Natalie A. Izurieta Hidalgo

Dr. med.

Electrophysiological and behavioral correlates of the processing of emotionally ambiguous faces in women and men with borderline personality disorder

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Doktormutter: Prof. Dr. Sabine C Herpertz

This is the first study to investigate the behavioral and electrophysiological correlates of the processing of emotionally ambiguous faces in male and female patients with BPD compared to a sex, age, and intelligence matched healthy control group. The results confirm alterations in the classification of emotionally ambiguous faces as well as in ERP early and intermediate stages of face processing, which may partially explain some of the patient´s impairments in social functioning.

The current work revealed a lower threshold for the recognition of anger in women and men with BPD, compared with healthy volunteers, which may be interpreted as an anger bias in BPD due to a hypersensitivity for subtle cues of social threat and may also reflect deficits in the recognition of facial happiness. Moreover, patients with BPD compared with healthy volunteers, showed a subtle deficit classifying faces displaying high intensities of anger, maybe due to a trade-off arousal and cognitive processes needed to disengage the attention of highly emotional stimuli. Interesting, men with BPD performed worse than women with BPD classifying faces with high proportion of anger, which may reflect an additionally sex disadvantage in men with

BPD, given that men showed a subtle general deficit in emotion recognition compared with women, who instead showed a general hypersensitivity in the recognition of anger.

In addition to behavioral alterations, the present study revealed differences in early (P100) and intermediate (N170, P300) stages of facial emotion processing in patients with BPD compared with healthy volunteers. Enhanced P100 peaks in patients with BPD, may indicate a general hyper-responsiveness for emotional stimuli, which may increase the attention for incoming (potentially threatening) social information. An early hypersensitivity for emotional stimuli was more evident in women compared with men, reflecting maybe evolutionary adaptations. Furthermore, deficits in the structural encoding of faces were observed, reflected by reduced N170 peaks especially at right electrode sites and thus, no right-lateralization as seen in healthy volunteers. Moreover, patients with BPD showed deficits in the categorical (P300) stage of face processing compared with healthy volunteers, which were more evident in men BPD, who displayed the more reduced P300 amplitudes. Additionally, BPD patients showed poor discrimination of emotional intensity among predominantly happy and maximal ambiguous faces but clear discrimination and enhanced amplitudes for predominantly angry faces.

Importantly, behavioral and electrophysiological alterations were strongest in patients with more difficulties of emotion regulation and anger trait, and additionally in women with BPD with severe self-reported BPD symptomatology. This may support the hypothesis that deficits in emotion recognition in BPD could partially underlined emotion regulation difficulties. On the same time, psychological factors may influence facial emotion processing through reentrances in the visual system from limbic and frontal cortex areas.

In summary, this study revealed in patients with BPD a hypersensitivity for subtle cues of facial anger and deficits in the discrimination of facial happiness as well as subtle deficits in the classification of highly socially threatening facial stimuli. These behavioral findings were underlined by a very early hyper-responsiveness for emotional stimuli and subsequent deficits in the structural and categorical facial emotion processing. These mechanisms may contribute to a more negative perception of others and the difficulties in emotion regulation and social functioning seen in BPD. Understanding the psychological and neurobiological underpinnings of BPD and their sex differences, may help to improve psychotherapeutic and psychopharmacologic strategies for the patients' impairments in interpersonal functioning.