

Supplementary Online Content

Akdeniz C, Tost H, Streit F, et al. Neuroimaging evidence for a role of neural social stress processing in ethnic minority–associated environmental risk. *JAMA Psychiatry*. Published online April 16, 2014. doi:10.1001/jamapsychiatry.2014.35.

eFigure 1. Main effects of stress induction on brain activation

eFigure 2. Association of stress-induced changes in salivary cortisol and pACC activation

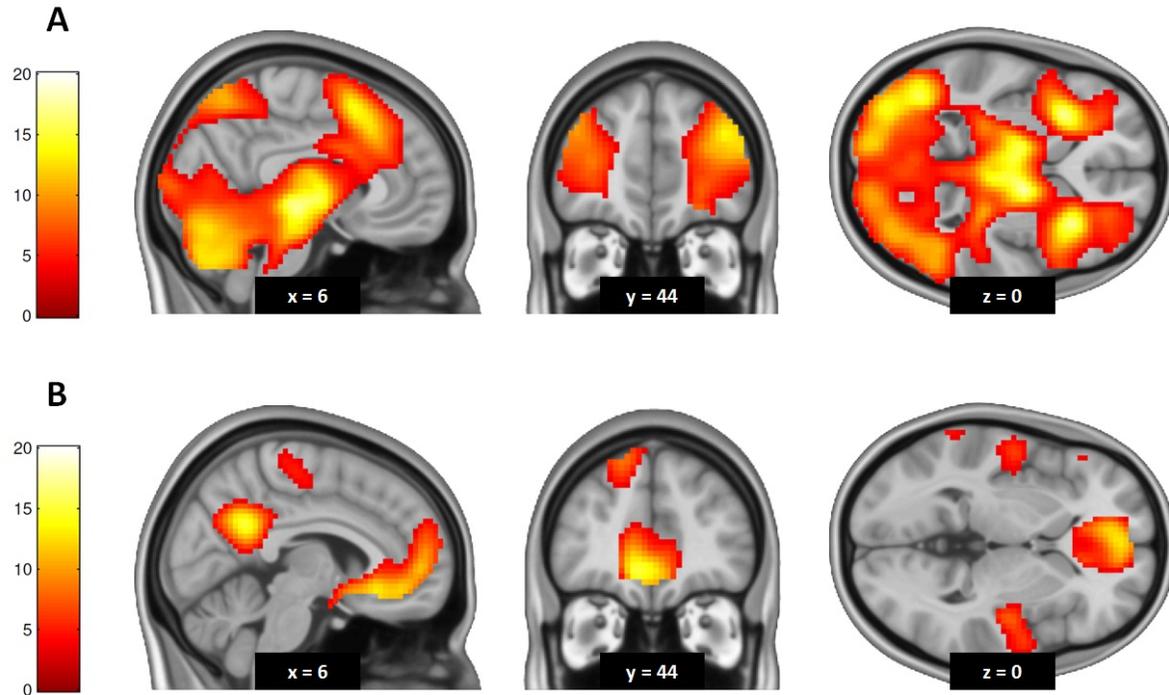
eFigure 3. Altered neural stress processing in Turkish relative to German individuals in a group comparison with balanced ethnical background of experimenters

eFigure 4. Chronic stress mediates the effects of perceived discrimination on pACC-dACC functional connectivity in ethnic minority individuals

eFigure 5. No significant group difference in activation in ethnic minority individuals relative to German individuals in fMRI experiments probing cognitive and emotion processing

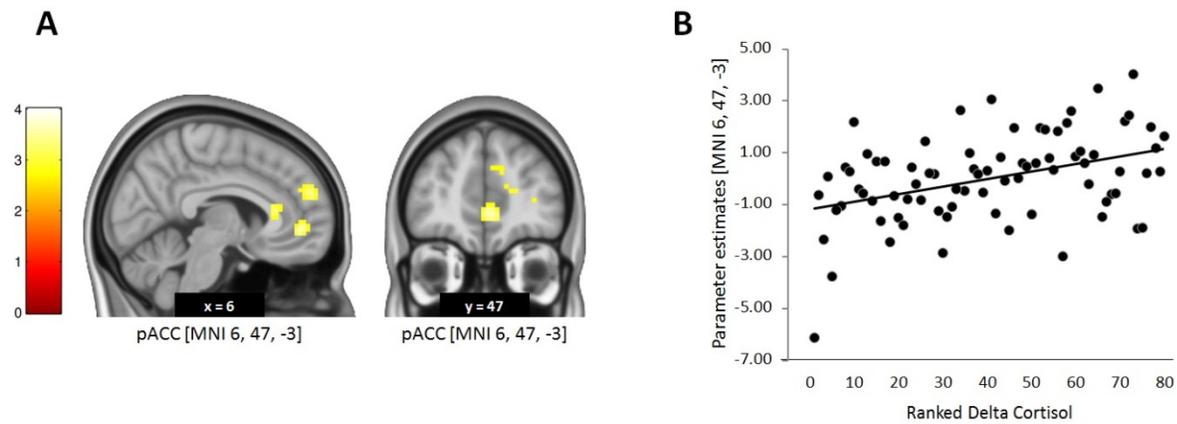
This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Main effects of stress induction on brain activation



