Data supplement for McTeague et al., Identification of Common Neural Circuit Disruptions in Emotional Processing Across Psychiatric Disorders. Am J Psychiatry (doi: 10.1176/appi.ajp.2019.18111271)

CONTENTS

Supplementary Methods

Search Terms. The following search terms were used in Pubmed to identify potential articles: (schizophrenia OR schizoaffective OR psychosis OR depression OR dysthymia OR unipolar depression OR major depression OR bipolar disorder OR mania OR specific phobia OR social anxiety OR social phobia OR panic disorder OR agoraphobia OR OCD OR GAD OR PTSD OR acute stress disorder OR anxiety OR substance abuse OR substance dependence OR addiction OR substance use disorder) AND (emotion) AND (IAPS OR pictures OR faces OR words OR IADS OR sounds OR conditioning OR threat OR shock OR reward OR punishment OR mood induction OR symptom provocation OR script imagery OR imagery OR recall OR memory OR error OR delay discounting OR anticipation OR mood induction OR video OR emotion regulation) AND (PET OR fmri).

Coordinate and Characteristics Extraction. Peak coordinates and study/participant characteristics were extracted from each paper separately by a minimum of two doctoral-level researchers and one doctoral student with expertise in psychiatric neuroimaging (LM, BR, JH, DC, YJ, CC). In the case of discrepancies one to three additional doctoral-level coders re-entered those articles. Each discrepancy resulting from more than straightforward entry error was reviewed to establish consensus.

The following variable criteria for coding study characteristics were provided.

<u>Pure Reactivity:</u>

Y or N the paradigm indexes straightforward emotion provocation. For example, emotional faces with no task are pure reactivity. The emotional stroop is not pure reactivity.

More emotion than cognition:

This variable is for coding paradigms that may have a task simultaneous with the emotional processing task. Enter Y or N as to whether the design is weighted more toward emotion provocation as opposed to cognitive processing/load. For example, tasks of gender identification during slowly presented (i.e., multiple seconds) emotional faces are more prominently emotional than cognitive given the low cognitive demand. A 1-back n-back with IAPS would be weighted more emotional than cognitive. However, with increasing load please decide if a paradigm is weighted more toward capturing cognitive than emotional processing. Performance data can help with that decision. If performance is near ceiling, the cognitive task is merely ensuring attention to the affective foreground.

Cognition/Emotion Explanation:

Describe the extent to which cognitive load could alter emotion provocation effects. For example, a gender identification task with faces will have a modest effect on emotional modulation and minimally recruit cognitive control circuitry whereas a 2- or 3-back imposed on emotional faces would have a stronger regulatory effect on emotional modulation and result in greater recruitment of cognitive control circuitry.

Type processing

Please code:

Reactivity

Regulation

Compound

Other

- Reactivity = passive reactivity (e.g., picture viewing; maintain condition of emotion regulation paradigm)
- Emotion Regulation = up or down/reappraisal regulation condition of emotion regulation paradigm
- Compound reactivity + cognitive task (emotional cues with concurrent cognitive task like n-back/ go/no-go)

Regulation Direction

If a regulation study specify

Activation Likelihood Estimation (ALE) Meta-analysis. The revised ALE algorithm, implemented in MATLAB, was used to identify areas of convergence of reported coordinates for patient/control differences in activation during emotional processing tasks higher than expected under a random spatial association (4, 5). ALE models activation as 3-dimensional Gaussian probability distributions centered on the reported peak coordinate, capturing the spatial uncertainty associated with each focus. The probability distributions for all foci of a given experiment were aggregated as a "modeled activation map" (6). The union of all modeled activation maps then resulted in

voxelwise ALE scores, which were tested against an analytically derived null-distribution that reflects a random spatial association between experiments with a fixed within-experiment distribution of foci (6). Hereby, random-effects inference was applied, which assesses above-chance convergence between experiments. The observed ALE scores were tested against the expectation on the ALE scores under the null distribution of random spatial association across experiments. The resulting nonparametric p values were then thresholded at a cluster-level familywise-error-corrected threshold of $p < .05$ (cluster-forming threshold at voxel-level $P < .005$) and transformed into z scores for display.

To avoid results dominated by one or two individual experiments and to have sufficient power to detect moderately sized effects, ALE interpretations were limited to those contrasts with at least 17 experiments. This is based on work by Eickhoff and colleagues (7) who simulated more than 120,000 meta-analysis datasets using empirical parameters (i.e., number of subjects, number of reported foci, distribution of activation foci) derived from the BrainMap database. This was towards the aim of characterizing the behavior of ALE analyses, to derive first power estimates for neuroimaging meta-analyses, and to thus formulate recommendations for future ALE studies. They demonstrated that cluster-level family-wise error (FWE) correction represents the most appropriate method for statistical inference. In turn, using cluster-level FWE thresholding, 17 experiments ensure that on average the contribution of the most dominant experiments is less than 50% whereas the contribution of the two most dominant experiments is less than 80%. This enables sufficient power to detect moderate effects. Furthermore, informed by these findings, in a recent consensus paper

leaders in neuroimaging meta-analysis who utilize a range of software suites formally recommended that a meta-analysis should include at least 17 experiments (8).

Supplementary Results

Final Selected Experiment Set. The final set of experiments submitted to meta-analysis consisted of 298 experiments from 254 articles (Figure S1; Table S1) for a total of 10,918 participants (5,427 patient and 5,491 control participants). The vast majority of experiments (n=283) utilized functional magnetic resonance imaging (fMRI) followed by 14 positron emission tomography experiments and one using single-photon emission computerized tomography. See Figure S5 for analyses limited to fMRI. Experiments were published between 1999 and May 2018.

For the small subset of articles that included multiple patient groups completing the same experimental paradigm (three papers included more than one patient group) each patient versus control comparison was included as a separate experiment. Articles with results of multiple tasks probing emotional processing in the same participants were included as separate experiments in the meta-analysis (i.e., 26 articles included two tasks; one article included three tasks; three articles included four tasks; one article included five tasks).

Experiments were selected to capture lifespan patterns and thus included participants ranging from childhood (youngest experiment group mean age=12.1 years) through older adulthood (oldest experiment group mean age=73.1 years). The majority of experiments represented adulthood (n=273; 18-50 years; participant mean age=44.40 years), followed by childhood/adolescence (n=21; <18 years; mean age=14.76 years) and very few with older adults (n=4; >50 years; mean age=60.27

years). See Figure S3 for analyses separately by age group. Furthermore, most experiments included medicated (n=174) versus unmedicated (n=119) patients while the information was lacking for 5 experiments. See Figure S4 for analyses by current medication status. Poorer behavioral performance and/or ratings of more intense emotional engagement on the scanner task by patients relative to control participants was reported in 158 experiments, no differences in 140 experiments, and not reported or assessed for 2 experiments. See Figure S5 for analyses by performance/ratings status. Baseline experiments of interventional studies (e.g., drug administration, treatment) otherwise meeting criteria were included.

The psychotic disorders category comprised experiments exclusively of schizophrenia (n=59). The more heterogeneous non-psychotic disorders category comprised 239 experiments of anxiety disorders (n=94; posttraumatic stress disorder (PTSD) n=28; obsessive compulsive disorder (OCD) n=20; social anxiety disorder n=17; specific phobia n=11; generalized anxiety disorder (GAD) n=10; panic disorder n=5; mixed anxiety disorders n=3), unipolar depressive disorders n=79, bipolar disorders n=47; and substance use disorders (mixed substance abuse and/or dependence disorders n=19: cocaine n=8; alcohol n=6; methamphetamine n=3; cannabis n=2). Across disorders, patient participants included those with first episode and chronic disorder manifestations, as well as interepisode expressions in the case of chronic bipolar and psychotic disorders (11/47 and 4/59 psychotic and bipolar disorder experiments respectively included interepisode patient samples). Reports of comorbidity were inconsistent across studies precluding quantification.

Included experiments also represented three broad types of emotional

processing: reactivity n=230, compound emotional/cognitive n=56; and regulate n=18. More specifically, tasks included an array of emotional processing tasks across multiple domains: picture viewing n=161, script reactivity/imagery n=20, stroop task n=15, conditioning n=12, and range of diverse tasks none of which each exceeded more than 1 to 11 studies. Experimental stimuli were predominantly faces (n=105) followed by scenes (n=89), words (n=28), scripts (n=20), shapes (n=18), sentences (n=6), heat (n=5), and a diverse range of stimuli each with less than 5 experiments each. Most experiments included medicated (n=174) as opposed to unmedicated patients (n=119) while information on medication was lacking for 5 experiments. Seventy-nine percent of all contrasts were of an emotional arousing condition relative to an "active" neutral condition whereas 16% of contrasts were in relation to baseline, and 5% were in relation to a fixation condition. Across all the 298 included experiments a total of 3,028 contrasts were extracted from the included papers. Of these, 2,099 or 69% represented unpleasant relative to neutral or baseline processing. Only 19% represented pleasant relative to neutral or baseline and 12% reported unpleasant and pleasant concurrently as an arousal contrast.

While the meta-analytic approach may impose limitations by the breadth of published literature, it also productively highlights a number of implied conceptual and methodological biases in psychiatric and cognitive neuroscience research. This was especially pronounced in examining lifespan effects. In the case of older adults, even with the very lenient threshold of categorizing all participants over 50 years as elderly, we could only identify four eligible experiments, i.e., less than 3% of the included set. With a global average life expectancy of 71 years and 79 years in the United States (WHO; http://www.who.int/gho/mortality_burden_disease/life_tables/en/), there is a

dearth of neuroimaging data to guide understanding of emotional processing and psychopathology in aging samples. In the case of children and young adults less than 18 years, we identified 21 eligible experiments, less than 10% of the experiment set. In turn, 56% of the total experiments were samples with mean ages between 30 and 40 years. The under-representation of younger and older samples was even more pronounced in the current meta-analysis than in our prior transdiagnostic meta-analysis of cognitive control neurocircuit function (9).

Relatedly, anxiety spectrum disorders far exceeded other disorder classes, possibly reflective of the nosological prediction that this pathology is synonymous with defensive hyper-reactivity (APA, 2013). Unipolar depression was the next most represented disorder class, followed by schizophrenia. Substance use disorders were the least represented with only 19 included experiments. Despite the wealth of substance use disorder papers with craving and related emotional processing during fMRI, most studies did not report voxelwise, whole brain results and were thus excluded.

Contribution Results to Aberrant Activation Analyses. Consistent with the array of included experiments, overwhelmingly, experiments of adulthood (18-50 years) contributed the most to all clusters (i.e., 86% on average across clusters; 90% of all contrasts), relative to experiments of childhood/adolescence (<18 years) and older adulthood (>50 years). Experiments of childhood/adolescence showed convergence in occipital and occipito-temporal regions whereas experiments of adulthood showed strong convergence in limbic/paralimbic and prefrontal regions as observed in the ALE across the lifespan. No convergence was observed for older adulthood. Results from

medicated and unmedicated samples contributed similarly across clusters. Furthermore, similar findings were observed whether or not patients and controls differed on task-related behavioral performance or subjective ratings. Considering modality, fMRI experiments contributed more (92% on average) than PET experiments, with no contributions from SPECT experiments (Figure S6). Regarding task processes, reactivity tasks (80% on average across clusters; 78% of all contrasts) contributed far more than regulation and compound tasks. Unpleasant as opposed to pleasant or a combination of pleasant and unpleasant processing contributed most (72% on average; 69% of all contrasts). Furthermore, convergent clusters were predominantly represented by picture (i.e., faces and scenes) processing tasks (45% on average; 52% of all contrasts) with the next strongest contributions from script processing/imagery (7% on average; Figure S7). In terms of specific stimuli, experiments that utilized faces contributed most across clusters (45% on average; 37% of all contrasts), followed by scenes (26% on average; 30% of all contrasts), words (11% on average; 10% of all contrasts), and scripts (7% on average; 8% of all contrasts). Corresponding ALE results stratified by sample and design characteristics are provided in Figures S3-S9. Analyses of extracted mean per voxel probability of patient aberrant activation relative to control participants by disorder class (Figure S2) further underscored the broad distribution of disorders contributing to each of the clusters of convergence. More specifically, region of interest (ROI) analyses on extracted data from the six significant clusters, demonstrated similar probabilities of voxelwise activation from the modeled activation maps across disorder groupings (Kruskal-Wallis Test, Hs=7.86-0.56, ns (Figure S2).

