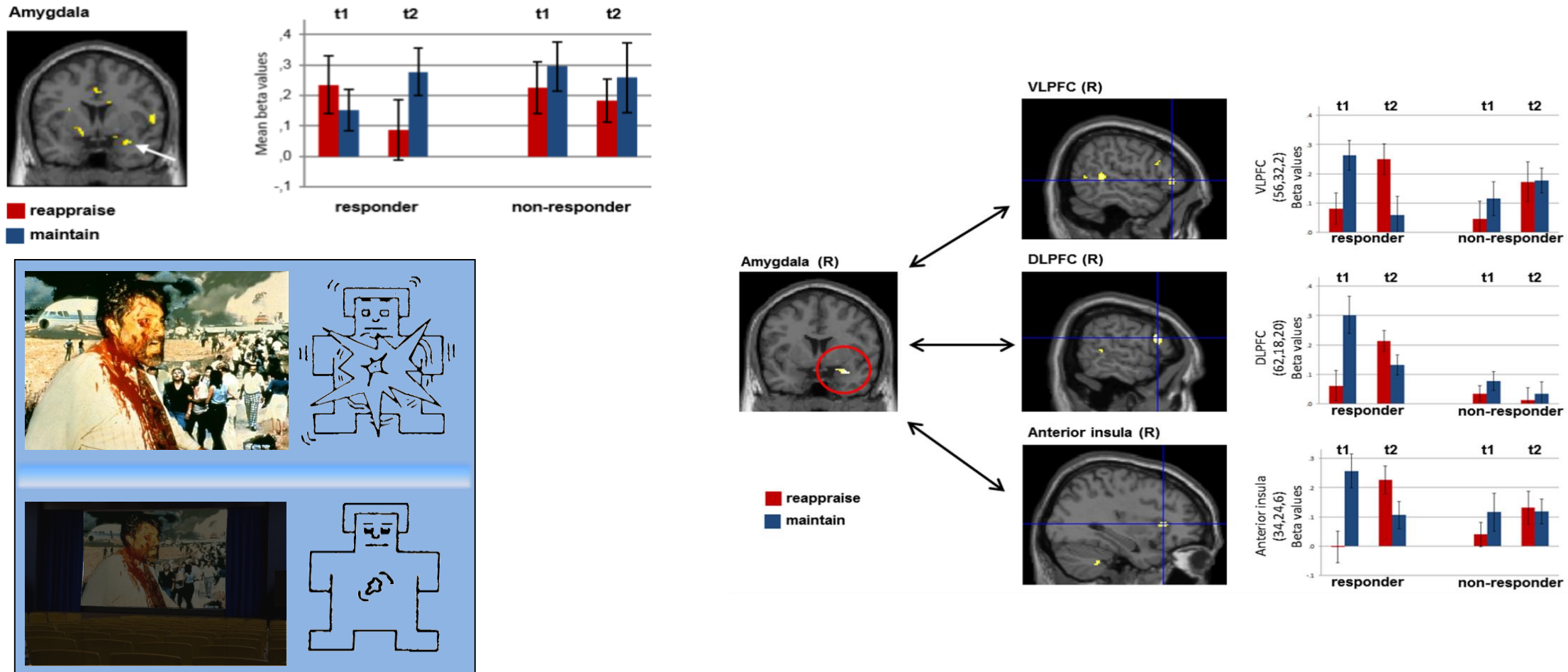


➤ Negative association between maternal antipathy and neuronal activity in the reward circuit (vmPFC/ACC, insula, ventral striatum) during anticipation of social (not-monetary) reward cues