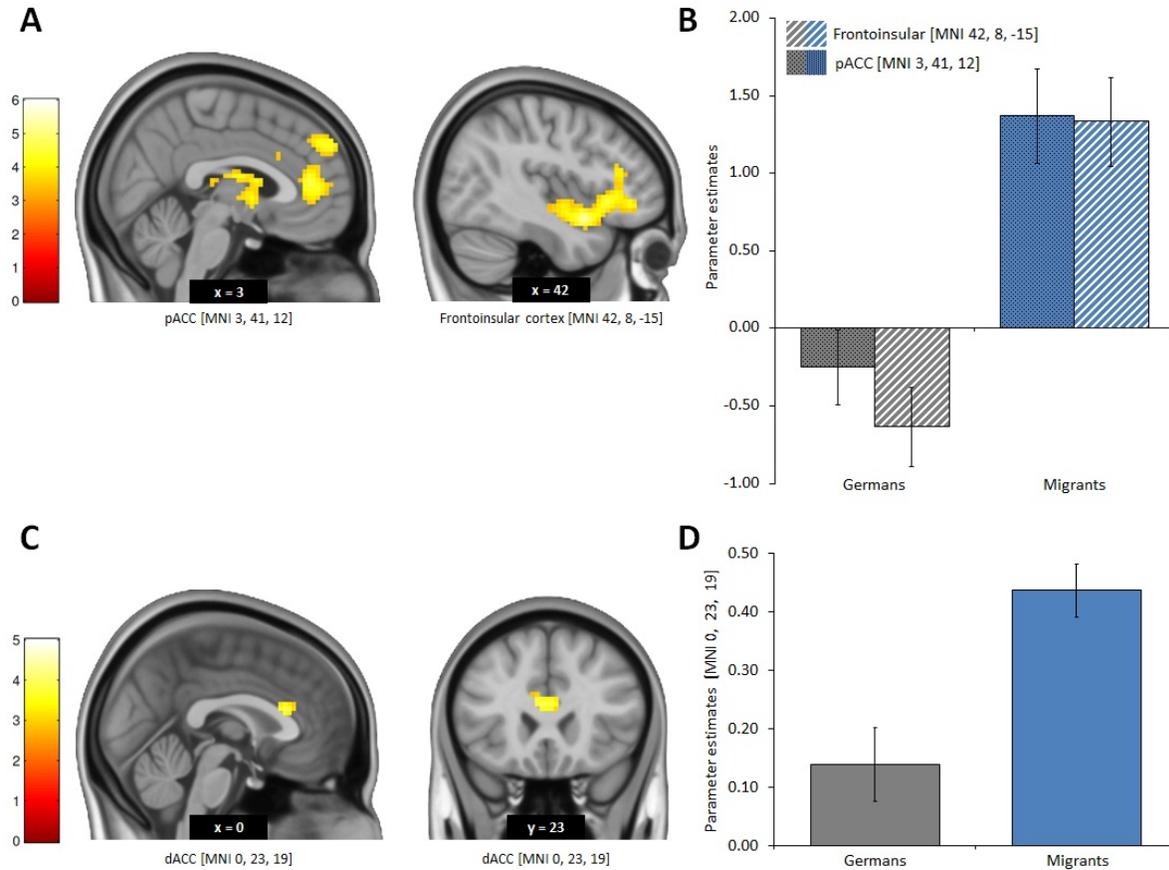
Significant effects of stress induction on brain activation. (A) Brain areas significantly more engaged in the stress condition relative to the control condition (e.g., amygdala, hippocampus, insula, striatum, dorsal ACC). (B) Brain areas significantly less engaged in the stress condition relative to the control condition (e.g., posterior cingulate, pACC, subgenual ACC). The functional maps are thresholded at a significance threshold of $P < .05$ FWE corrected for multiple comparisons across the whole brain and displayed on a sagittal (left panel), coronal (middle panel) and transversal (right panel) section of a structural template. Map coordinates refer to the standard space as defined by the Montreal Neurological Institute, MNI. FWE = family-wise error corrected for multiple comparisons. Color bar represents t values.