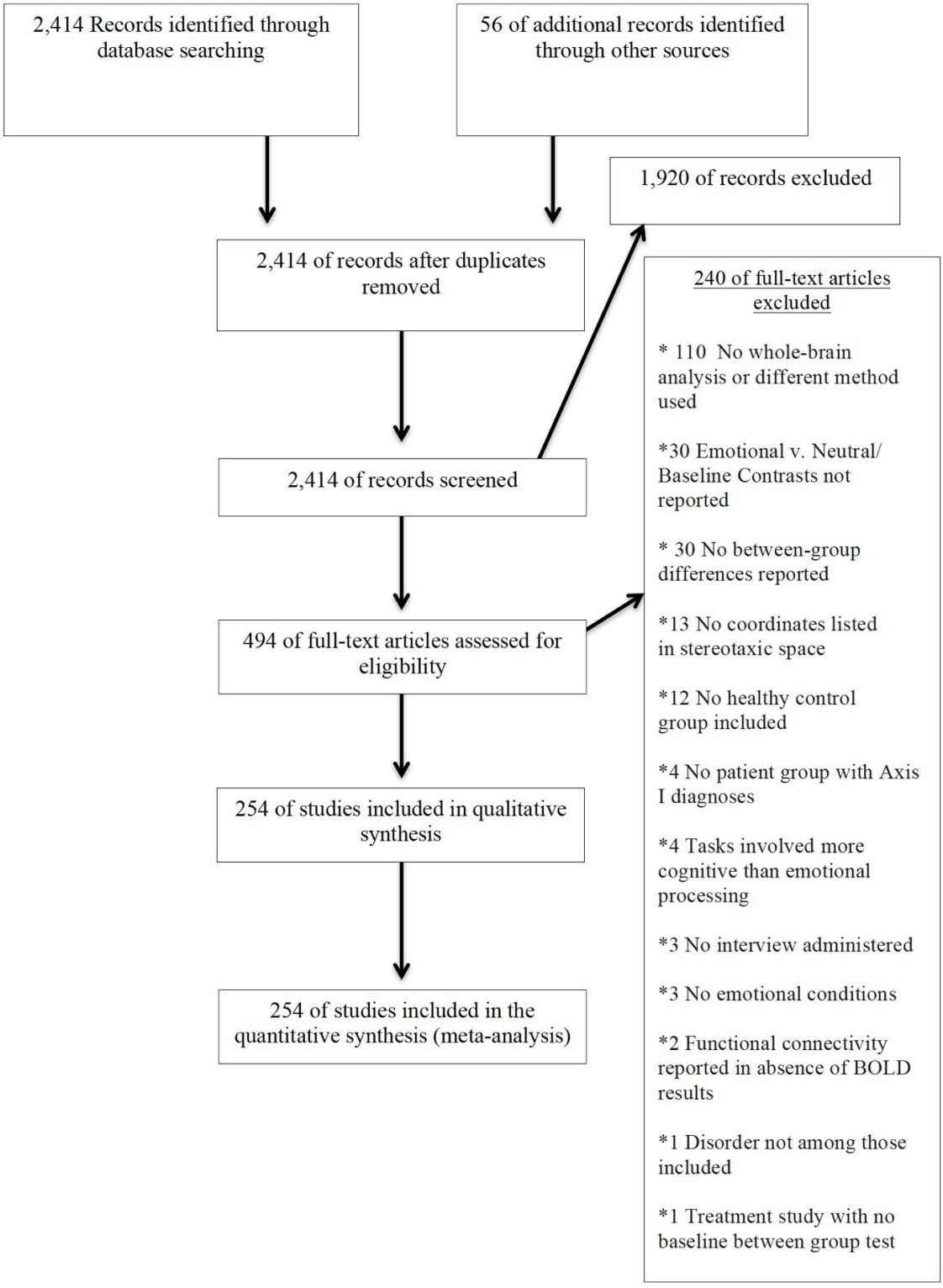

FIGURE S1. Flow diagram of paper selection

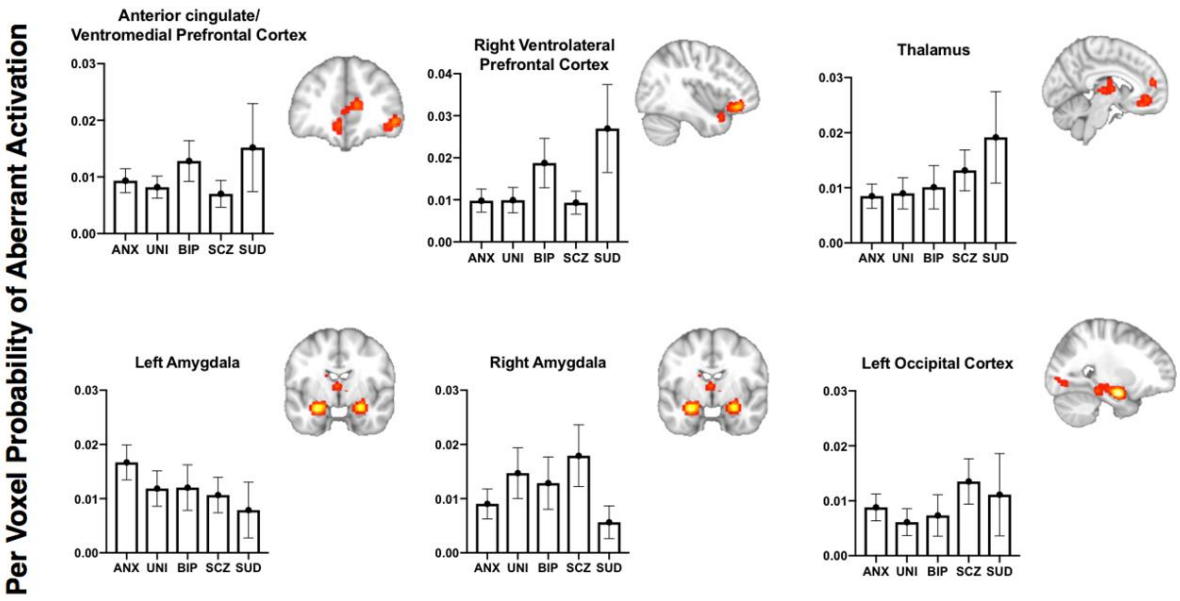

FIGURE S2. Extracted mean per voxel probability of patient aberrant activation (i.e., pooled across patient hyper- and hypo-activation and across processing types) relative to control participants by disorder class. ANX=anxiety spectrum disorders; UNI=unipolar depression spectrum disorders; BIP=bipolar spectrum disorders; SCZ=schizophrenia spectrum disorders; SUD=substance use disorders. Consistent with a transdiagnostic signature, a broad distribution of disorders contributed to each of the clusters of convergence. This was confirmed by follow up region of interest (ROI) analyses on extracted data from the six significant clusters, which demonstrated similar probabilities of voxelwise activation from the modeled activation maps across disorder groupings (Independent Samples Kruskal-Wallis Test, Us=7.86-0.56, ns).

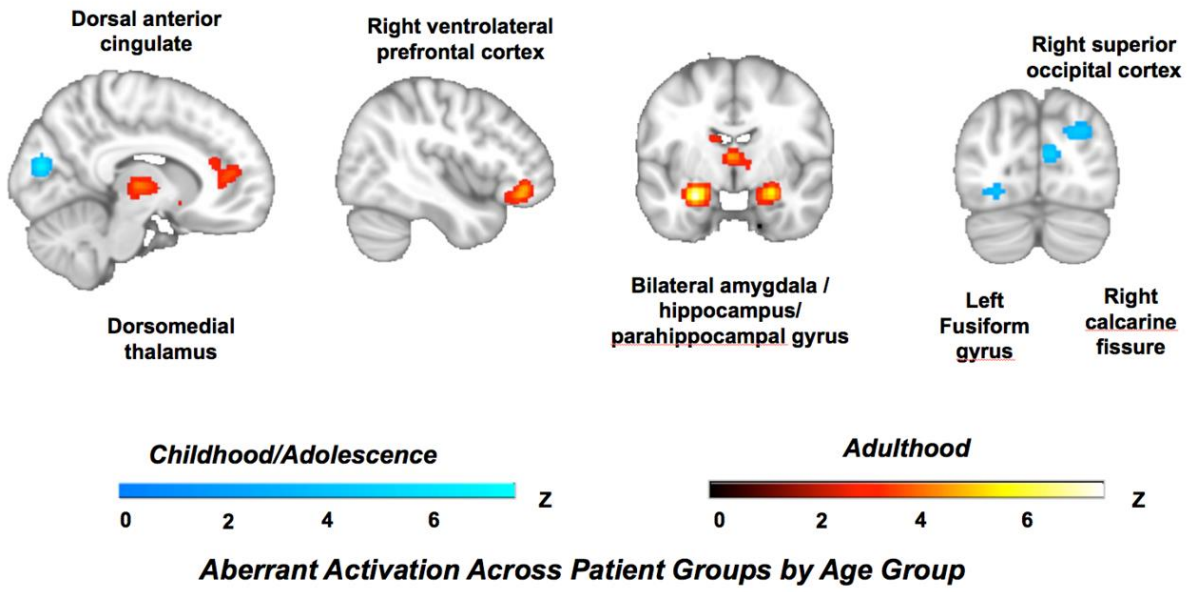

FIGURE S3. Aberrant Activation by Age Group. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation and processing types), separately by age groups. The majority of experiments represented adulthood (n=273; 18-50 years; participant mean age=44.40 years), followed by childhood/adolescence (n=21; <18 years; mean age=14.76 years) and very few with older adults (n=4; >50 years; mean age=60.27 years). Not surprisingly, the latter group did not show convergence. This was confirmed by follow up region of interest (ROI) analyses on extracted data from the significant clusters in the aberrant activation analyses (collapsing across hyper- and hypo-activation) as well as for those which separately converged for patient hyper- and hypo-activation. Across age groups, similar per voxel probability of activation was observed rom the modeled activation maps by ROI (Independent Samples Kruskal-Wallis Tests, H=3.44-0.28, ns. Non-significant results should be interpreted with caution given the dramatically different experiment ns by age group.

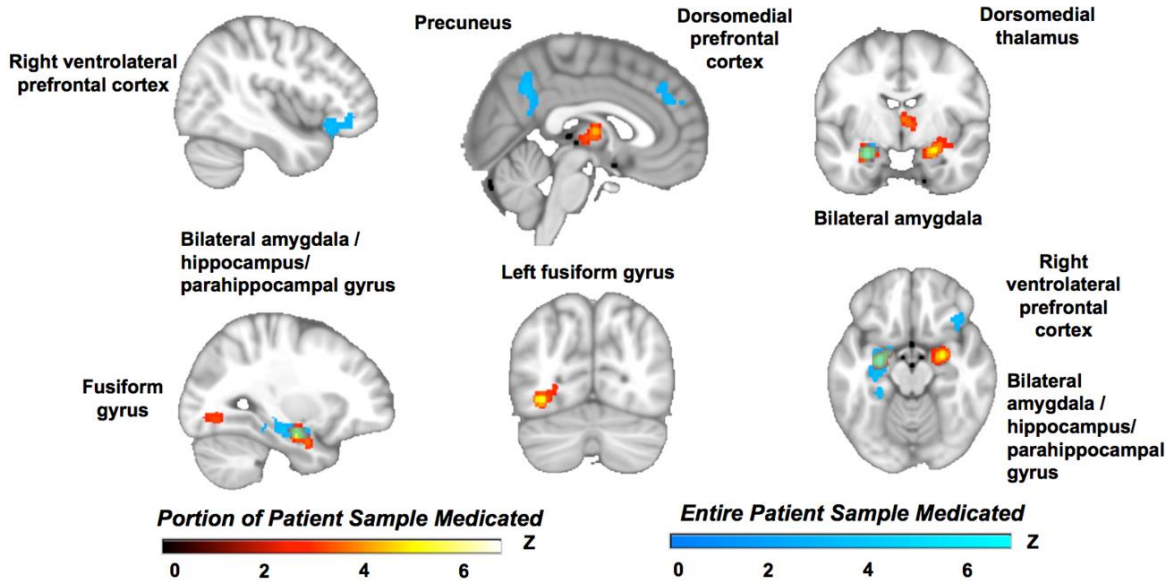

FIGURE S4. Aberrant Activation by Medication Status. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing types), separately by experiments with medicated and unmedicated samples.

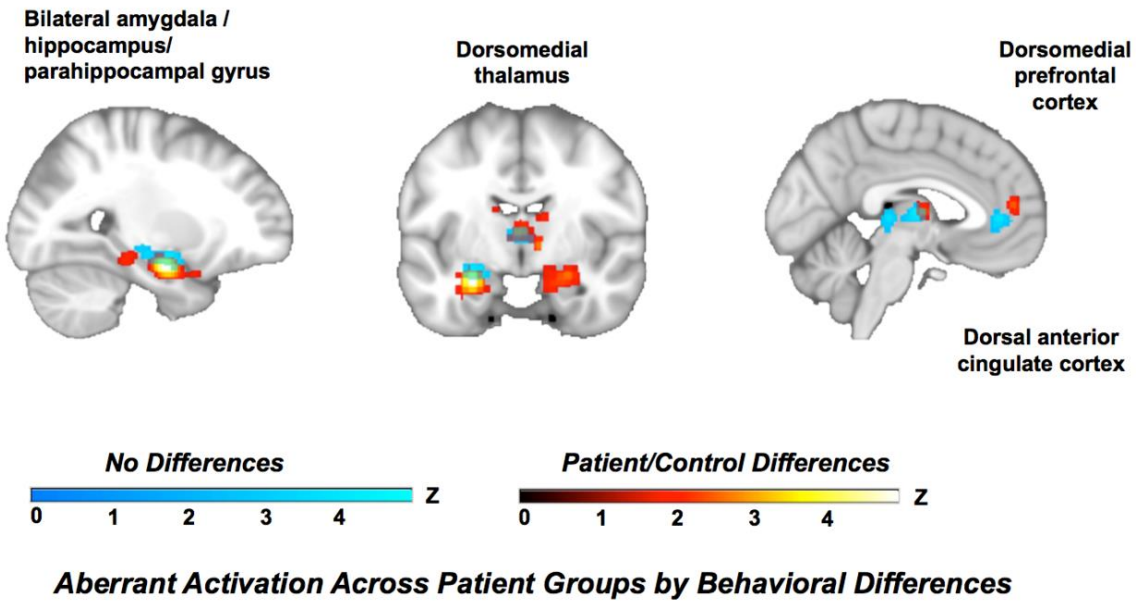

FIGURE S5. Aberrant activation by performance/subjective ratings differences between patients and control participants. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing types), separately by experiments for which patients and controls differed on behavioral performance and/or intensity of subjective ratings. All experiments for which patients and controls differed represented worse behavioral performance and/or more intense subjective ratings of aversion among patient samples. Poorer behavioral performance and/or ratings of more intense emotional engagement on the scanner task by patients relative to control participants was reported in 158 experiments, no differences in 140 experiments, and not reported or assessed for 2 experiments.