MECHANISM-BASED PSYCHOTHERAPY AND PREDICTORS OF CHANGE

Neuronal Correlates of DBT Treatment Effects on Affect Regulation in BPD

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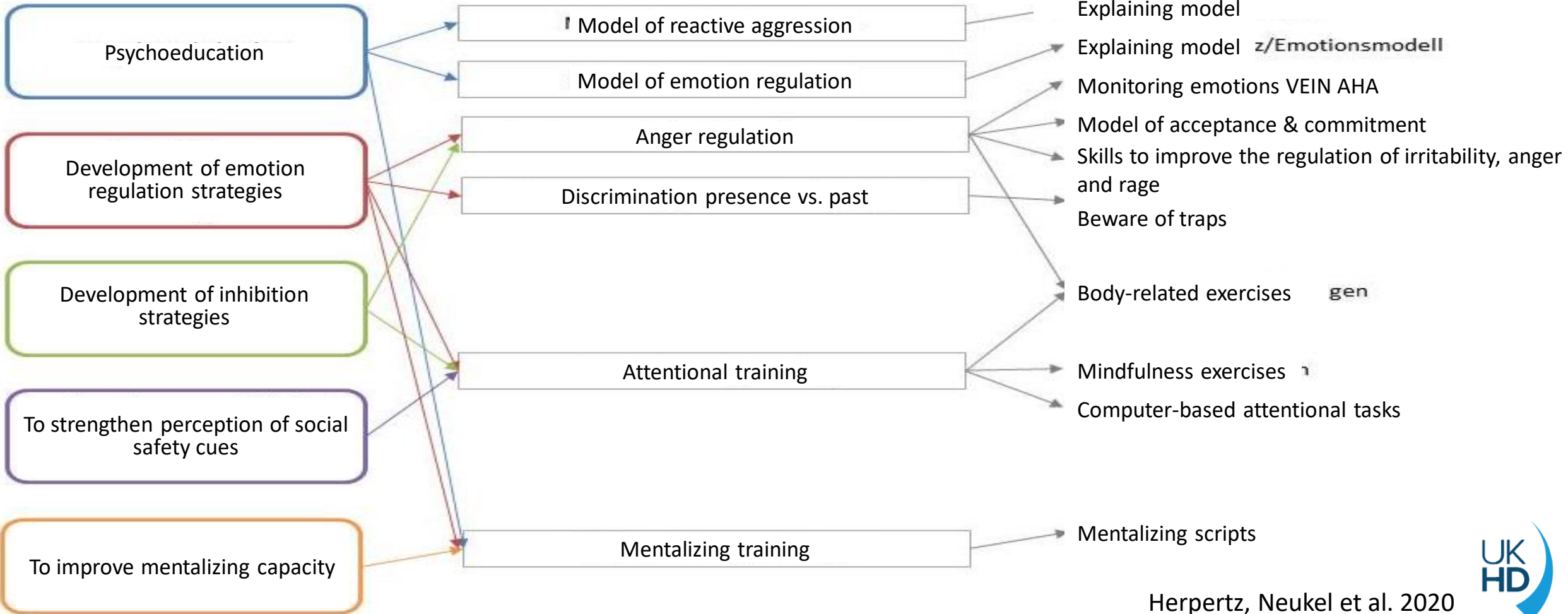
Group Therapy Targeting Functional Impairments

Mechanism-based Antiaggression Psychotherapy (MAAP)

