

Appendix 1 to Vistoli D, Lavoie MA, Sutliff S, et al. fMRI examination of empathy for pain in people with schizophrenia reveals abnormal activation related to cognitive perspective-taking but typical activation linked to affective-sharing. *J Psychiatry Neurosci* 2017.

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Supplement

In the main text of this paper, we examined the brain regions involved in imagining pain in others compared to pain in oneself (PO1>PS1). To determine if the observed results in the TPJ/pSTS were specific to the Pain scenarios or were associated with a more general process related to actions observation, we also examined the NPO1>NPS1 contrast (i.e. for the NoPain scenarios). This contrast was then compared to the Other versus Self contrast performed for Pain scenarios (see full text) through the [(PO1>PS1) > (NPO1>NPS1)] contrast. We performed these contrasts for each group and then between-groups in both directions.

As for the other analyses of the article, we used a voxel threshold of $p < 0.001$ with a cluster size (k) of 90 voxels, corresponding to a whole-brain corrected $p < 0.05$ based on Monte-Carlo simulations (100000 simulations). For brain regions where we had our a priori hypothesis (here, the bilateral TPJ), we also reported activations at a less stringent cluster threshold of 10 voxels with a $p < 0.001$.

The NPO1>NPS1 contrast revealed no significant activation in the TPJ/pSTS for either group. The only supra-threshold cluster of activation for that contrast was observed in patients in the left putamen at the border of the anterior insula (107 voxels), but the between-groups comparison revealed no significant group difference. In controls, the [(PO1>PS1) > (NPO1>NPS1)] contrast revealed significant activations in the bilateral TPJ/pSTS as well as the bilateral inferior and middle frontal gyri. Patients showed no supra-threshold activation for this

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contrast. The Controls > Patients comparison replicated our previously observed difference in the left TPJ/pSTS and revealed an additional between-group effect in the bilateral inferior frontal gyri, extending to the precentral gyrus on the left hemisphere. The reverse comparison (Patients > Controls) showed no supra-threshold activation.

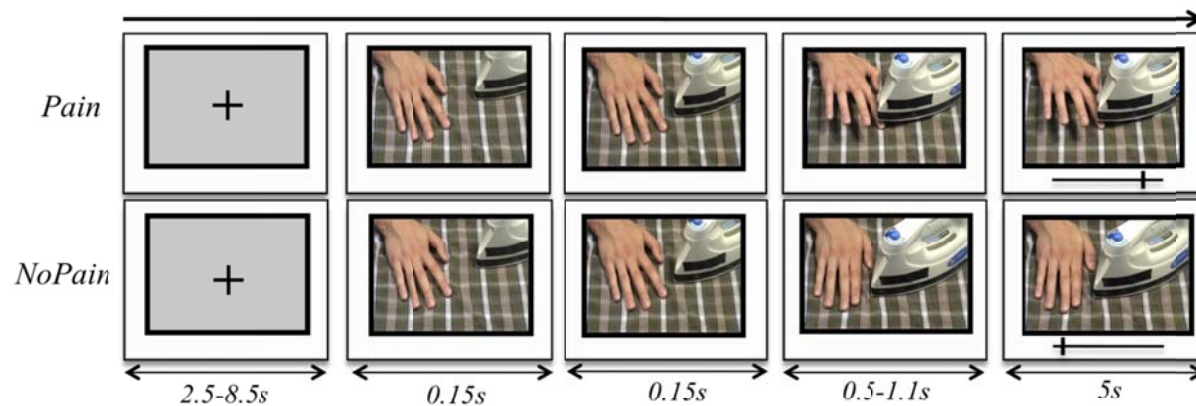
Overall, neither group showed activation related to the Self/Other manipulation for the NoPain condition, and the results confirmed that the between-group differences in the bilateral TPJ/pSTS in controls was observed for the Pain scenarios only. This specificity reinforces the interpretation that TPJ/pSTS activation during the task is not related to a general process involved in actions observation but to the cognitive perspective-taking process involved in situations requiring understanding others' pain. The absence of between-groups difference for NoPain situations is in line with the fact that neural activations related to actions observation is relatively intact in schizophrenia.

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Figure S1: Example of one trial of the experimental task. Each trial consists of the pseudo-dynamic presentation of three pictures depicting a right hand performing a daily-life action. On the third picture, each stimulus results in either a painful (Pain) or non-painful (NoPain) event. Participants have 5 seconds to rate the level of pain using a visual analog scale.



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Table S1: The 8 conditions of the empathy task.

| | Pain (P) | | NoPain (NP) | |
|-------------------------------------|----------|-----------|-------------|-----------|
| | Self (S) | Other (O) | Self (S) | Other (O) |
| First-person visual perspective (1) | PS1 | PO1 | NPS1 | NPO1 |
| Third-person visual perspective (3) | PS3 | PO3 | NPS3 | NPO3 |