eFigure 2. Association of stress-induced changes in salivary cortisol and pACC activation



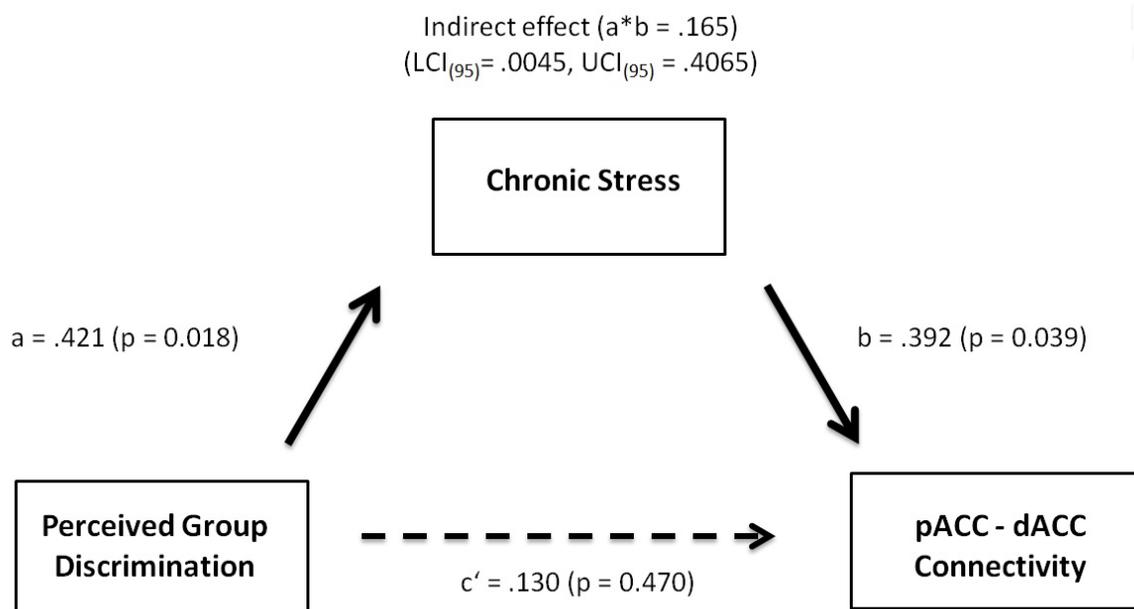
(A) Significant positive association between pACC activation during stress processing and rank-order delta differences in salivary cortisol ($t = 3.68$, $P_{FWE} = .023$ ROI corrected) displayed on a sagittal (left) and coronal (right) section of a structural template MRI. (B) Scatter plot illustration of the association of pACC activation estimates extracted from the peak voxel (y axis) and rank of log-transformed delta cortisol values (x axis). Color bars represent t values. Map coordinates refer to the standard space as defined by the Montreal Neurological Institute, MNI. FWE = family-wise error corrected for multiple comparisons, ROI = region of interest.

eFigure 3. Altered neural stress processing in Turkish relative to German individuals in a group comparison with balanced ethnical background of experimenters