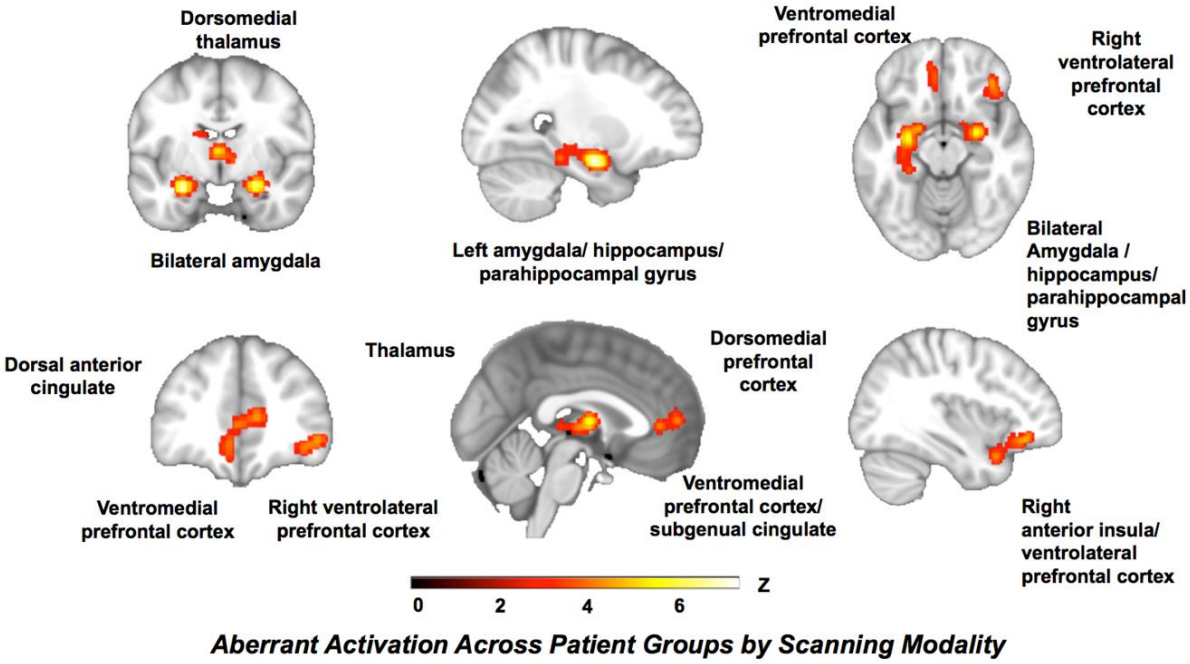

FIGURE S6. Aberrant activation by modality. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across, disorder, patient hyper- and hypo-activation, and processing types), separately by experiments assessed with utilized functional magnetic resonance imaging (fMRI; n=283), positron emission tomography (PET; n=14), and single-photon emission computerized tomography (SPECT; n=1). Only experiments with fMRI showed convergence.

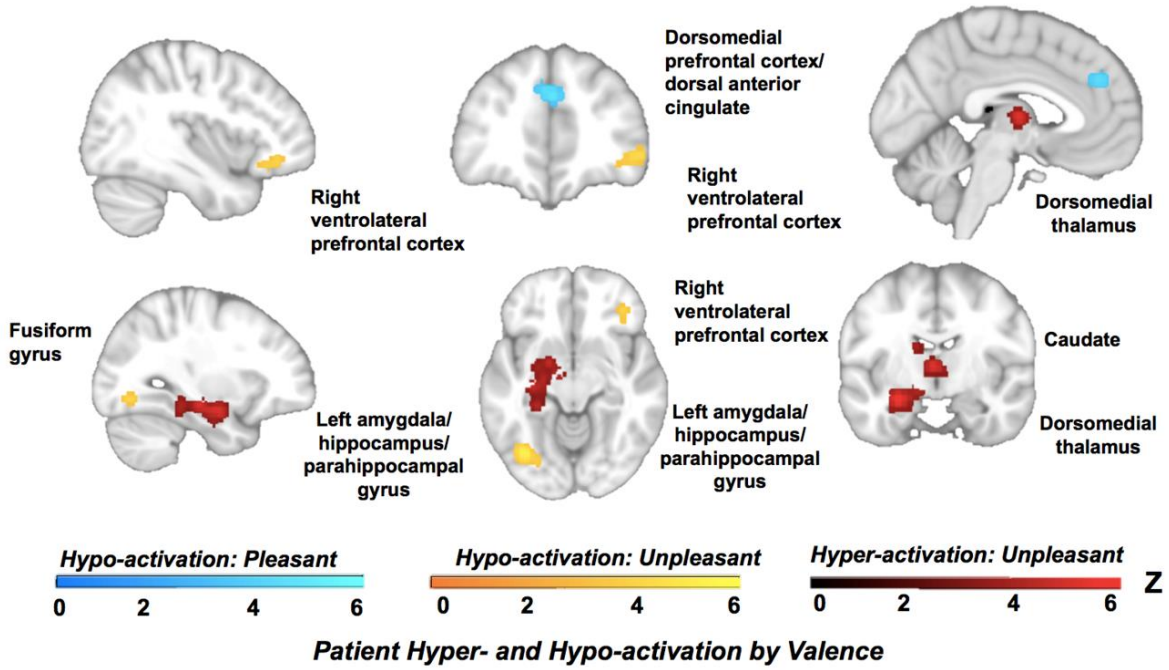

FIGURE S7. Aberrant activation by valence. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing types), separately by experiments of pleasant, unpleasant or combined pleasant/unpleasant processing.

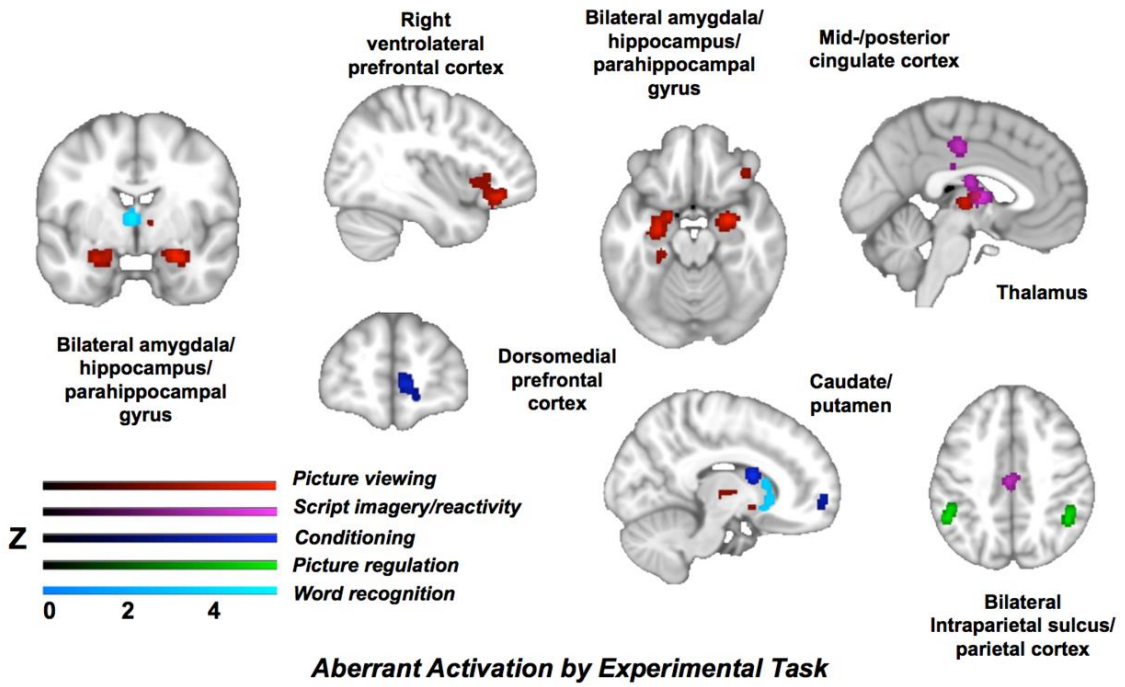

FIGURE S8. Aberrant activation by experimental task. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing types) separately by experimental task contrasts that demonstrated convergence. Notably, while picture viewing (n=161) and script/reactivity/imagery (n=20), had sufficient contrasts to determine moderate effect sizes and avoid predominant contribution by a single study, conditioning (n=12), regulation of responses to pictures (n=11), and word recognition (n=6) did not and convergence should be interpreted with caution.

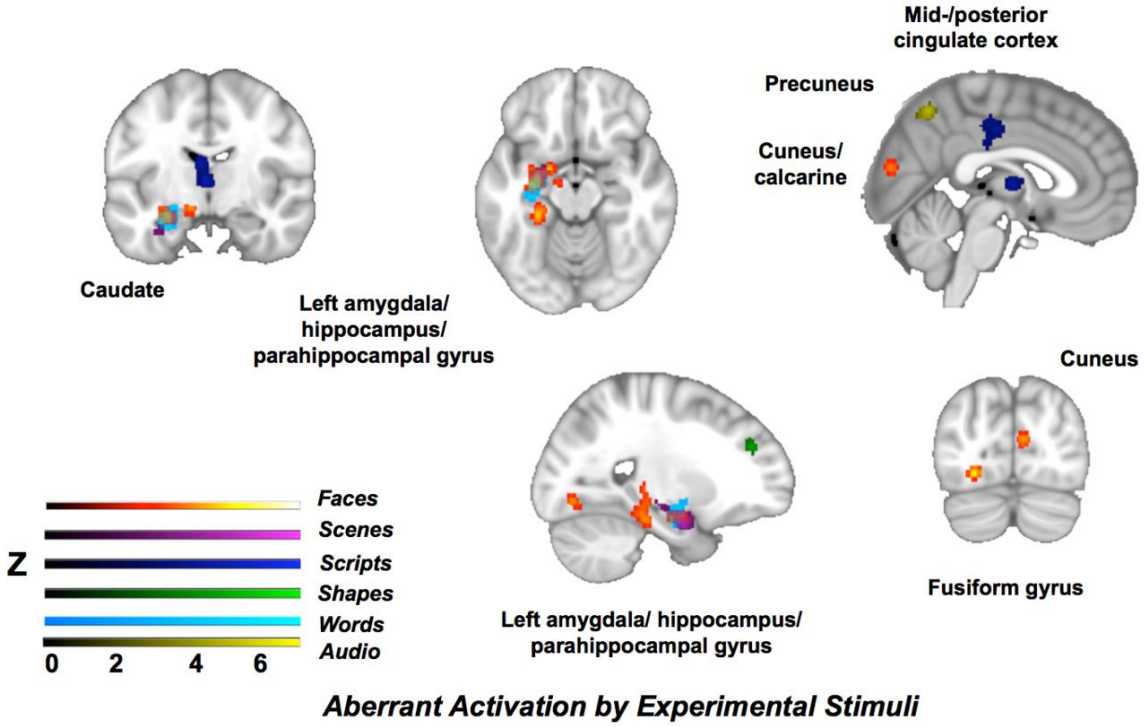

FIGURE S9. Aberrant activation by experimental stimuli. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing types) separately by stimuli contrasts that demonstrated convergence. Experimental stimuli were predominantly faces (n=105) followed by scenes (n=89), words (n=28), scripts (n=20), shapes (n=18), sentences (n=6), heat (n=5), and a diverse range of stimuli each with less than 5 experiments each.

