|  |
| --- |
| **Supplementary Table S3.** *Results of neuroimaging studies investigating empathy* |
|  | **Study** | **Study n****Behavioural results** | **N, Age, Sample, IQ** | **Task****Analysis** | **Contrast** | **Brain activation** | **Coordinates****MNI** |
| **SZ** |  |  |  |  |  |  |  |  |  |
| *Studies comparing affective response > control/baseline* |  |  |  |  |  |  |  |
|  | Derntl et al.  | 1 | SZ = 15 (5F) | Affective response to  | Affective response >  | **SZ < HC:** |  |  |  |
|  | 2012 | HC > SZ: Accuracy | HC = 15 (5F) | sentences describing  | word counting  | R Middle Cingulate Cortex  | 18 | 8 | 42 |
|  |  | HC = SZ: RT | Mean age  | social situations |  | L Precuneus | -10 | -62 | 52 |
|  |  |  | SZ: 34.2 (9.1) | Whole brain |  | L Middle Frontal Gyrus  | -38 | 14 | 52 |
|  |  |  | HC: 30.4 (8.9) |  |  | L Posterior Cingulate Cortex  | -10 | -66 | 14 |
|  |  |  | Inpatients |  |  | L Superior Frontal Gyrus  | -2 | 34 | 58 |
|  |  |  | Outpatients |  |  | **SZ > HC:** none |  |  |  |
|  |  |  | IQ: No difference |  |  |  |  |  |  |
|  |  | 1 |  |  |  |  |  |  |  |
|  | Harvey et al.  | HC > SZ: Accuracy | SZ = 15 (2F) | Empathic accuracy (EA)  | EA > Baseline | **SZ < HC:**  |  |  |  |
|  | 2013 |  | HC = 15 (2F) | Rating |  | Precuneus | -4 | -65 | 30 |
|  |  |  | Mean age  | using video clips |  | Middle Frontal Gyrus | -23 | 45 | 34 |
|  |  |  | SZ: 42.4 (11.8) | Whole brain |  | Thalamus  | 8 | -12 | 13 |
|  |  |  | HC: 42.9 (8.6) |  |  | **SZ > HC:** none |  |  |  |
|  |  |  | Outpatients |  |  |  |  |  |  |
|  |  |  | IQ: NR |  |  |  |  |  |  |
| **ASD** |  |  |  |  |  |  |  |  |  |
| *Studies comparing reaction to (observed) pain > control* |  |  |  |  |  |  |  |
|  | Hadjikhani et al. | 1  | ASD = 36 (3F) | Empathy for pain using | Pain > no pain | **ASD < HC:** none |  |  |  |
|  | 2014 | ASD: empathy quotient | HC = 31 (3F) | video clips |  | **ASD > HC:** none |  |  |  |
|  |  | Pos. related to insula, ACC  | Mean age  | ROI Corrected |  |  |  |  |  |
|  |  | OFC, TP, SMA, putamen, | ASD: 23.5 (8.7) | Uncorrected |  | **ASD < HC:** |  |  |  |
|  |  | Caudate, thalamus,  | HC: 22.5 (7.5) |  |  | L Middle Frontal Gyrus (dlPFC) | -40 | 34 | 20 |
|  |  | Amygdala & hippocampus | Adolescents & Adults |  |  | R Middle Frontal Gyrus ( LPFC) | -34 | 46 | 4 |
|  |  | activation | IQ: No difference |  |  | L Cingulate Gyrus (Anterior Cingulate) | -14 | 24 | 24 |
|  |  |  |  |  |  | L Inferior Parietal Lobule (Supramarginal Gyrus) | -60 | -46 | 48 |
|  |  |  |  |  |  | L No gray matter found (Superior Parietal Cortex) | -30 | -42 | 40 |
|  |  |  |  |  |  | L Precuneus (TPJ) | -42 | -64 | 40 |
|  |  |  |  |  |  | R No gray matter found (Cerebellum) | 30 | -50 | -56 |
|  |  |  |  |  |  | L Middle Frontal Gyrus (Orbitofrontal Cortex) | -30 | 40 | -16 |