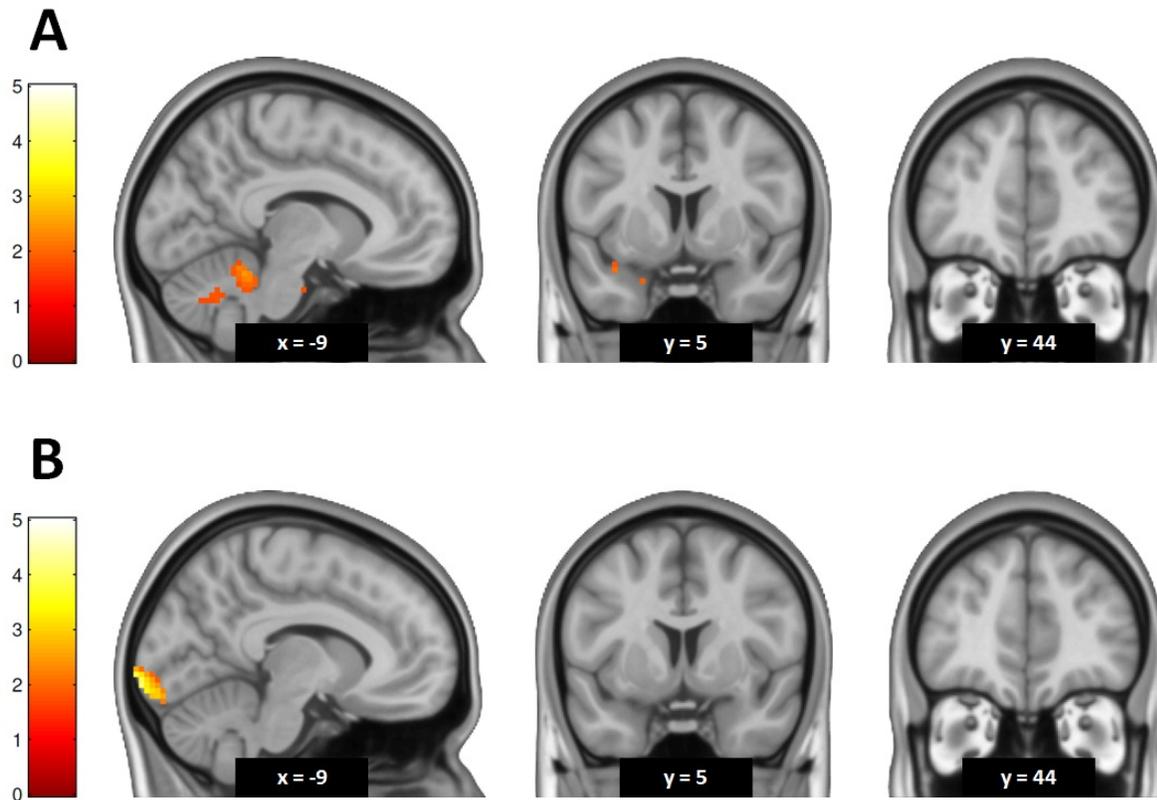
(A) Significant increase in pACC ($t = 4.62$, $P_{FWE} = .004$, ROI corrected), medial prefrontal cortex ($t = 5.64$, $P_{FWE} = .016$, whole-brain corrected) and frontoinsula cortex ($t = 5.32$, $P_{FWE} = .036$, whole-brain corrected) activation during stress processing in Turkish migrants examined by German experimenters compared to matched German participants examined by Turkish experimenters. (B) Plotted are the mean contrast estimates extracted from the peak voxel in pACC and frontoinsula cortex of the activation analysis. (C) Significant increase in pACC-dACC functional connectivity during stress processing in the group comparison with balanced ethnical background of investigators ($t = 3.91$, $P_{FWE} = .012$, ROI corrected). (D) Plotted are the mean contrast estimates extracted from the peak voxel of the functional connectivity analysis. Error bars represent standard errors of the mean. For presentation purposes, maps are thresholded at $P = .001$ (activation analysis) and $P = .005$ (connectivity analysis), uncorrected, and displayed on sagittal and coronal sections of a structural template. Color bars represent t values. Map coordinates refer to the standard space as defined by the Montreal Neurological Institute, MNI. FWE = family-wise error corrected for multiple comparisons, ROI = region of interest.

eFigure 4. Chronic stress mediates the effects of perceived discrimination on pACC-dACC functional connectivity in ethnic minority individuals



Mediation analysis in ethnic minority individuals with perceived group discrimination as independent variable, chronic stress as mediator, and pACC-dACC functional connectivity estimates as dependent variable (see text for details). The indirect effect of the mediation model ($a*b$) is significant at $P < .05$ as inferred from bias-corrected 95% percentile bootstrap confidence intervals based on 10,000 bootstrap samples. Path coefficients are standardized coefficients from regression analyses.

eFigure 5. No significant group difference in activation in ethnic minority individuals relative to German individuals in fMRI experiments probing cognitive and emotion processing



No significant differences in brain activation in second-generation Turkish migrants during *N*-back working memory (A) and the processing of negative emotional facial expressions (B). The otherwise unmasked functional maps are thresholded at $P = .05$, uncorrected, for presentation purposes, and displayed on a sagittal (left panel) and two coronal (middle and right panel) sections of a structural template matching the sections displayed for the stress experiment in Figure 2. Color bars represent t values. Coordinates refer to the standard space as defined by the Montreal Neurological Institute, MNI.