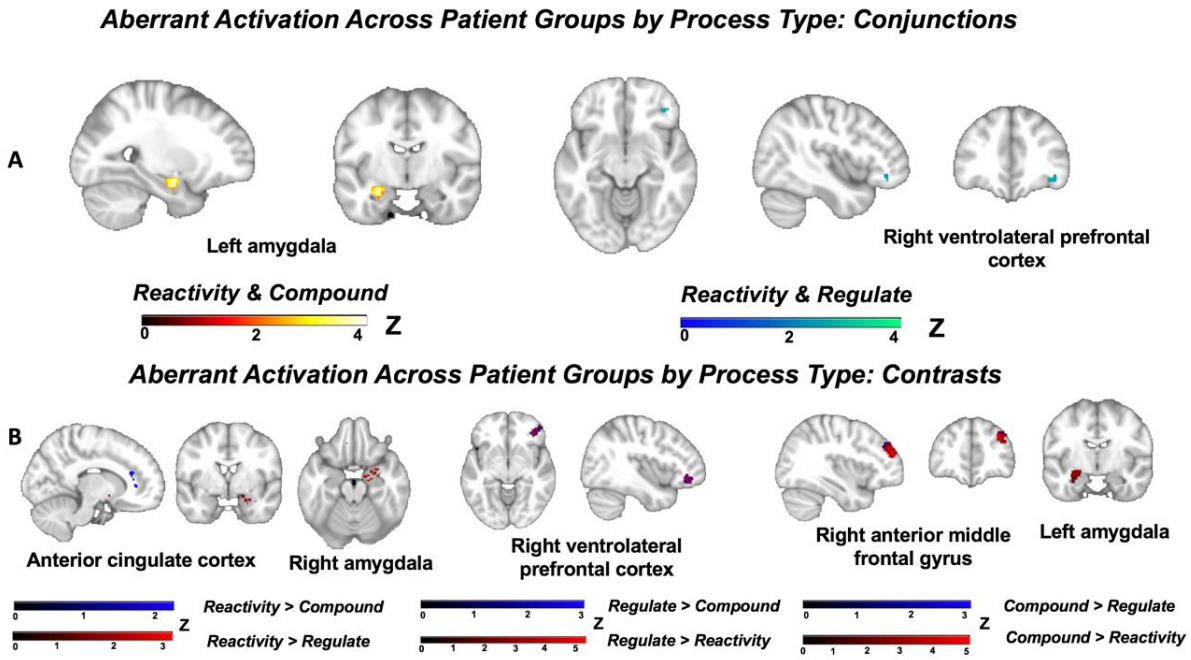

FIGURE S10. **A**. Conjunctions of transdiagnostic aberrant activation (i.e., pooled across disorder and patient hyper- and hypo-activation) for reactivity, regulation, and compound processing tasks. Shared disruption in left ventrolateral prefrontal cortex was demonstrated during emotional reactivity and regulation and in right amygdala during emotional reactivity and compound processing. **B**. Contrasts of transdiagnostic aberrant activation (i.e., pooled across disorder and patient hyper- and hypo-activation) for reactivity, regulation, and compound processing tasks.

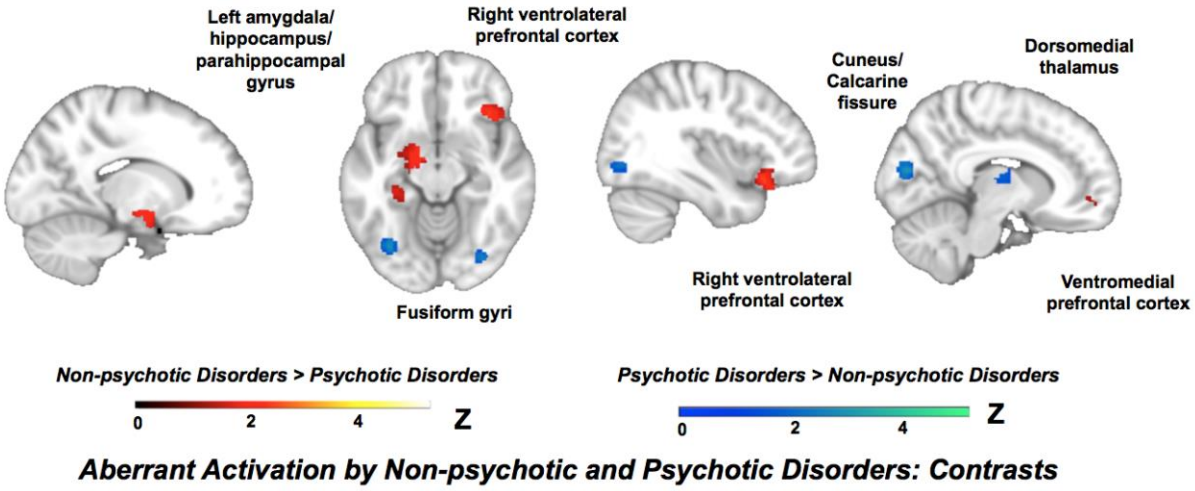

FIGURE S11. Contrasts of transdiagnostic aberrant activation (i.e., pooled across disorder, patient hyper- and hypo-activation and processing tasks) for non-psychotic and psychotic disorder groups.

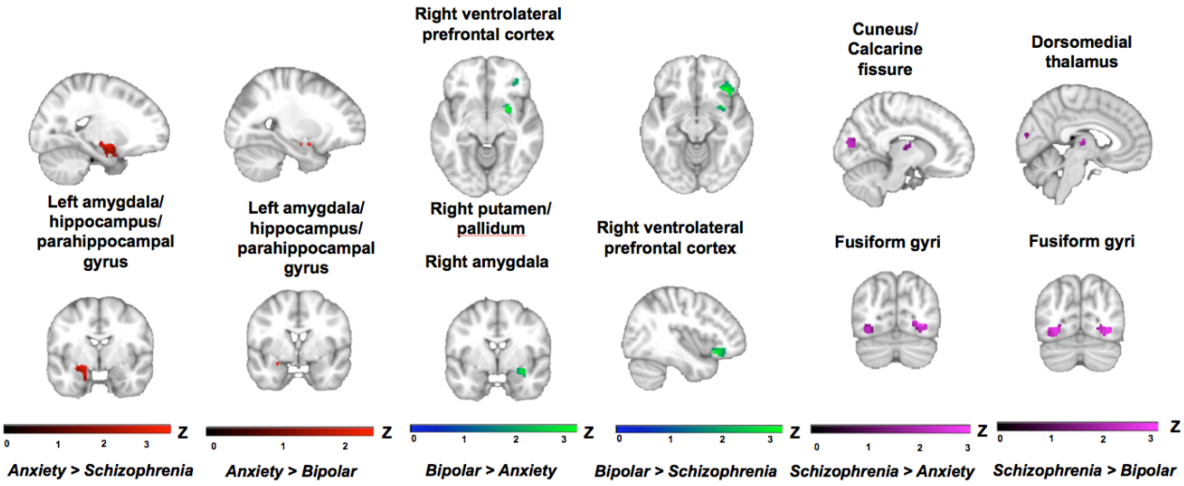

FIGURE S12. Contrasts of aberrant activation (i.e., pooled across patient hyper- and hypo-activation and tasks) for disorder spectra that showed convergence. Unipolar depressive and substance use disorder groups did not show convergence.

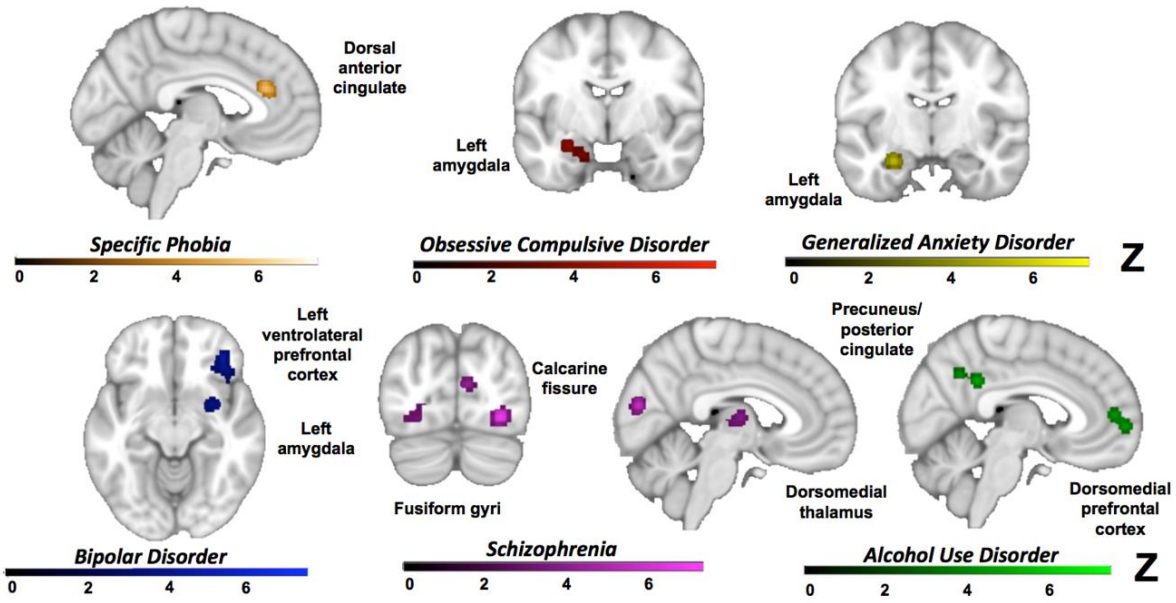

FIGURE S13. Contrasts of aberrant activation (i.e., pooled across patient hyper- and hypo-activation and tasks) for specific disorder groups. Convergence was observed for specific phobia (n=11), OCD (n=20), GAD (n=10), bipolar disorder (n=47), schizophrenia (n=59), and alcohol use disorder (n=6). No convergence was observed for unipolar depressive disorders (n=79), PTSD (n=28), social anxiety disorder (n=17), cocaine use disorder (n=8), panic disorder (n=5), methamphetamine use disorder (n=3), mixed anxiety disorders (n=2), cannabis use disorder (n=2), and mixed anxiety and depressive disorders (n=1).

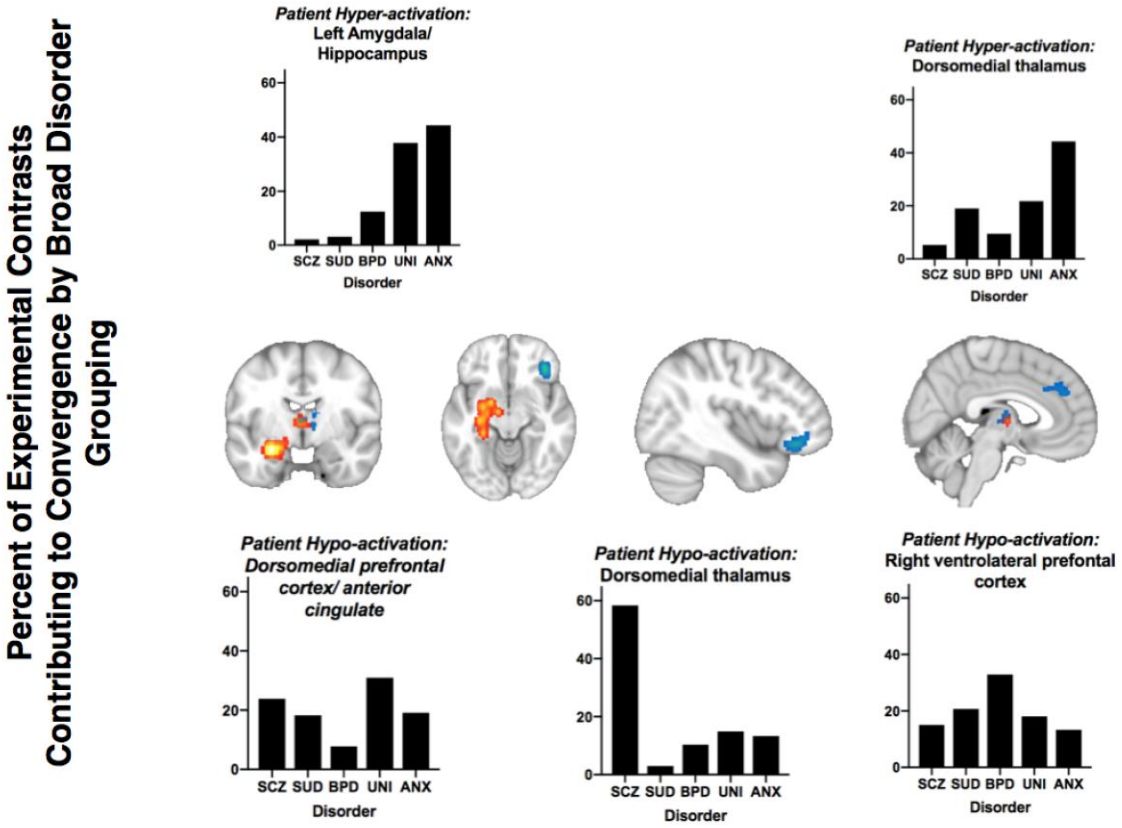

FIGURE S14. Percent of experimental contrasts contributing to convergence according to broad diagnostic grouping. ANX=anxiety spectrum disorders; UNI=unipolar depression spectrum disorders; BIP=bipolar spectrum disorders; SCZ=schizophrenia spectrum disorders; SUD=substance use disorders.