|  |  |  |  |  |  | **ASD > HC:** |  |  |  |
|  |  |  |  |  |  | L Middle Occipital Gyrus (Occipital lobe) | 24 | -98 | 26 |
|  |  |  |  |  |  | L Middle Occipital Gyrus (Inferior lateral occipital cortex) | -54 | -72 | -2 |
|  |  |  |  |  |  | L Superior Temporal Gyrus (Temporal Pole) | -40 | 10 | -26 |
|  |  |  |  |  |  |  |  |  |  |
|  | Fan et al. 2014 |  | ASD = 24 (male only) | Empathy for pain  | Pain > no pain | **ASD < HC:** |  |  |  |
|  |  |  | HC = 21 | (accidental or |  | L Superior Frontal Gyrus (Cuneus) | -2 | 68 | 32 |
|  |  |  | Mean age  | caused by another) |  | L Superior Frontal Gyrus | -14 | 52 | 30 |
|  |  |  | ASD: 18.4 (2.8) | using pictures |  | L Cingulate Gyrus (Anterior Cingulate) | -16 | 24 | 32 |
|  |  |  | HC: 19.3 (3.4) | Whole brain |  | R Medial Frontal Gyrus (Precentral Gyrus) | 10 | -18 | 60 |
|  |  |  | Adolescents & Adults |  |  | R Superior Frontal Gyrus | 20 | 52 | 36 |
|  |  |  | IQ: No difference |  |  | R Hippocampus (Middle Temporal Gyrus) | 32 | -26 | -8 |
|  |  |  |  |  |  | L Superior Temporal Gyrus (Middle temporal) | -46 | -58 | 22 |
|  |  |  |  |  |  | L Globus Pallidus (Amygdala) | -16 | -8 | -12 |
|  |  |  |  |  |  | L Posterior Cingulate (Precuneus) | -8 | -52 | 20 |
|  |  |  |  |  |  | L Anterior Insula | -32 | 14 | 16 |
|  |  |  |  |  |  | **ASD > HC:** |  |  |  |
|  |  |  |  |  |  |  R Inferior Parietal Lobule (Postcentral Gyrus) | 50 | -32 | 62 |
|  |  |  |  |  |  |  L Inferior Frontal Gyrus | -48 | 4 | 18 |
|  |  |  |  |  | Inflicted pain >  | **ASD < HC:** |  |  |  |
|  |  |  |  |  | accidental pain |  R Posterior Cingulate | 10 | -44 | 6 |
|  |  |  |  |  |  |  L Posterior Cingulate | -6 | -42 | 16 |
|  |  |  |  |  |  |  R Medial Frontal Gyrus (prefrontal cortex) | 14 | 32 | 40 |
|  |  |  |  |  |  |  R Thalamus | 4 | -20 | 18 |
|  |  |  |  |  |  |  R Superior Temporal Gyrus (TPJ) | 48 | -32 | 12 |
|  |  |  |  |  |  |  L Superior Temporal Gyrus (TPJ) | -58 | -46 | 20 |
|  |  |  |  |  |  | **ASD > HC:** none |  |  |  |
|  |  |  |  |  |  |   |  |  |  |
|  | Bird et al. 2010 | ASD < HC: Pleasantness | ASD = 18 (male only) | Empathy for pain in  | High pain > low pain  | **ASD < HC:** none |  |  |  |
|  |  | of low-pain stimulus | HC = 18 | significant other | other  | **ASD > HC:** none |  |  |  |
|  |  |  | Mean age | ROI (high pain-low pain self) |  |  |  |  |  |
|  |  |  | ASD: 34.6 (13.3) | Whole brain (uncorrected) | High pain - low pain  | **ASD < HC:**  |  |  |  |
|  |  |  | HC: 35.0 (12.8) |  | other  | R Lingual Gyrus (Visual Cortex) | 24 | -81 | -9 |
|  |  |  | Adults |  |  | **ASD > HC:** none |  |  |  |
|  |  |  | IQ: No difference |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| *Studies comparing affective response > control/baseline* |  |  |  |  |  |  |  |