Aims

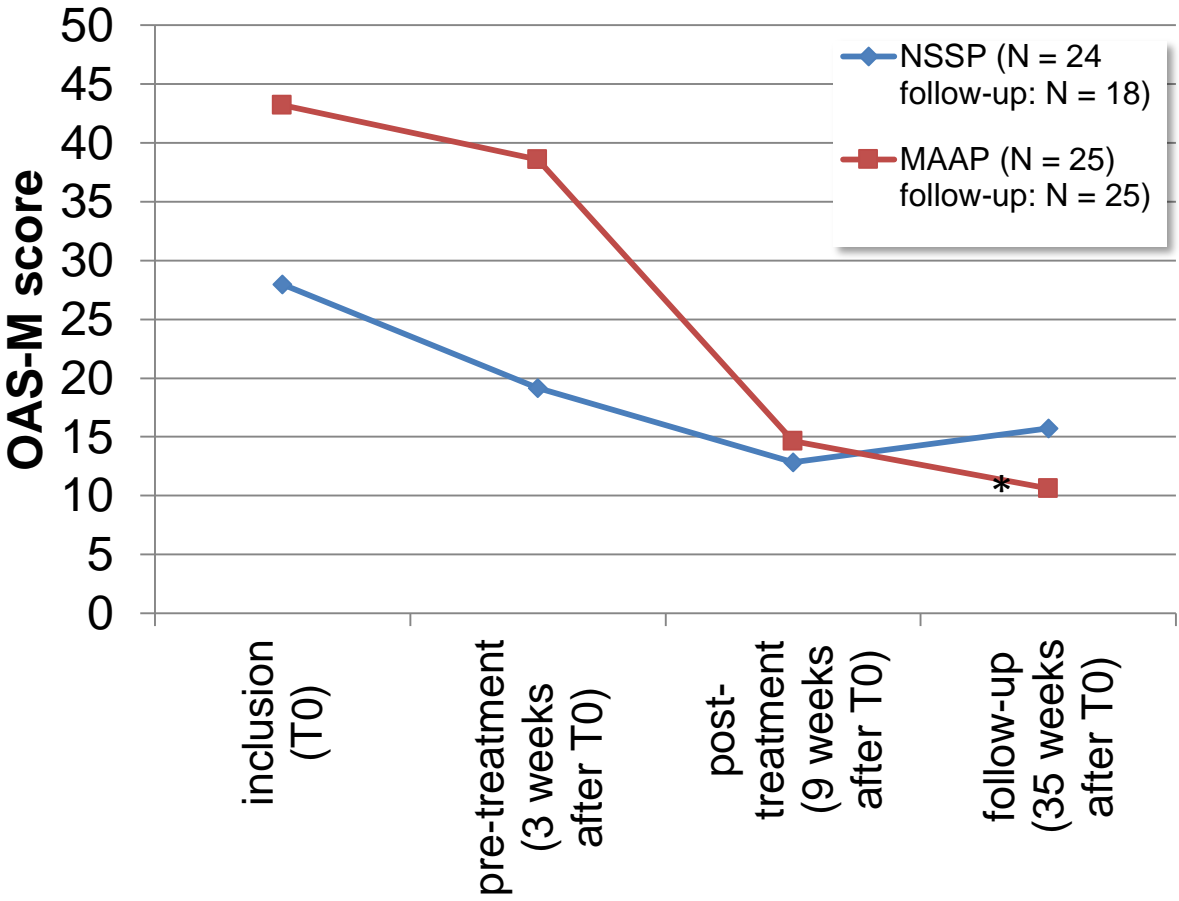
Targets

Interventions: 12 sessions group and 1 session single therapy

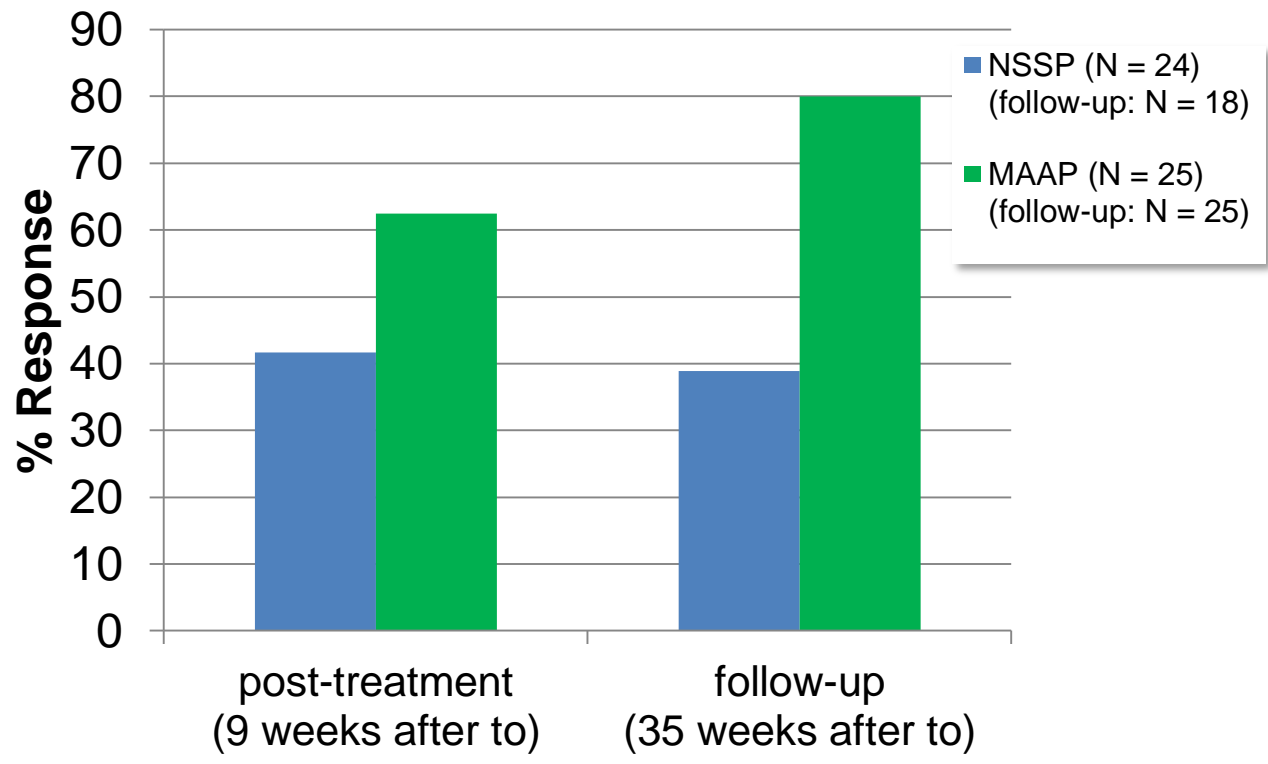


Mechanism-based Anti-Aggression-Group Psychotherapy (MAAP RCT, Phase II)

Primary Outcome OAS-M (overt aggression Q1-3)