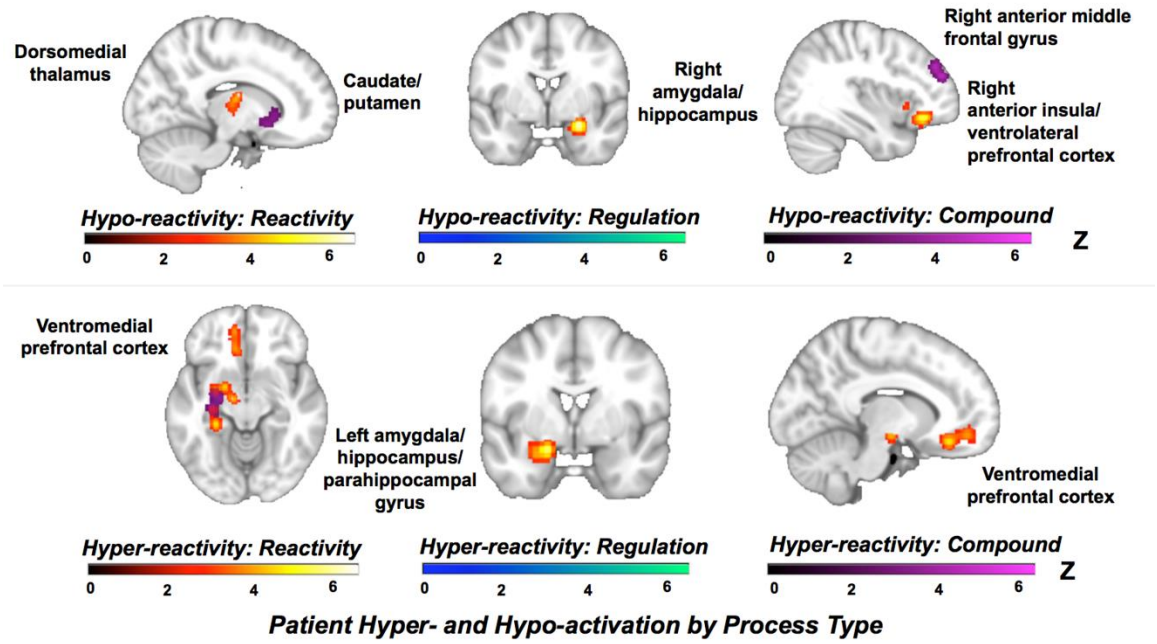

FIGURE S15. Regions of transdiagnostic aberrant activation during emotional processing (i.e., pooled across disorder and patient hyper- and hypo-activation) separated by processing types.

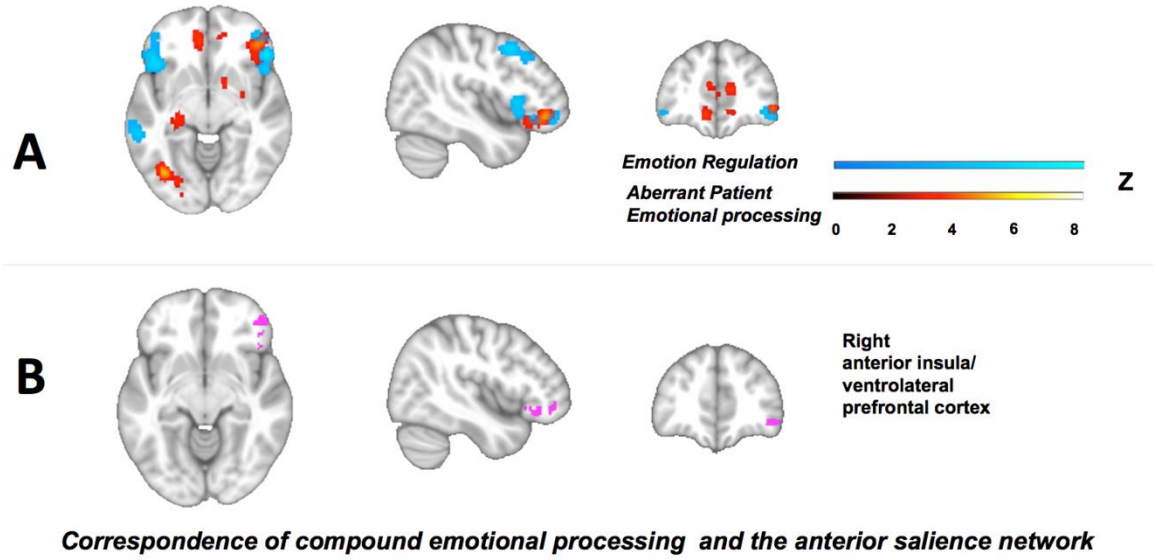

FIGURE S16. A. Regions of transdiagnostic aberrant activation during emotional processing tasks (i.e., pooled across disorder, patient hyper- and hypo-activation) (RED) and the regions involved in intact cognitive emotion regulation as identified by Langner and colleagues ((1). B. Conjunction between regions of transdiagnostic aberrant activation during emotional processing tasks (i.e., pooled across patient hyper- and hypo-activation) and the regions involved in intact cognitive emotion regulation as identified by Langner and colleagues.

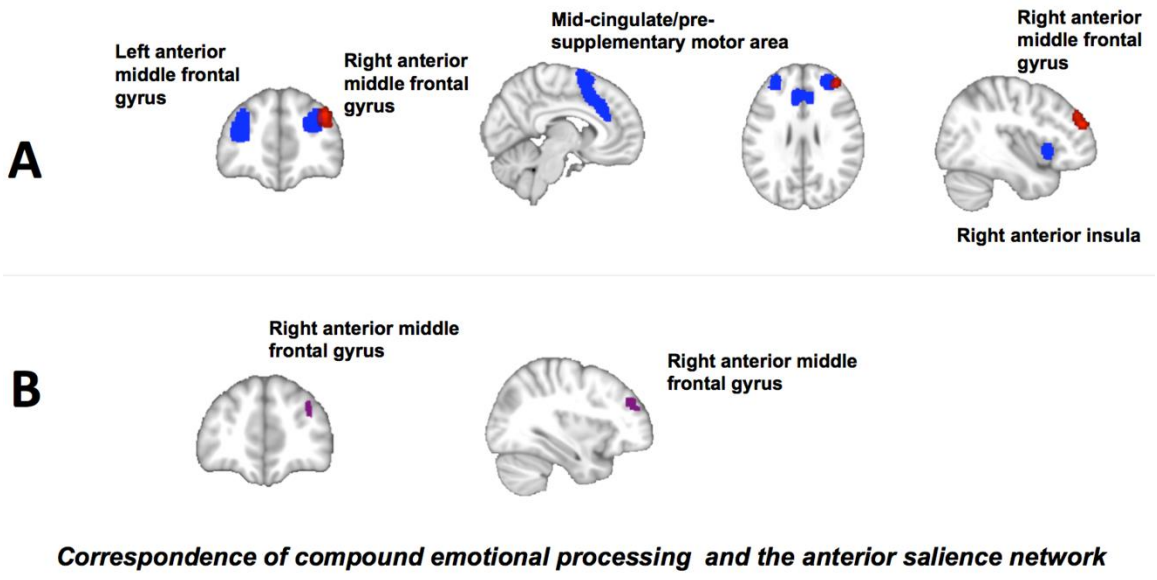

FIGURE S17. A. Regions of transdiagnostic aberrant activation during compound emotional processing tasks (i.e., pooled across disorder and patient hyper- and hypo-activation) (RED) and the anterior salience network identified by Shirer and colleagues (2). B. Conjunction between regions of transdiagnostic aberrant activation during compound emotional processing tasks (i.e., pooled across disorder and patient hyper- and hypo-activation) and the anterior salience network identified by Shirer and colleagues (2012) (PURPLE).

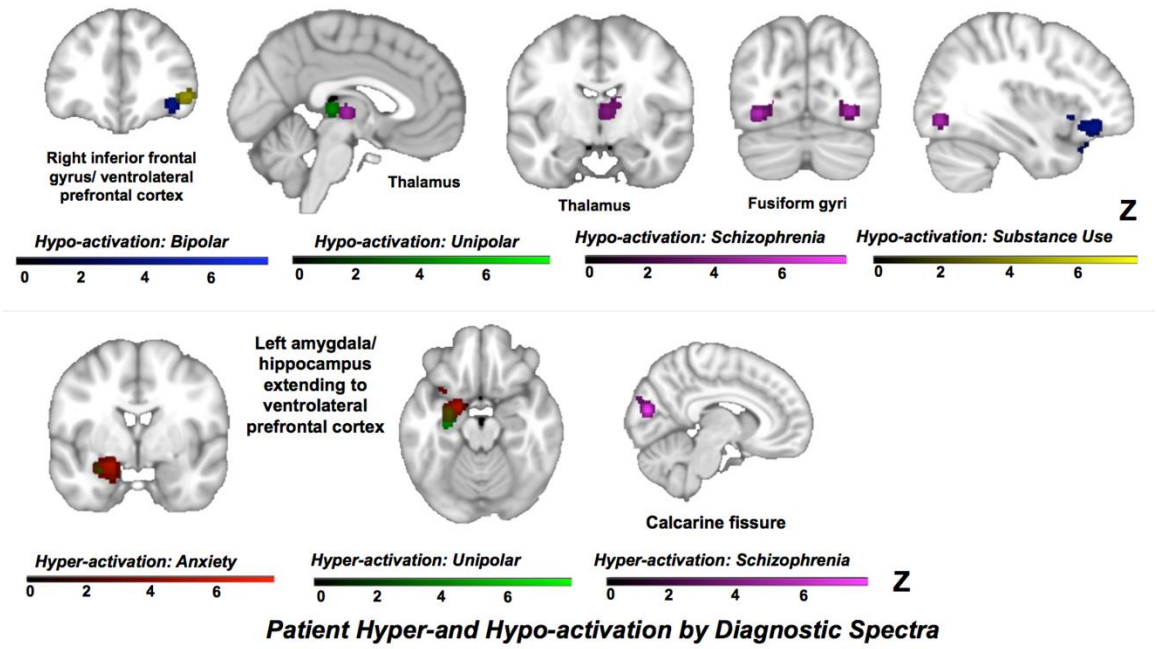

FIGURE S18. Regions of disruption by diagnostic spectra, separated by patient hyper- and hypo-activation.

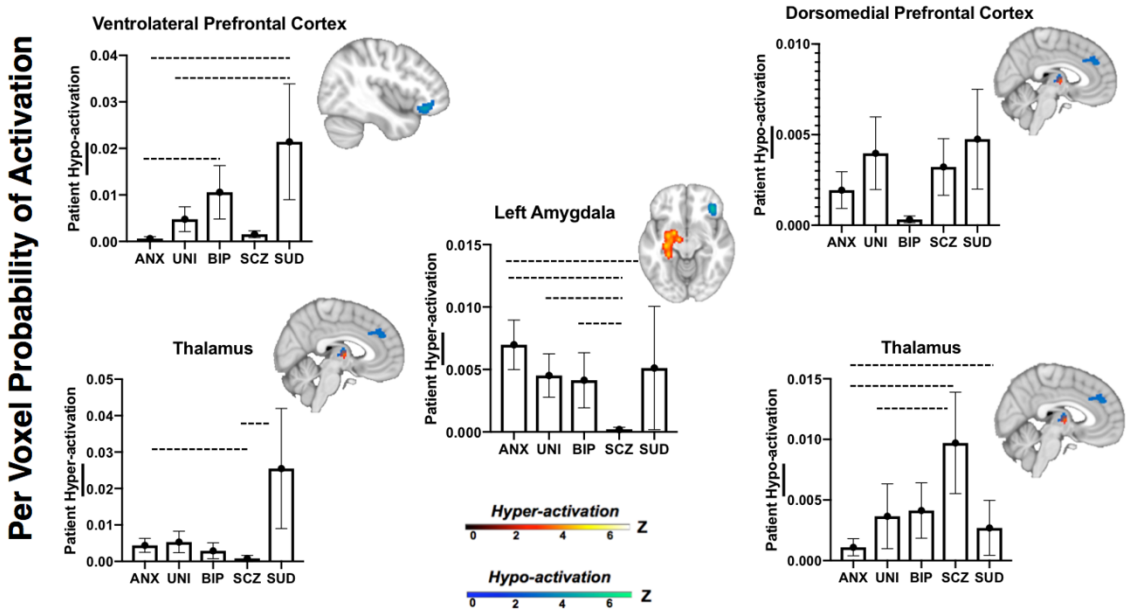

FIGURE S19. Extracted mean per voxel probability of patient hyper- (red) and hypo-activation (blue) relative to control participants by disorder class. ANX=anxiety spectrum disorders; UNI=unipolar depression spectrum disorders; BIP=bipolar spectrum disorders; SCZ=schizophrenia spectrum disorders; SUD=substance use disorders. Consistent with a transdiagnostic signature, a broad distribution of disorders contributed to each of the clusters of convergence. This was confirmed by follow up region of interest (ROI) analyses on extracted data from the five significant clusters. Significant omnibus results were observed for patient hypo-activation in ventrolateral prefrontal cortex (Kruskal-Wallis Test, H=15.1, p<.01) and thalamus (U=17.7, p<.01and hyper-activation in left amygdala (U=19.2, p<.01). Exploratory pairwise comparisons were computed. Dashed lines indicate significant differences, uncorrected for multiple comparisons.