|  | Schneider et al. | ASD < HC | ASD = 28 (13 F) | Emotional expression in  | Emotional > neutral  | **ASD < HC**: (males) none |  |  |  |
|  | 2013 | Matching emotions with  | HC = 28 (13 F) | Video clips; judge own  |  | **ASD > HC**: none |  |  |  |
|  |  | target in self and other  | Mean age males:  | & other emotional state |  | **ASD < HC**: (females)  |  |  |  |
|  |  | condition; emotion  | ASD: 32.7 (9.97) | Whole Brain |   | R Red Nucleus (Periaqueductal Gray) | 3 | -28 | -5 |
|  |  | recognition in neutral  | HC: 34.3 (9.73) |  |  | **ASD > HC**: none |  |  |  |
|  |  | condition in female ASD | females  |  |  |  |  |  |  |
|  |  |  | ASD: 29.9 (8.02) |  |  |  |  |  |  |
|  |  |  | HC: 27.9 (7.02) |  |  |  |  |  |  |
|  |  |  | Adults |  |  |  |  |  |  |
|  |  |  | IQ: No difference |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | Greimel et al.  | ASD < HC: Congruence for weak emotions | ASD = 15 (male only) | Emotional faces; judge  | Other – baseline | **ASD < HC:** |  |  |  |
|  | 2010 | in self and other condition | HC = 15 | own & other emotional  |  | L Cuneus (Superior occipital gyrus) | -18 | -90 | 32 |
|  |  | ASD = HC: RT | Mean age  | state |  | R Uncus (Anterior Fusiform Gyrus) | 36 | -10 | -38 |
|  |  |  | ASD: 14.9 (1.6) | ROI |  | **ASD > HC**: none |  |  |  |
|  |  |  | HC: 15.0 (1.4) |  |  |  |  |  |  |
|  |  |  | Children & Adolescents  |  | Self-baseline | **ASD < HC:** |  |  |  |
|  |  |  | IQ: No difference |  |  | L Inferior Frontal Gyrus | -56 | 20 | -22 |
|  |  |  |  |  |  | **ASD > HC**: none |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | Silani et al.  | ASD = HC: RT | ASD = 15 (2F) | Emotional pictures with  | Evoked emotion vs  | **ASD < HC:**  |  |  |  |
|  | 2008 | & valence ratings | HC =15 (2F) | different valence; rate  | control | L Medial Frontal Gyrus (Rectus)  | -12 | 38 | -14 |
|  |  |  | Mean age  | emotion evoked by picture |  | L Superior Frontal Gyrus | -14 | 56 | 32 |
|  |  |  | ASD: 36.6 (11.7) | Whole brain (corrected) |  | L Superior Frontal Gyrus | -12 | 56 | 14 |
|  |  |  | HC: 33.7 (10.3) |  |  | L Middle Frontal Gyrus (Inferior Frontal) | -36 | 28 | 24 |
|  |  |  | Adults |  |  | R Medial Frontal Gyrus (Anterior Cingulate) | 10 | 38 | 32 |
|  |  |  | IQ: No difference |  |  | L Paracentral Lobule (Cingulum mid) | -6 | -22 | 50 |
|  |  |  |  |  |  | L Precuneus  | -10 | -54 | 38 |
|  |  |  |  |  |  | L Middle Temporal Gyrus (Inferior Temporal) | -50 | -2 | -34 |
|  |  |  |  |  |  | L Middle Temporal Gyrus (Temporal Pole) | -56 | 4 | -30 |
|  |  |  |  |  |  | L Precentral Gyrus ( Postcentral Gyrus) | 62 | -8 | 34 |
|  |  |  |  |  |  | L Cerebellum | -6 | -50 | -30 |
|  |  |  |  |  |  | R Cerebellum | 6 | -54 | -34 |
|  |  |  |  |  |  | **ASD > HC:**  |  |  |  |
|  |  |  |  |  |  | L Precentral gyrus | -30 | -10 | 68 |
