Meta-analysis of functional neuroimaging studies of emotion perception and experience in schizophrenia

Supplemental Information

Supplemental Methods and Materials

Meta-analytic Procedure

The meta-analysis was conducted using multilevel kernel density analysis (MKDA; 1-3). The analysis focused only on group contrasts conducted within each study for schizophrenia > healthy control subjects (SCZ>HC), or healthy control > schizophrenia subjects (HC>SCZ). We chose to analyze only group contrasts conducted within studies, as opposed to group contrasts of meta-foci obtained between studies, to minimize biases introduced by differences between studies. Foci from contrasts of interests from each study were mapped onto the Montreal Neurological Institute (MNI) brain template (4) in 2 mm isotropic voxels. Coordinates reported in Talairach space (5) were transformed into MNI space, using SPM (tal2mni.m; 4, 6). Foci within each study were convolved with a spherical kernel of radius 10 mm (7), and each voxel was assigned a value of 1 if it fell within 10 mm of any focus and 0 otherwise. Thus, foci were converted into a contrast indicator map (CIM) for each study. A density map, across studies, was then created by taking a weighted average of the CIMs where the weights are the square-root of the study sample size. Structures were identified using Functional MRI of the Brain Software Library (8), and the density map was overlaid on the MNI single brain template using MRICRON. Voxel-wise significance was obtained via a permutation test (Monte Carlo simulation; n = 30,000) of the null hypothesis of complete spatial randomness over gray matter for CIMs. In other words, for each CIM, contiguous activation volumes of voxels were identified. Each

simulation randomly distributed the locations of the activation volumes across gray matter, and 30,000 simulations were used to calculate the null distribution of the density map. Thus, an expectation was obtained for a given density, due to randomness alone. By comparing the density of the actual foci with the simulated density maps, one can estimate the chance (probability) that the actual density occurred by chance. A probability threshold was set, correcting for the multiple comparisons across all gray-matter voxels, to derive a family-wise error rate of 0.05 (2). As an additional safeguard against Type I errors, we report only meta-analytic foci with 10 or more voxels (80 mm^3).

In MKDA, the unit of analysis is the contrast, not the activation foci, so that multiple activation foci from one study count the same as a single focus from another study, which partially corrects for differences in thresholding of activation foci across studies. In the results, we list both the foci contributed by the analyzed contrasts, as well as the number of independent contrasts.

Supplemental References

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