Appendix 1 to Bertsch K, Roelofs K, Roch PJ, et al. Neural correlates of emotional action control in anger-prone women with borderline personality disorder. *J Psychiatry Neurosci* 2017.

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Supplementary Information

Methods

Participants

Data of four participants had to be rejected due to joystick malfunctioning (3 participants) or excessive head movements (>7mm in z-direction during >20 volumes, 1 participant; initial criterion for head movements: >3.3mm).

Approach-Avoidance Task

Stimuli. Facial stimuli consisted happy and angry expressions of 36 models (18 male) selected from several picture sets (Ekman & Friesen, 1976; Lundqvist et al., 1998; Martinez & Benavente, 1998; Matsumoto & Ekman, 1988). Faces were grayscaled, trimmed from hair and non-facial contours, matched for brightness and contrast values, and presented on a black background. Stimuli were projected at the center of a screen, viewed via a mirror above the subject's head.

Task. The middle position was defined as the central area covering 15% along the sagittal plane. Joystick movements of ≥60% along the sagittal plane ≤3sec after stimulus presentation were regarded as valid responses. Participants received visual feedback for invalid responses.

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Experimental Protocol

For all participants, the diagnostic process comprised an extensive telephone screening for inclusion and exclusion criteria (approx. 45min) followed by an onsite diagnostic appointment (approx. 3h). At the day of the experiment, participants performed a urine toxicology test for exclusion of acute substance abuse. Experiments took place between 1.30 and 5.00 p.m. starting with detailed instructions and the collection of a saliva sample. After the task, which lasted for approx. 35min including a calibration of the joystick, anatomical scans were collected from all participants.

MRI data processing

The first 4 volumes were discarded to allow for T1 equilibration. Given the multiecho GRAPPA MR sequence (Poser et al., 2006), the head motion parameters were estimated on the MR images with the shortest TE (9.3ms), since these images are the least affected by possible artifacts. These motion-correction parameters, estimated using a least-square approach with 6 rigid body transformation parameters (translations, rotations), were then applied to the 4 echo images collected for each excitation. After spatial realignment, the 4 echo images were combined into a single MR volume using an optimized echo weighting method (Poser et al., 2006). The time series for each voxel were temporally realigned to the first slice in time to correct for differences in slice time acquisition. The T1-weighted image was spatially coregistered to the mean of the functional images. The fMRI time series were

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transformed and resampled at an isotropic voxel size of 2mm into the standard Montreal Neurological Institute (MNI) space using both linear and nonlinear transformation parameters as determined in a probabilistic generative model that combines image registration, tissue classification, and bias correction (i.e., unified segmentation and normalization) of the coregistered T1-weighted image (Ashburner & Friston, 2005). The normalized functional images were spatially smoothed using an isotropic 8mm full-width at half-maximum Gaussian kernel.

In addition to task-relevant regressors, original, squared cubic, first- and second-order derivatives of movement parameters and three regressors describing the time course of signal intensities averaged over different image compartments (white matter, cerebrospinal fluid, and proportion of MR image outside the scull) were included (Verhagen et al., 2006).

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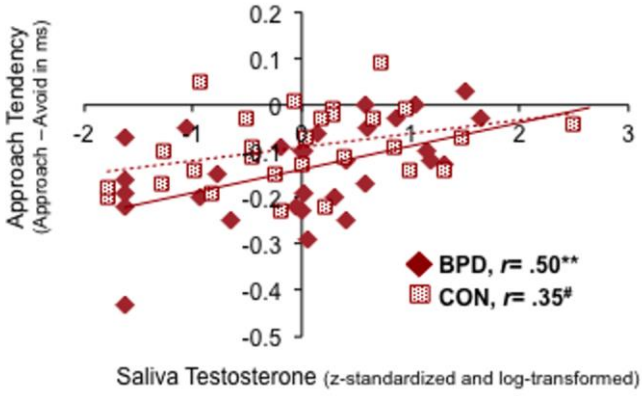
Supplementary Figure



Supplementary Figure 1. Association between testosterone levels (z-standardized and log-transformed) and approach tendency (reaction times of approach minus avoidance behavior averaged across happy and angry facial expressions) in patients with borderline personality disorder (BPD) and healthy volunteers (CON). **: $p<.01$. #: $p<.10$.