|  |  |  |  |  |  | R Precuneus | 10 | -58 | 48 |
|  |  |  |  |  |  | L Superior Parietal Lobule (Inferior Parietal) | -30 | -50 | 50 |
|  |  |  |  |  |  | R Culmen (Lingual Gyrus) | 8 | -40 | -6 |
|  |  |  |  |  |  | R Superior (Middle Occipital Gyrus) | 38 | -80 | 32 |
|  |  |  |  |  |  | R Cuneus (Superior Occipital Gyrus) | 26 | -82 | 30 |
|  |  |  |  |  |  |  |  |  |  |
|  | Schulte-Rüther  | ASD < HC: Congruent emotions | ASD = 14 (male only) | Emotional faces; judge  | Other-control | **ASD < HC:** |  |  |  |
|  | et al. 2011 | in self-condition | HC = 14 | own and other emotional |  | R Anterior Cingulate (vMPFC) | 2 | 48 | -16 |
|  |  |  | Mean age  | state |  | L Medial Frontal Gyrus (vMPFC) | -8 | 56 | -14 |
|  |  |  | ASD: 27.4 (9.34) | ROI |  | L Culmen (Precuneus/PCC) | -8 | -50 | 2 |
|  |  |  | HC: 25.1 (6.69) |  |  | **ASD > HC:** |  |  |  |
|  |  |  | Adults |  |  | Medial Frontal Gyrus (dMPFC) | 8 | 28 | 42 |
|  |  |  | IQ: No difference |  | Self-control | **ASD < HC:** none |  |  |  |
|  |  |  |  |  |  | **ASD > HC:** |  |  |  |
|  |  |  |  |  |  | R Superior Frontal Gyrus (dMPFC) | 12 | 62 | 30 |
|  |  |  |  |  |  | R Middle frontal gyrus | 50 | 16 | 46 |
|  |  |  |  |  |  | R Inferior Frontal Gyrus | 40 | 26 | -12 |
|  |  |  |  |  |  | R Superior Temporal Gyrus (TPJ) | 50 | -50 | 30 |
|  |  |  |  |  | Self-other | **ASD < HC:** none |  |  |  |
|  |  |  |  |  |  | **ASD > HC:** none |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **PP** |  |  |  |  |  |  |  |  |  |
| *Studies comparing reaction to (observed) pain > control* |  |  |  |  |  |  |  |
|  | Decety et al. | aINS pos associated with PCL-r  | PP = 37 (male only) | Empathy for pain using | Imagine self: pain – no  | **PP < HC:** |  |  |  |
|  | 2013b | Scores during self and neg  | HC = 40 | pictures; imagine self vs.  | pain | R Medial Frontal Gyrus (Orbitofrontal Cortex) | 14 | 58 | -2 |
|  |  | associated With PCL-r during other  | Mean age  | imagine other condition |  | L Medial Frontal Gyrus (dlPFC) | -12 | 52 | 8 |
|  |  | condition | PP: 32.5 (7.8) | ROI  |  | Red Nucleus (Periaqueductal Grey) | 0 | -28 | -14 |
|  |  |  | HC: 34.6 (6.9) |  |  | **PP > HC:** |  |  |  |
|  |  |  | PP: PCL-r ≥ 30 |  |  | R Inferior Frontal Gyrus | 50 | 26 | 8 |
|  |  |  | HC: PCL-r ≤ 20 |  |  | L Cingulate Gyrus (Anterior Midcingulate) | -4 | 8 | 34 |
|  |  |  | Incarcerated |  |  | R Cingulate Gyrus (Anterior Midcingulate) | 4 | 10 | 32 |
|  |  |  | IQ: matched |  |  | L Cingulate Gyrus (SMA) | -10 | 2 | 50 |
|  |  |  |  |  |  | R Anterior Insula | 38 | 20 | 12 |
|  |  |  |  |  |  | R Superior Temporal Gyrus (pSTS) | 44 | -48 | 14 |
|  |  |  |  |  | Imagine other: pain – no  | **PP < HC:** |  |  |  |
|  |  |  |  |  | pain | R Inferior Frontal Gyrus | 44 | 26 | 2 |
|  |  |  |  |  |  | R Cingulate Gyrus (Anterior Midcingulate) | 6 | 18 | 34 |