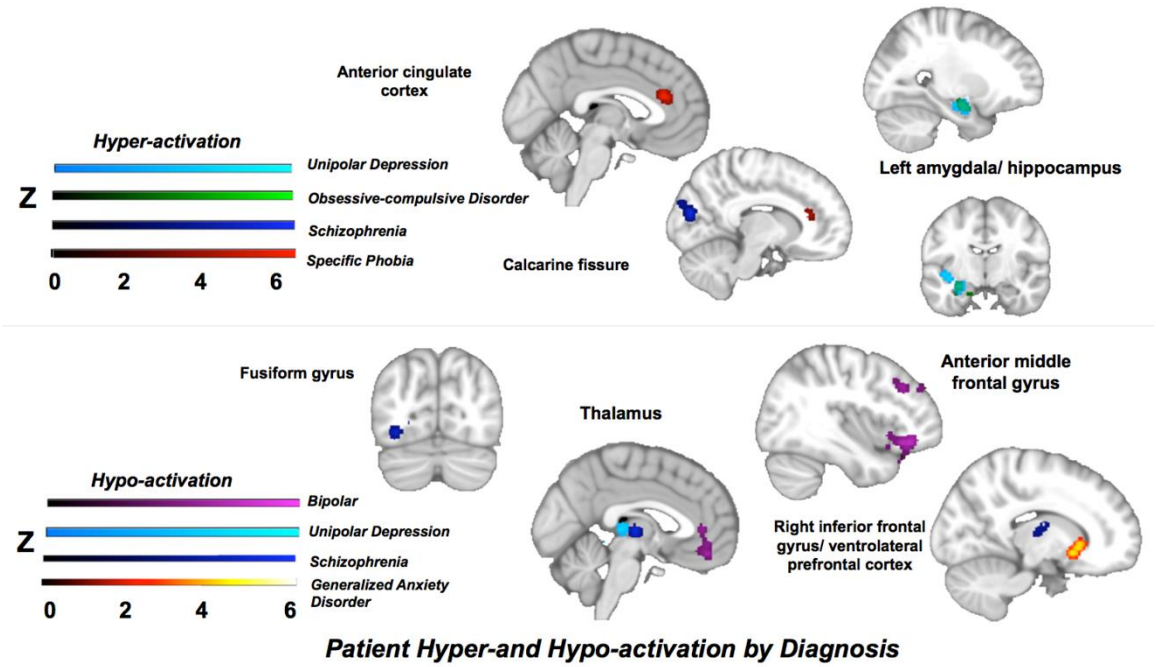

FIGURE S20. Regions of disruption by specific diagnosis, separated by patient hyper- and hypo-activation. Disorders that showed convergence for patient hyper-activation were unipolar depression (n=79), bipolar depression (n=47), and schizophrenia (n=59). GAD also showed convergence though the results should be interpreted with caution given the inclusion of only 10 experiments. Disorders that showed convergence for patient hypo-activation were unipolar depression (n=79), schizophrenia (n=59), and OCD (n=20). Specific phobia also showed convergence though the results should be interpreted with caution given the inclusion of only 10 experiments.

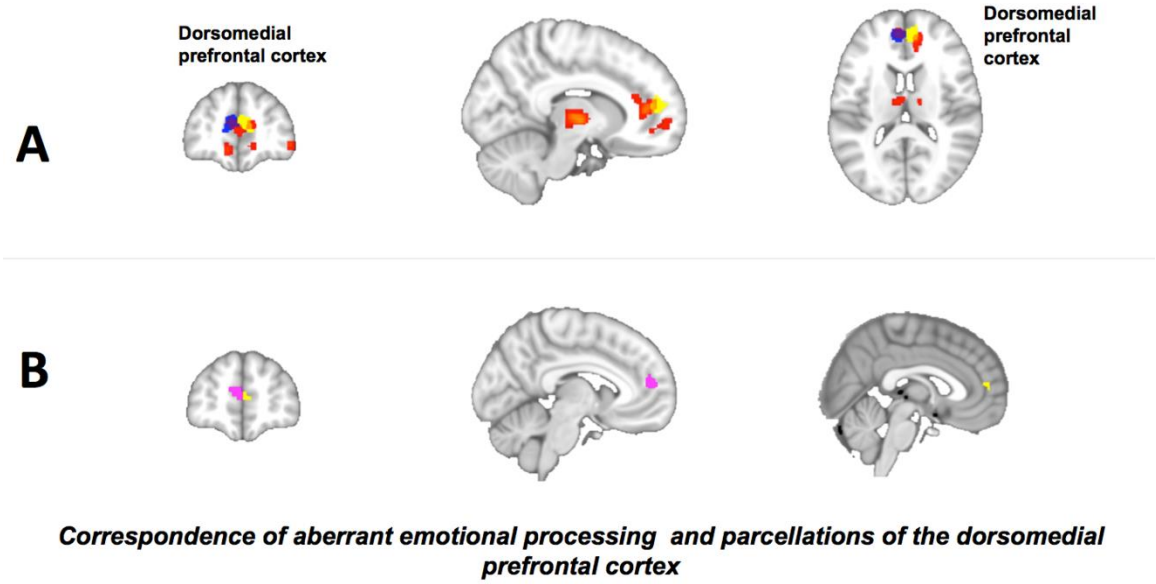

FIGURE S21. A. Regions of transdiagnostic aberrant activation during emotional processing tasks (i.e., pooled across disorder, patient hyper- and hypo-activation, and processing tasks) (RED) and the dorsomedial prefrontal regions parcellated by Eickhoff and colleagues (3) and the conjunction (B).

TABLE S1. Experiments included in meta-analysis by diagnostic grouping, process, task and stimuli (reference list follows the table)

Ref #	Experiment #	PUBMEDID	Diagnostic Group	Process	Experimental Task	Stimuli
(1)	1	17010993	MDD	Reactivity	Picture viewing	Pictures
(2)	2	22978709	SUD	Regulate	Picture viewing regulation	Pictures
(2)	3	22978709	SUD	Regulate	Picture viewing regulation	Pictures
(3)	4	15860337	ANX	Reactivity	Picture viewing	Faces
(3)	5	15860337	ANX	Reactivity	Picture viewing	Faces
(3)	6	15860337	ANX	Reactivity	Picture viewing	Faces
(4)	7	18180763	ANX	Reactivity	Picture viewing	Pictures
(4)	8	18180763	ANX	Reactivity	Picture viewing	Pictures
(4)	9	18180763	ANX	Reactivity	Picture viewing	Pictures
(4)	10	18180763	ANX	Reactivity	Picture viewing	Pictures
(5)	11	20579005	SUD	Reactivity	Picture viewing	Pictures
(6)	12	24381810	SCZ	Compound	Delayed discounting	Pictures
(7)	13	17570347	MDD	Reactivity	Pain perception	Heat
(8)	14	25183555	ANX	Reactivity	Anticipation	Shapes
(8)	15	25183555	ANX	Reactivity	Anticipation	Shapes
(9)	16	26456416	ANX	Compound	Go / No Go	Pictures
(10)	17	19950195	BPD	Reactivity	Monetary incentive delay	Shapes
(11)	18	19632301	MDD	Reactivity	Picture viewing	Pictures
(12)	19	10553744	ANX	Reactivity	Script reactivity	Scripts
(13)	20	10202567	ANX	Reactivity	Listen	Audio
(14)	21	15997600	ANX	Reactivity	Conditioning	Pictures
(15)	22	15013830	ANX	Compound	Stroop	Words
(16)	23	17182108	ANX	Compound	Word recognition	Words
(17)	24	12742675	ANX	Compound	Word recognition	Words
(18)	25	25085721	MDD	Reactivity	Picture viewing	Faces
(19)	26	23298715	MDD	Reactivity	Picture viewing	Faces
(20)	27	19434621	ANX	Reactivity	Stroop	Words
(21)	28	21215728	ANX	Reactivity	Anticipation	Pictures
(22)	29	28205606	MDD	Reactivity	Picture viewing	Faces
(23)	30	27921216	MDD	Reactivity	Script reactivity	Scripts
(23)	31	27921216	MDD	Reactivity	Script reactivity	Scripts
(24)	32	15570157	MDD	Reactivity	Lexical decision task	Words
(25)	33	21781000	ANX	Reactivity	Picture viewing	Faces
(26)	34	23558337	BPD	Reactivity	Anticipation	Pictures
(27)	35	20950283	ANX	Reactivity	Picture viewing	Pictures
(27)	36	20950283	ANX	Reactivity	Picture viewing	Pictures
(28)	37	24990479	BPD	Compound	CPT	Pictures
(28)	38	24990479	BPD	Compound	CPT	Pictures
(29)	39	15289277	BPD	Reactivity	Picture viewing	Pictures
(30)	40	23469861	SUD	Reactivity	Picture viewing	Faces

(31)	41	27672555	MDD	Compound	Picture viewing	Faces
(32)	42	16112653	BPD	Reactivity	Picture viewing	Faces
(33)	43	25635920	MDD	Compound	Go/ No Go	Faces
(34)	44	21098808	MDD	Reactivity	Script reactivity	Scripts
(35)	45	21557888	MDD	Reactivity	Picture viewing	Faces
(36)	46	22306196	SCZ	Reactivity	Picture recognition	Faces
(36)	47	22306196	SCZ	Reactivity	Picture viewing	Pictures
(36)	48	22306196	SCZ	Reactivity	Script reactivity	Scripts
(37)	49	21777105	MDD	Reactivity	Picture viewing	Faces
(38)	50	24493839	BPD	Reactivity	Picture viewing	Faces
(39)	51	21267430	SCZ	Reactivity	Conditioning	Shapes
(40)	52	18706701	MDD	Compound	Picture viewing	Pictures
(41)	53	23355265	BPD	Reactivity	Picture viewing	Faces
(41)	54	23355265	BPD	Reactivity	Picture viewing	Faces
(42)	55	12893418	ANX	Reactivity	Picture viewing	Pictures
(43)	56	22574121	SCZ	Reactivity	Picture viewing	Pictures
(44)	57	23051903	SCZ	Reactivity	Picture viewing	Faces
(45)	58	15184035	BPD	Compound	Go/No Go	Words
(46)	59	12090812	MDD	Compound	Go/No Go	Words
(47)	60	25799565	SUD	Reactivity	Monetary incentive delay	Shapes
(48)	61	17012690	MDD	Reactivity	Word reading	Words
(49)	62	17595018	ANX	Reactivity	Picture viewing	Faces
(50)	63	24156926	BPD	Compound	Picture viewing	Faces
(50)	64	24156926	BPD	Compound	Picture viewing	Faces
(51)	65	26244883	BPD	Compound	Picture viewing	Faces
(52)	66	23473989	MDD	Reactivity	Anticipation	Pictures
(53)	67	27436308	ANX	Reactivity	Picture viewing	Pictures
(54)	68	28501740	ANX	Reactivity	Picture viewing regulation	Pictures
(55)	69	18063349	BPD	Reactivity	Picture viewing	Faces
(56)	70	21854858	BPD	Reactivity	Picture viewing	Faces
(57)	71	24146315	MDD	Compound	Video	Video
(58)	72	25171782	ANX	Reactivity	Picture viewing	Faces
(59)	73	23911154	BPD	Reactivity	Picture viewing	Faces
(59)	74	23911154	MDD	Reactivity	Picture viewing	Faces
(60)	75	22571805	MDD	Compound	Picture viewing	Faces
(60)	76	22571805	MDD	Reactivity	Picture viewing	Faces
(61)	77	17965984	MDD	Reactivity	Picture recognition	Faces
(62)	78	25880400	MDD	Reactivity	Stroop	Faces
(63)	79	17403973	MDD	Reactivity	Implicit picture viewing	Faces
(64)	80	15351766	MDD	Reactivity	Implicit picture viewing	Faces
(64)	81	15351766	MDD	Reactivity	Picture viewing	Faces
(65)	82	24690369	ANX	Reactivity	Picture viewing	Pictures
(66)	83	25274821	ANX	Reactivity	Conditioning	Video
(67)	84	18771714	ANX	Compound	N-back	Faces
(68)	85	18507736	SUD	Reactivity	Picture viewing	Pictures
(69)	86	19188539	ANX	Reactivity	Picture viewing	Faces
(70)	87	24760279	ANX	Reactivity	Picture viewing	Pictures