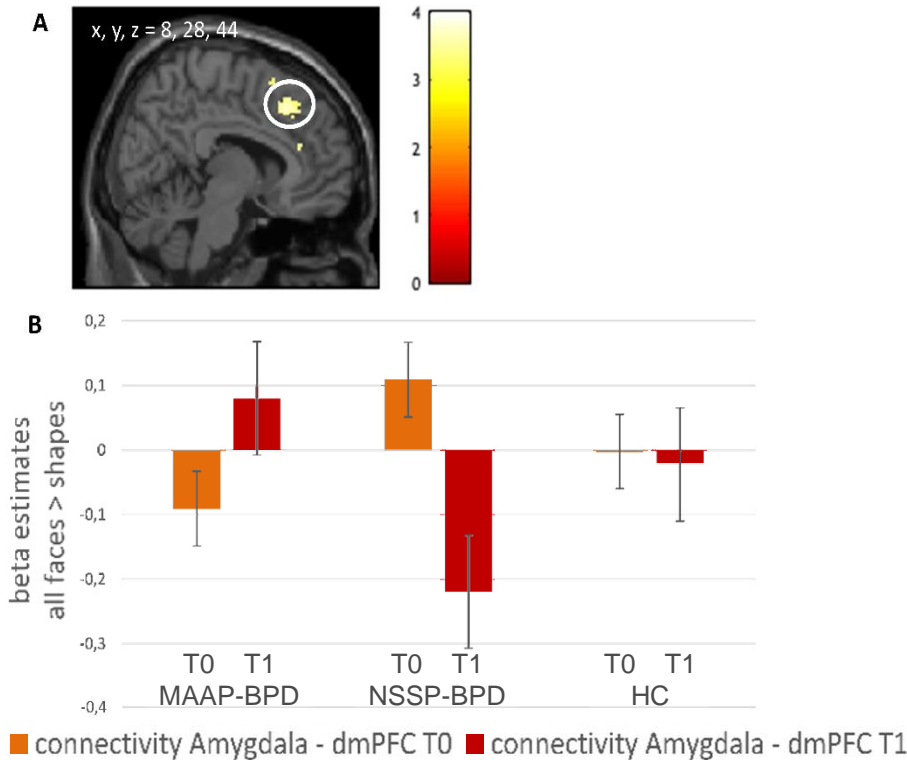
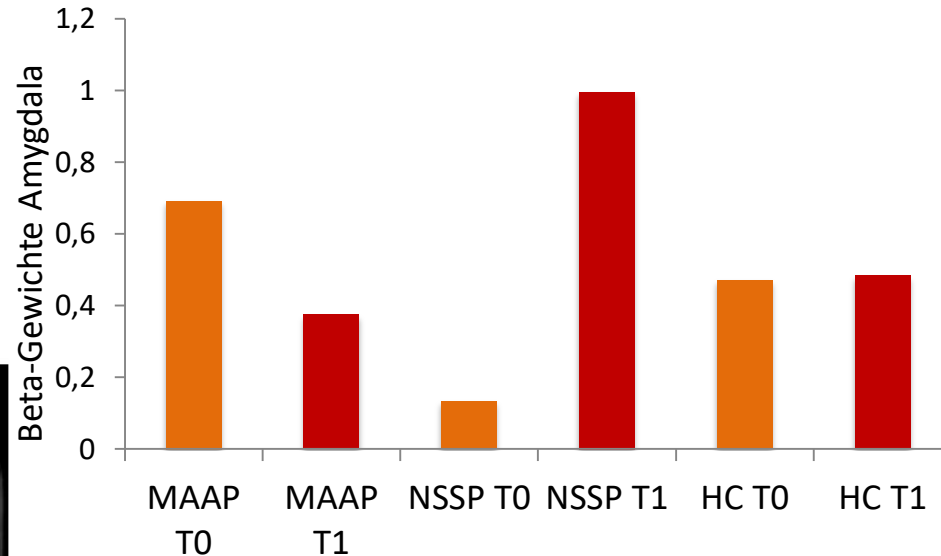
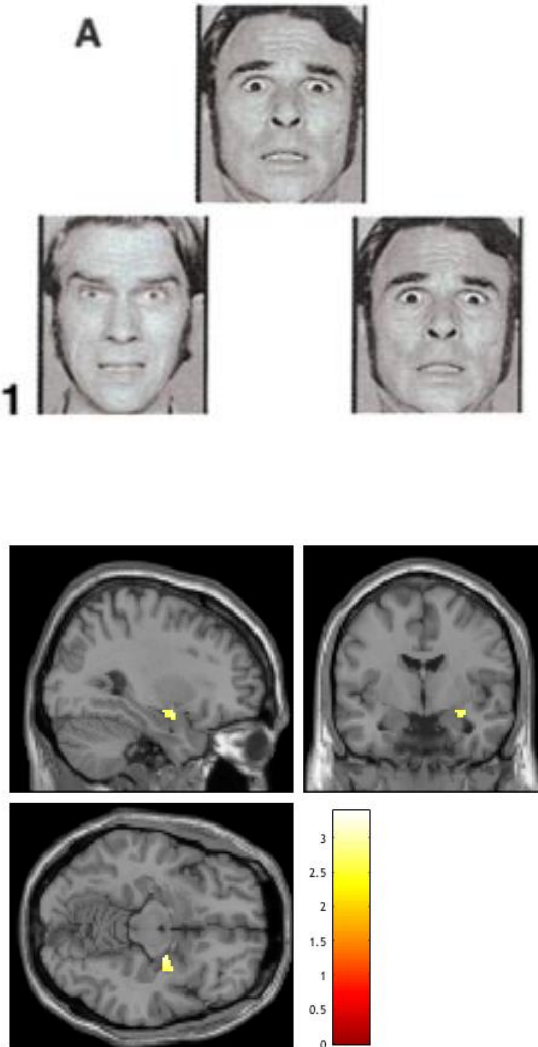
Secondary outcome: Response (>50% reduction OAS-M)



Trend for a significant group effect at post-treatment, significant difference at follow-up



Mechanisms of Change in BPD Evoked by MAAP



- Patients showed a decrease in amygdala activation in response to facial stimuli after MAAP, whereas an increase in amygdala activation was found after NSSP.
- In the MAAP group, connectivity between amygdala and dorsomedial prefrontal cortex increased from pre- to post-treatment compared to the NSSP group.

Take home message

- Social threat hypersensitivity in patients with BPD appears to involve strong early automatic (limbic) processing as well as low cognitive (prefrontal) reasoning of social cues.
- Patients with BPD are likely to respond with approach behavior to social threat (attack vs. escape) probably reflecting the early experience that threat is inevitable.
- Patients with BPD work hard to control but fail to regulate anger emotions.
- Patients with early life trauma may share social anhedonia and poor social cognition associated with social dysfunction.
- The identified mechanisms involved in affect regulation and social cognition may be related to early experiences of interpersonal trauma; specific and shared mechanisms need to be differentiated.
- Psychotherapy may be further developed by targeting the brain mechanisms underlying functional impairments.
- Parenting programs are needed to decrease maltreatment in families.