|  |  |  |  |  |  | R Anterior Cingulate (mPFC) | 16 | 32 | 12 |
|  |  |  |  |  |  | L Precentral Gyrus (Anterior Insula) | -44 | 14 | 4 |
|  |  |  |  |  |  | R Anterior Insula | 34 | 30 | 4 |
|  |  |  |  |  |  | L Superior Frontal Gyrus (SMA) | -6 | 16 | 54 |
|  |  |  |  |  |  | R Medial Frontal Gyrus (SMA) | 8 | 24 | 46 |
|  |  |  |  |  |  | R Superior Temporal gyrus (pSTS) | 50 | -52 | 22 |
|  |  |  |  |  |  | R Insula (Inferior Parietal Lobule) | 44 | -32 | 22 |
|  |  |  |  |  |  | L Insula (Inferior Parietal Lobule) | -48 | -36 | 22 |
|  |  |  |  |  |  | R Putamen | 30 | 8 | 2 |
|  |  |  |  |  |  | L Putamen | -14 | 10 | -2 |
|  |  |  |  |  |  | **PP > HC:** |  |  |  |
|  |  |  |  |  |  | R Superior Frontal Gyrus (dlPFC) | 28 | 48 | 14 |
|  |  |  |  |  |  | L Fusiform Gyrus (Inferior Temporal Gyrus) | -50 | -38 | -18 |
|  |  |  |  |  |  | R Caudate (Ventral Striatum) | 10 | 16 | -6 |
|  |  |  |  |  |  |  |  |  |  |
|  | Decety et al.  | Middle cingulate, IFG, dmPFC | PP = 27 (male only) | 1) Empathy for pain  | Pain interaction – no  | **PP < HC:**  |  |  |  |
|  | 2013a | L Angular gyrus neg associated | HC = 28 | caused by another using  | pain interaction | R Medial Frontal Gyrus (vmPFC) | 2 | 16 | -28 |
|  |  | With PCL-r (factor 1 & 2), r | Mean age: NR | video clips (pain) |  | R Superior Frontal Gyrus (Lateral OFC) | 26 | 70 | -12 |
|  |  | Angular gyrus, r pSTS neg associated | PP: PCL-r ≥ 30 | interaction) |  | L Culmen (Periaqueductal Grey) | -6 | -30 | -12 |
|  |  | With factor 1, l pSTS, dACC & striatum | HC: PCL-r ≤ 20 | 2) Empathy for pain in  |  | **PP > HC:** |  |  |  |
|  |  | neg associated with factor 2 | Incarcerated | facial expressions using  |  | R Precentral Gyrus (Inferior Frontal Gyrus) | 56 | 10 | 6 |
|  |  | Anterior insula pos associated  | IQ: matched | video clips (pain) |  | L Inferior Frontal Gyrus | -50 | 14 | 14 |
|  |  | with factor 1 & 2 |  | ROI  |  | R Medial Frontal Gyrus (dmPFC) | 6 | 58 | 16 |
|  |  | L postcentral & r precentral gyrus pos  |  |  |  | R Medial Frontal Gyrus (dorsal ACC) | 4 | 50 | 16 |
|  |  | Associated with factor 1 |  |  |  | L Medial Frontal Gyrus (dorsal ACC) | -8 | 38 | 26 |
|  |  |  |  |  |  | R Cingulate Gyrus (Anterior Midcingulate) | 2 | 16 | 28 |
|  |  |  |  |  |  | R Superior Frontal Gyrus (SMA) | 8 | 18 | 54 |
|  |  |  |  |  |  | R Claustrum (Anterior Insula) | 36 | 16 | -8 |
|  |  |  |  |  |  | L Anterior Insula | -36 | 16 | -8 |
|  |  |  |  |  |  | R Superior Temporal gyrus (pSTS) | 60 | -46 | 18 |
|  |  |  |  |  |  | L Inferior Parietal Lobule (Supramarginal Gyrus) | -54 | -42 | 28 |
|  |  |  |  |  |  | L Putamen (Dorsal Striatum Globus Pallidus) | -14 | 8 | 2 |
|  |  |  |  |  |  | R Dorsal Striatum /Globus Pallidus | 14 | 4 | -2 |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | Pain expression – no  | **PP < HC:** |  |  |  |