(71)	88	17499485	MDD	Reactivity	Picture viewing	Faces
(72)	89	16237317	MDD	Reactivity	Picture viewing	Faces
(73)	90	26763141	MDD	Reactivity	Prisoners dilemma	Words
(74)	91	23146249	SCZ	Reactivity	Conditioning	Shapes
(75)	92	23769293	MDD	Reactivity	Picture viewing	Faces
(76)	93	23482626	MDD	Regulate	Picture viewing	Pictures
(77)	94	18536699	MDD	Reactivity	Picture viewing	Pictures
(78)	95	19656642	SUD	Reactivity	Implicit picture viewing	Faces
(79)	96	29524918	SCZ	Compound	N-back	Faces
(80)	97	18056543	SCZ	Reactivity	Picture viewing	Faces
(81)	98	20663646	SCZ	Reactivity	Picture viewing	Faces
(82)	99	20642398	SCZ	Compound	N-back	Odor
(83)	100	25151338	BPD	Reactivity	Picture viewing	Faces
(84)	101	18295746	SCZ	Reactivity	Implicit picture viewing	Faces
(85)	102	26619965	ANX	Reactivity	Picture viewing	Pictures
(86)	103	19594507	BPD	Reactivity	Picture viewing	Faces
(87)	104	17488322	SUD	Reactivity	Picture viewing	Pictures
(88)	105	28224080	ANX	Reactivity	Picture viewing	Faces
(88)	106	28224080	ANX	Reactivity	Picture viewing	Pictures
(89)	107	20080793	MDD	Regulate	Picture viewing	Pictures
(90)	108	25448398	MDD	Reactivity	Picture viewing	Faces
(91)	109	25827506	MDD	Reactivity	Picture viewing	Faces
(92)	110	28551555	BPD	Reactivity	Picture viewing	Pictures
(93)	111	24738049	ANX	Reactivity	Listen	Audio
(94)	112	22945619	SCZ	Reactivity	Conditioning	Pictures
(95)	113	19605517	SCZ	Reactivity	Conditioning	Scripts
(96)	114	24416328	SCZ	Reactivity	Script reactivity	Scripts
(97)	115	17331476	ANX	Reactivity	Picture viewing	Pictures
(97)	116	17331476	ANX	Reactivity	Picture recognition	Pictures
(98)	117	18310580	BPD	Reactivity	Picture viewing	Faces
(99)	118	17699669	MDD	Regulate	Picture recognition	Pictures
(100)	119	18346998	MDD	Reactivity	Picture viewing	Faces
(101)	120	21175552	ANX	Reactivity	Monetary incentive delay	Shapes
(102)	121	18818053	SCZ	Reactivity	Listen	Audio
(102)	122	18818053	SCZ	Reactivity	Listen	Audio
(103)	123	15993859	MDD	Reactivity	Script reactivity	Scripts
(104)	124	22273442	BPD	Reactivity	Implicit picture viewing	Faces
(105)	125	18797310	BPD	Reactivity	Picture viewing	Faces
(106)	126	19632283	BPD	Reactivity	Picture viewing	Avatars
(107)	127	26103120	SCZ	Compound	Implicit word retrieval	Words
(107)	128	26103120	SCZ	Reactivity	Encoding words	Words
(108)	129	23547713	ANX	Reactivity	Picture viewing	Faces
(109)	130	17916330	MDD	Reactivity	Monetary incentive delay	Shapes
(110)	131	14550677	MDD	Reactivity	Picture viewing	Pictures
(110)	132	14550677	MDD	Regulate	Picture viewing	Pictures

(111)	133	17885606	BPD	Compound	Stroop	Words
(112)	134	22079660	SCZ	Compound	Picture viewing	Pictures
(112)	135	22079660	SCZ	Reactivity	Picture viewing	Pictures
(113)	136	24381781	SCZ	Reactivity	Picture viewing	Pictures
(114)	137	12208637	ANX	Reactivity	Script reactivity	Scripts
(115)	138	11691703	ANX	Reactivity	Script reactivity	Scripts
(116)	139	12559652	ANX	Reactivity	Script reactivity	Scripts
(117)	140	24268934	SCZ	Reactivity	Picture viewing	N-back
(118)	141	24619004	SCZ	Reactivity	Picture viewing	Pictures
(119)	142	15500300	BPD	Reactivity	Picture viewing	Faces
(120)	143	21284912	SCZ	Reactivity	Picture viewing	Faces
(121)	144	22113155	SCZ	Reactivity	Picture viewing	Faces
(122)	145	28285207	MDD	Reactivity	Word reading	Words
(123)	146	15576062	ANX	Reactivity	Script reactivity	Scripts
(124)	147	24465469	SCZ	Reactivity	Implicit picture viewing	Faces
(125)	148	23201307	SCZ	Reactivity	Conditioning	Shapes
(126)	149	22524493	BPD	Reactivity	Picture viewing	Faces
(127)	150	15597038	ANX	Reactivity	Speech anticipation	Speech
(128)	151	23611156	ANX	Reactivity	Conditioning	Shapes
(129)	152	12634477	ANX	Reactivity	Word reading	Words
(130)	153	16837058	BPD	Reactivity	Word recognition	Words
(131)	154	16225562	BPD	Compound	Stroop	Words
(132)	155	17547581	BPD	Reactivity	Picture viewing	Pictures
(133)	156	21664220	BPD	Reactivity	Picture viewing	Faces
(134)	157	15184236	ANX	Reactivity	Picture viewing	Pictures
(134)	158	15184236	ANX	Reactivity	Picture viewing	Pictures
(134)	159	15184236	ANX	Reactivity	Picture viewing	Pictures
(134)	160	15184236	ANX	Reactivity	Picture viewing	Pictures
(135)	161	23806873	SUD	Reactivity	Anticipation	Shapes
(136)	162	23385487	ANX	Reactivity	Picture viewing	Pictures
(137)	163	23738207	SCZ	Reactivity	Picture viewing	Pictures
(137)	164	23738207	SCZ	Reactivity	Picture viewing	Pictures
(138)	165	18310578	SCZ	Reactivity	Picture viewing	Faces
(139)	166	24434194	SCZ	Reactivity	Picture viewing	Faces
(140)	167	23740049	ANX	Reactivity	Conditioning	Pictures
(141)	168	19748076	ANX	Reactivity	Conditioning	Shapes
(141)	169	19748076	ANX	Reactivity	Conditioning	Faces
(142)	170	22398297	MDD	Regulate	Picture viewing	Faces
(143)	171	14990520	SCZ	Reactivity	Listen	Sentences
(143)	172	14990520	SCZ	Reactivity	Listen	Sentences
(143)	173	14990520	SCZ	Reactivity	Listen	Sentences
(143)	174	14990520	SCZ	Reactivity	Listen	Sentences
(143)	175	14990520	SCZ	Reactivity	Listen	Sentences
(144)	176	12598724	MDD	Reactivity	Picture viewing	Pictures
(145)	177	17825123	MDD	Compound	Stroop	Words
(146)	178	24258223	SUD	Compound	Stroop	Words
(147)	179	18458208	ANX	Compound	Dot probe	Faces
(148)	180	25781332	ANX	Compound	Picture viewing	Pictures
(149)	181	27442922	ANX	Compound	Picture recognition	Pictures

(150)	182	26277269	ANX	Compound	Word recognition	Words
(151)	183	26924833	ANX	Compound	Word recognition	Words
(152)	184	22832855	SCZ	Regulate	Picture viewing regulation	Pictures
(152)	185	22832855	BPD	Regulate	Picture viewing regulation	Pictures
(153)	186	24888525	SCZ	Reactivity	Picture viewing	Faces
(154)	187	17684497	SCZ	Reactivity	Reinforcement learning	Shapes
(155)	188	25689570	MDD	Reactivity	Picture viewing	Faces
(156)	189	27547195	ANX	Reactivity	Picture viewing	Pictures
(156)	190	27547195	ANX	Reactivity	Picture viewing	Pictures
(157)	191	22548898	BPD	Reactivity	Anticipation	Pictures
(158)	192	26329118	SCZ	Compound	Picture recognition	Pictures
(159)	193	20716396	ANX	Reactivity	Picture viewing	Faces
(160)	194	14514490	SCZ	Reactivity	Picture viewing	Pictures
(161)	195	19409961	SCZ	Reactivity	Listen	Audio
(162)	196	19849880	BPD	Compound	Stroop	Words
(163)	197	20855051	BPD	Compound	N-back	Faces
(164)	198	19419593	ANX	Reactivity	Script reactivity	Scripts
(165)	199	18827725	SCZ	Compound	N-back	Odor
(166)	200	17097071	BPD	Reactivity	Picture viewing	Faces
(167)	201	19242292	BPD	Reactivity	Implicit picture viewing	Faces
(168)	202	17964741	SUD	Reactivity	Picture viewing	Faces
(169)	203	22832817	BPD	Reactivity	Picture viewing	Faces
(170)	204	24290464	BPD	Compound	Implicit picture viewing	Faces
(171)	205	21159729	SCZ	Reactivity	Picture viewing	Faces
(172)	206	19411368	MDD	Reactivity	Monetary incentive delay	Shapes
(173)	207	22901627	ANX/DEP	Reactivity	Picture viewing	Pictures
(174)	208	22294257	SUD	Reactivity	Script reactivity	Scripts
(174)	209	22294257	SUD	Reactivity	Script reactivity	Scripts
(175)	210	22833192	ANX	Compound	Stroop	Pictures
(176)	211	22895096	ANX	Reactivity	Script reactivity	Scripts
(177)	212	29304386	MDD	Reactivity	Picture viewing	Faces
(178)	213	28197859	MDD	Regulate	Picture viewing	Faces
(179)	214	26529426	ANX	Compound	Picture viewing regulation	Pictures
(179)	215	26529426	ANX	Regulate	Picture viewing regulation	Pictures
(180)	216	19171077	ANX	Reactivity	Reversal learning	Pictures
(180)	217	19171077	BPD	Reactivity	Reversal learning	Pictures
(181)	218	17467008	SCZ	Reactivity	Picture viewing	Faces
(182)	219	24862389	BPD	Compound	Stroop	Pictures
(183)	220	20934190	MDD	Reactivity	Picture viewing	Pictures
(184)	221	24569319	SUD	Reactivity	Reinforcement learning	Shapes
(185)	222	15955491	ANX	Reactivity	Implicit picture viewing	Pictures

(186)	223	21477817	MDD	Reactivity	Picture viewing	Faces
(187)	224	20569645	MDD	Reactivity	Picture viewing	Faces
(188)	225	17902000	ANX	Reactivity	Picture viewing	Pictures
(189)	226	16046064	ANX	Reactivity	Picture viewing	Pictures
(190)	227	22644919	ANX	Reactivity	Picture viewing	Pictures
(191)	228	22321875	ANX/DEP	Reactivity	Listen	Sentences
(191)	229	22321875	ANX/DEP	Reactivity	Picture viewing	Faces
(192)	230	18580874	SCZ	Reactivity	Picture viewing	Faces
(193)	231	27501356	SUD	Reactivity	Script reactivity	Scripts
(194)	232	14512216	ANX	Reactivity	Picture viewing	Pictures
(195)	233	10200737	ANX	Reactivity	Script reactivity	Scripts
(196)	234	14757593	ANX	Reactivity	Script reactivity	Scripts
(197)	235	11750889	ANX	Compound	Stroop	Words
(198)	236	11983183	MDD	Compound	Word reading	Words
(199)	237	24818080	ANX	Compound	Picture viewing	Pictures
(200)	238	16163517	SUD	Reactivity	Script reactivity	Scripts
(201)	239	19261334	MDD	Compound	Decision making	Pictures
(202)	240	23796796	MDD	Reactivity	Monetary incentive delay	Shapes
(203)	241	22079658	MDD	Reactivity	Monetary incentive delay	Shapes
(204)	242	28093278	SCZ	Reactivity	Picture viewing	Faces
(204)	243	28093278	SCZ	Reactivity	Picture viewing	Faces
(205)	244	28402574	MDD	Regulate	Picture viewing	Faces
(205)	245	28402574	MDD	Regulate	Picture viewing	Pictures
(206)	246	23827769	ANX	Reactivity	Picture viewing	Faces
(207)	247	21051038	BPD	Reactivity	Picture viewing	Pictures
(208)	248	17681799	ANX	Reactivity	Picture viewing	Pictures
(209)	249	20100882	MDD	Compound	CPT	Heat
(210)	250	23481626	MDD	Reactivity	Anticipation	Shapes
(211)	251	18981339	MDD	Compound	CPT	Heat
(212)	252	15691520	MDD	Reactivity	Picture viewing	Faces
(213)	253	16487943	SCZ	Reactivity	Picture viewing	Faces
(214)	254	20360158	SCZ	Reactivity	Picture viewing	Faces
(214)	255	20360158	SCZ	Reactivity	Picture viewing	Faces
(215)	256	20307892	MDD	Reactivity	Picture viewing	Faces
(216)	257	20595014	BPD	Reactivity	Picture viewing	Faces
(216)	258	20595014	BPD	Reactivity	Picture viewing	Faces
(217)	259	15219596	SCZ	Reactivity	Picture viewing	Pictures
(218)	260	12409155	SCZ	Reactivity	Picture viewing	Pictures
(219)	261	19081708	ANX	Compound	Word recognition	Words
(220)	262	11481154	ANX	Reactivity	Speech anticipation	Speech
(221)	263	22858151	BPD	Regulate	Picture viewing	Pictures
(222)	264	27814960	MDD	Compound	Picture recognition	Pictures
(223)	265	27747152	SCZ	Compound	Picture recognition	Faces
(224)	266	21205806	SCZ	Reactivity	Picture viewing	Pictures
(225)	267	15664794	ANX	Reactivity	Picture viewing	Pictures
(226)	268	16061770	ANX	Compound	Stroop	Words
(226)	269	16061770	ANX	Compound	Stroop	Words
(227)	270	21054920	MDD	Reactivity	Picture viewing	Faces