|  |  |  |  |  | pain expression | R Inferior Frontal Gyrus | 50 | 5 | 15 |
|  |  |  |  |  |  | L Precentral Gyrus (Inferior Frontal Gyrus) | -38 | 5 | 25 |
|  |  |  |  |  |  | R Anterior Cingulate (vmPFC) | 8 | 30 | -10 |
|  |  |  |  |  |  | R Superior Frontal Gyrus (Lateral OFC) | 30 | 55 | -10 |
|  |  |  |  |  |  | R Medial Frontal Gyrus (dmPFC) | 8 | 58 | 35 |
|  |  |  |  |  |  | L Superior Frontal Gyrus (dmPFC) | -10 | 40 | 45 |
|  |  |  |  |  |  | L Dorsal anterior cingulate gyrus | -2 | 35 | 5 |
|  |  |  |  |  |  | L Middle cingulate cortex | -18 | 8 | 42 |
|  |  |  |  |  |  | R Caudate (pSTS) | 42 | -40 | 2 |
|  |  |  |  |  |  | L Middle Temporal Gyrus (pSTS) | -52 | -72 | 20 |
|  |  |  |  |  |  | R Inferior Parietal Lobule (Supramarginal Gyrus) | 68 | -25 | 38 |
|  |  |  |  |  |  | R Middle Temporal Gyrus (Inferior Parietal Lobule | 52 | -65 | 28 |
|  |  |  |  |  |  | L Middle Temporal Gyrus (Inferior Parietal Lobule) | -50 | -77 | 32 |
|  |  |  |  |  |  | R Dorsal striatum (Globus Pallidus) | 15 | 8 | -2 |
|  |  |  |  |  |  | R Dorsal striatum (Putamen) | 28 | 12 | 12 |
|  |  |  |  |  |  | **PP > HC:** |  |  |  |
|  |  |  |  |  |  | R Claustrum (Anterior Insula) | 28 | 28 | 0 |
|  |  |  |  |  |  | L Inferior Frontal Gyrus (Anterior Insula) | -32 | 30 | 0 |
|  |  |  |  |  |  |  |  |  |  |
|  | Marsh et al.  | HC = PP | PP = 14 (6F) | Empathy for pain using  | Pain > no pain | **PP < HC:** |  |  |  |
|  | 2013 | Other pain: PCL-r neg associated | HC = 21 (6F) | pictures; imagine self vs  |  | L Superior Frontal Gyrus (Medial Frontal) | -4 | 57 | 25 |
|  |  | rostral ACC, factor 1 l rostral ACC & | Mean age  | imagine other condition |  | L Rostral Anterior Cingulate | -1 | 35 | 24 |
|  |  | Amygdala | PP: 15.4 (2.3) | Whole brain |  | R Cingulate (Rostral Anterior Cingulate) | 8 | 35 | 27 |
|  |  |  | HC: 14.3 (1.8) |  |  | R Putamen/Lentiform Nucleus | 20 | 2 | 2 |
|  |  |  | PCL-r > 20  |  |  | **PP > HC:** none |  |  |  |
|  |  |  | Children & Adolescents |  | Other pain > no pain | **PP < HC:** |  |  |  |
|  |  |  | IQ: No difference |  |  | L Superior Frontal Gyrus | -22 | 41 | 24 |
|  |  |  |  |  |  | R Rostral Anterior Cingulate  | 2 | 33 | 7 |
|  |  |  |  |  |  | R Precentral Gyrus (Insula) | 32 | 1 | 22 |
|  |  |  |  |  |  | L Amygdala/Uncus | -16 | 0 | -33 |
|  |  |  |  |  |  | **PP > HC:** none |  |  |  |
|  |  |  |  |  | Self-pain > no pain | **PP < HC:** none |  |  |  |
|  |  |  |  |  |  | **PP > HC:** none |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| *Studies comparing affective response > control/baseline* |  |  |  |  |  |  |  |
|  | Meffert et al.  |  | PP = 18 (male only) | 1) Observation of  | Observation >  | **PP < HC:** |  |  |  |
|  | 2013 |  | HC = 26 | interacting hands  | baseline | R Inferior Parietal Lobule (Postcentral Gyrus) | 36 | -33 | 54 |
|  |  |  | Mean age  | (pain, love, exclusion,  |  | R Postcentral Gyrus (Supramarginal Gyrus) | 51 | -24 | 42 |
|  |  |  | PP: 39.2 (2.4) | neutral) |  | R Postcentral Gyrus (Supramarginal Gyrus) | 60 | -15 | 27 |
|  |  |  | HC: 37.0 (1.6 | 2) Empathy: instruction to |  | L Inferior Parietal Lobule (Postcentral Gyrus) | -33 | -36 | 45 |
|  |  |  | PCL-r > 26 | feel with one of the hands  |  | L Midcingulate gyrus | -9 | -18 | 42 |
|  |  |  | Incarcerated | (pain, love) |  | L Precuneus | -12 | -42 | 48 |
|  |  |  | IQ: No difference | Localizer task: experience  |  | R Medial Frontal Gyrus (Superior Frontal) | 21 | -3 | 54 |
|  |  |  |  | similar interactions with  |  | R Superior Frontal Gyrus (Pre-SMA) | 6 | 18 | 54 |
|  |  |  |  | own hand |  | R Medial Frontal Gyrus (Pre-SMA) | 12 | 6 | 57 |
|  |  |  |  | ROI |  | R Inferior Frontal Gyrus | 60 | 15 | 18 |
|  |  |  |  |  |  | R Inferior Frontal Gyrus | 48 | 12 | 24 |
|  |  |  |  |  |  | L Claustrum (Insula) | -36 | -6 | -12 |
|  |  |  |  |  |  | L Insula | -36 | -3 | 12 |
|  |  |  |  |  |  | R Cingulate Gyrus (Precentral Gyrus) | 27 | -12 | 48 |
|  |  |  |  |  |  | L Inferior Frontal Gyrus | -51 | 15 | 27 |
|  |  |  |  |  |  | R Inferior Frontal Gyrus (Anterior Insula) | 30 | 15 | -18 |
|  |  |  |  |  |  | R Anterior Insula | 36 | 18 | -12 |
|  |  |  |  |  |  | L Precentral Gyrus | -27 | -21 | 51 |
|  |  |  |  |  |  | L Precentral Gyrus | -27 | -9 | 54 |
|  |  |  |  |  |  | L Precentral Gyrus | -33 | -6 | 60 |
|  |  |  |  |  |  | L Anterior Insula | -33 | 15 | 3 |
|  |  |  |  |  |  | L Claustrum (Anterior Insula) | -27 | 21 | 6 |
|  |  |  |  |  |  | R Midcingulate Gyrus | 9 | -21 | 39 |
|  |  |  |  |  |  | R Superior Temporal Gyrus | 42 | -33 | 15 |
|  |  |  |  |  |  | R Insula (Rolandic operculum) | 45 | -24 | 18 |
|  |  |  |  |  |  | R Insula (Superior Temporal Gyrus) | 45 | -3 | -9 |
|  |  |  |  |  |  | R Claustrum (Middle Insula) | 42 | 3 | 0 |
|  |  |  |  |  |  | R Inferior Frontal Gyrus | 54 | 30 | 0 |
|  |  |  |  |  |  | L Postcentral Gyrus | -54 | -15 | 21 |
|  |  |  |  |  |  | L Postcentral Gyrus | -54 | -15 | 33 |
|  |  |  |  |  |  | R Midcingulate Gyrus | 9 | 9 | 27 |
|  |  |  |  |  |  | R Midcingulate Gyrus | 3 | 15 | 21 |
|  |  |  |  |  |  | R Anterior Insula | 36 | 30 | 6 |
|  |  |  |  |  |  | **PP > HC: none** |  |  |  |
|  |  |  |  |  | Empathy > baseline | **PP < HC:** |  |  |  |
|  |  |  |  |  |  | R Inferior Parietal Lobule (Postcentral Gyrus) | 36 | -33 | 51 |
|  |  |  |  |  |  | L Inferior Parietal Lobule (Postcentral Gyrus) | -33 | -36 | 45 |
|  |  |  |  |  |  | **PP > HC:** |  |  |  |
|  |  |  |  |  |  | R Insula (Parietal Operculum) | 42 | -15 | 18 |
|  |  |  |  |  |  | L Precentral Gyrus (Parietal Operculum) | -57 | 12 | 9 |