(228)	271	22617625	SCZ	Compound	Go/No Go	Words
(229)	272	17285093	ANX	Reactivity	Smell	Odor
(230)	273	24262816	ANX	Reactivity	Picture viewing	Faces
(231)	274	23056309	MDD	Reactivity	Picture viewing	Faces
(232)	275	21041614	MDD	Reactivity	Picture viewing	Faces
(233)	276	23809145	MDD	Reactivity	Picture viewing	Faces
(234)	277	22773540	BPD	Reactivity	Picture viewing	Faces
(235)	278	25872899	MDD	Reactivity	Stroop	Pictures
(235)	279	25872899	MDD	Reactivity	Stroop	Words
(235)	280	25872899	MDD	Compound	Stroop	Words
(236)	281	18450929	MDD	Compound	Oddball	Pictures
(237)	282	18455373	MDD	Compound	Oddball	Pictures
(238)	283	17403978	BPD	Compound	Go/No Go	Faces
(239)	284	19922553	BPD	Reactivity	Picture recognition	Pictures
(240)	285	14992974	SCZ	Reactivity	Implicit picture recognition	Faces
(240)	286	14992974	SCZ	Reactivity	Implicit picture recognition	Faces
(240)	287	14992974	SCZ	Reactivity	Implicit picture recognition	Faces
(241)	288	17398080	SCZ	Reactivity	Picture viewing	Faces
(241)	289	17398080	SCZ	Reactivity	Picture viewing	Faces
(242)	290	16216534	ANX	Reactivity	Implicit picture viewing	Faces
(243)	291	14625149	ANX	Reactivity	Picture viewing	Faces
(244)	292	24349161	ANX	Compound	Picture viewing regulation	Pictures
(244)	293	24349161	ANX	Regulate	Picture viewing regulation	Pictures
(244)	294	24349161	ANX	Regulate	Picture viewing regulation	Pictures
(245)	295	23888999	SUD	Reactivity	Conditioning	Heat
(245)	296	23888999	SUD	Reactivity	Conditioning	Shapes
(245)	297	23888999	SUD	Reactivity	Conditioning	Heat
(246)	298	15235232	MDD	Reactivity	Video	Video
(247)	299	26639452	MDD	Compound	Directed forgetting	Words
(248)	300	17097275	ANX	Reactivity	Picture viewing	Faces
(249)	301	19589603	MDD	Reactivity	Word reading	Words
(250)	302	24493842	MDD	Reactivity	Script reactivity	Scripts
(251)	303	27750155	MDD	Reactivity	Picture viewing	Pictures
(252)	304	23911835	ANX	Reactivity	Delayed discounting	Shapes
(253)	305	21878364	MDD	Reactivity	Picture viewing	Faces
(253)	306	21878364	MDD	Reactivity	Picture viewing	Faces
(254)	307	24517388	ANX	Regulate	Picture viewing regulation	Faces
(254)	308	24517388	ANX	Regulate	Picture viewing regulation	Faces
(254)	309	24517388	ANX	Regulate	Picture viewing regulation	Scripts

Ref=Reference number; Schizophrenia=schizophrenia, schizoaffective, schizophreniform, and delusional disorders; Bipolar=bipolar disorders; Unipolar= major depression, dysthymia; Anxiety=obsessive-compulsive disorder, posttraumatic stress disorder, social anxiety disorder, Substance Use=mixed substance abuse and/or dependence).

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TABLE S2. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of transdiagnostic pooled patient hyper- and hypoactivation (i.e., aberrant activation across disorders) during functional neuroimaging of emotional processing tasks.

Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Right Inferior frontal gyrus/ ventrolateral prefrontal cortex	609	5.34	40	36	-12
Left amygdala/ hippocampus/ parahippocampal gyrus	976	7.79	-26	-8	-18
Right amygdala	439	6.51	26	-4	-18
Dorsal anterior cingulate extending to ventromedial prefrontal cortex	838	4.33	12	42	10
Inferior occipital/fusiform	382	5.52	-36	-70	-8
Thalamus	713	5.61	0	-8	8

TABLE S3. Percent contribution to clusters of convergence for whole-brain pooled aberrant activation meta-analytic contrasts by experiment sample and design characteristics.

	Cluster of convergence					
Experiment sample/ design characteristics	Right Inferior frontal gyrus/ ventrolateral prefrontal cortex	Left amygdala/ hippocampus	Right amygdala	Dorsomedial prefrontal cortex/ anterior cingulate	Inferior occipital cortex/ fusiform gyrus	Thalamus
Contrast Direction						
Control > Patient	59.42	31.14	57.8	49.19	67.55	52.71
Patient > Control	40.58	68.86	42.2	50.81	32.45	47.29
Disorder Class						
Non-psychotic	83.46	85.14	73.58	79.27	56.78	70.93
Psychotic	16.54	14.86	26.42	20.73	43.22	29.07
Broad Diagnostic Group						
Anxiety	26.53	39.11	23.55	27.17	22.44	30
Major Depression	19.39	28.18	29.08	22.54	16.38	21.02
Schizophrenia	16.54	14.86	26.42	20.73	43.22	29.07
Bipolar Disorder	24.95	15.12	17.99	18.46	10.42	11.38
Substance Use	12.59	2.72	2.96	11.09	7.54	8.53
Specific Diagnostic Group						
Mixed Anxiety Disorders	0	0	0	0	0	0
Mixed Anxiety/ Depression	0	0	0	1.4	0	0
SUD: Cannabis	0	0.03	0	0	0	0.15
SUD: Methamphetamine	6.44	0.1	0	0.01	0.1	0.08
GAD	2.67	5.78	0.77	2.86	2.76	0
SUD: Alcohol	4.15	0.34	2.09	7.69	7.44	1.04
SUD: Cocaine	2.01	2.26	0.87	3.39	0.01	7.27
Panic Disorder	0.71	1	0.12	1.44	0.86	1.44
Specific Phobia	1.75	3.42	3.89	1.63	1.84	7.38
Social Anxiety Disorder	5.58	6.37	3.89	4.84	2.57	3.79

OCD	5.03	11.36	11.07	3.37	5.74	4.44
PTSD	10.79	11.18	26.42	11.61	8.66	12.95
Bipolar Disorder	24.95	15.12	17.99	18.46	10.42	11.38
Schizophrenia	16.54	14.86	26.42	20.73	43.22	29.07
Major Depression	19.39	28.18	29.08	22.54	16.38	21.02
Age Group						
Adult	91.14	94.42	87.24	91.51	66.61	84.88
Child/adolescent	7	2.18	10.87	7	29.26	13.82
Older adult	1.86	3.39	1.89	1.49	4.13	1.3
Current Psychotropic Medication						
Yes	51.78	51.85	60.34	56.69	63.41	50.35
No	47.93	45.12	39.65	40.34	36.59	44.79
Not reported	0.29	3.03	0.02	2.97	0	4.85
Behavioral Performance/Rating						
Yes	43.62	59.49	53.73	59.51	58.58	53.22
No	56.38	40.51	46.27	40.49	41.42	46.78
Imaging Modality						
Functional MRI	91.25	89.53	93.09	95.2	89.68	96.22
PET	8.75	10.47	6.91	4.8	10.32	3.78
SPECT	0	0	0	0	0	0
Task Process						
Reactivity	80.87	72.8	83.66	83.86	76.9	84.66
Regulation	9.09	3.47	0	3.68	7.3	5.69
Compound	10.04	23.72	16.34	12.7	15.8	9.64
Valence						
Emotional	7.58	9.66	10.36	14.43	5.57	12.13
Pleasant	21.4	8.76	23.7	22.7	14.55	20
Unpleasant	71.02	81.59	65.94	62.87	79.88	67.87
Task Type						
Picture processing	62.84	48.75	55.85	59.14	62.51	52.11
Script processing	3.11	5.1	5.8	10.2	5.25	15.03

Emotional stroop	1.98	9.02	10.84	8.65	2.01	4.74
Fear conditioning	2.75	2.56	1.29	6.44	4.61	1.42
Stimulus Type						
Faces	46	41.2	46.1	43.34	56.57	38.1
Scenes	30.54	26.14	25.09	27.01	21.52	30.24
Words	5.37	15.72	13.84	13.76	7.24	8.77
Scripts	3.11	5.1	5.8	10.2	5.25	15.03
Shapes	5.45	3.26	2.97	2.94	3.04	1.3

Contributions by task and stimulus type are reported for categories that contained at least 12 unique contrasts.

TABLE S4. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of transdiagnostic pooled patient hyper- and hypoactivation (i.e., aberrant activation across disorders) during functional neuroimaging of different emotional processes

Process/Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Reactivity					
Left amygdala/ hippocampus/ parahippocampal gyrus	506	6.15	-26	-6	-20
Right amygdala/ hippocampus/ parahippocampal gyrus	422	6.49	26	-4	-18
Right anterior insula/ ventrolateral prefrontal cortex	40	4.67	40	32	-12
Ventromedial prefrontal cortex	328	4.25	-8	34	-16
Thalamus	733	5.21	0	-8	8
Dorsal anterior cingulate	477	477	10	40	8
Compound					
Left amygdala/	314	5.63	-26	-8	-16
hippocampus/	235	4.80	36	42	32
parahippocampal gyrus					
Right dorsolateral prefrontal cortex					
Regulate					
Right anterior insula/prefrontal cortex	151	5.15	40	40	-10

TABLE S5. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of pooled hyper- and hypo-activation during functional neuroimaging of emotional processing separately for psychotic and non-psychotic samples.

Class/Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Non-Psychotic Pooled Activation					
Right inferior frontal gyrus/ ventrolateral prefrontal cortex	631	5.22	40	34	-12
Left amygdala/ hippocampus/ parahippocampal gyrus	1030	7.14	-26	-8	-18
Right amygdala/ hippocampus/	311	4.92	26	-4	-18
Thalamus	504	5.17	-2	-8	6
Dorsal anterior cingulate	411	3.80	2	52	8
Psychotic Pooled Activation					
Calcarine fissure	345	6.96	-36	-70	-8
Left fusiform gyrus/cuneus	261	7.47	32	-78	-6
Thalamus	370	5.09	-2	-18	2
Right fusiform gyrus/cuneus	220	6.50	8	-82	16

TABLE S6. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of transdiagnostic patient hyper- and hypoactivation (i.e., pooled across disorders and processing tasks) during functional neuroimaging of emotional processing.

Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Control > Patient					
Right ventrolateral prefrontal cortex	364	5.20	38	34	-12
Dorsomedial Thalamus	445	4.48	-2	-18	2
Dorsomedial prefrontal cortex/anterior cingulate	265	3.90	0	44	30
Patient > Control					
Left amygdala/ hippocampus/ parahippocampal gyrus	1142	6.84	-26	-6	-18
Dorsomedial thalamus	265	4.89	-2	-8	6

TABLE S7. Percent contribution to clusters of convergence for whole-brain patient hypo- and hyper-activation contrasts by experiment sample and design characteristics.

	Cluster of convergence				
Experiment sample/ design characteristics	Right ventrolateral prefrontal cortex	Dorsomedial Thalamus	Dorsomedial prefrontal cortex	Left amygdala	Dorsomedial thalamus
Contrast Direction					
Control > Patient	100	100	100	0	0
Patient > Control	0	0	0	100	100
Disorder Class					
Non-psychotic	84.99	41.65	76.16	97.84	94.7
Psychotic	15.01	58.35	23.84	2.16	5.3
Broad Diagnostic Group					
Anxiety	13.31	13.36	19.14	44.35	44.35
Major Depression	18.07	14.94	30.97	37.81	21.79
Schizophrenia	15.01	58.35	23.84	2.16	5.3
Bipolar Disorder	32.9	10.36	7.78	12.48	9.53
Substance Use	20.72	2.98	18.26	3.21	19.03
Specific Diagnostic Group					
Mixed Anxiety Disorders	0	0	0	0	0
Mixed Anxiety/Depression	0	0	0	0	0
SUD: Cannabis	0	0	1.1	0	0
SUD: Methamphetamine	11.47	0.26	1.36	0	0
GAD	5.89	0	0	3.82	0
SUD: Alcohol	4.99	0.06	15.44	0.56	3.24
SUD: Cocaine	4.26	2.66	0.36	2.64	15.78
Panic Disorder	0	2.73	0	1.11	3.25
Specific Phobia	0	0	0	5.12	14.17
Social Anxiety Disorder	0	0	10.47	7.02	7.18
OCD	0.01	0	0.5	16.35	6.62

PTSD	7.41	10.64	8.17	10.92	13.13
Bipolar Disorder	32.9	10.36	7.78	12.48	9.53
Schizophrenia	15.01	58.35	23.84	2.16	5.3
Major Depression	18.07	14.94	30.97	37.81	21.79
Age Group					
Adult	89.06	84.3	88.28	93.03	83.43
Child/adolescent	10.35	15.7	4.01	2.57	12.64
Older adult	0.59	0	7.71	4.4	3.94
Current Psychotropic Medication					
Yes	50.21	67.68	35.43	41.07	34.18
No	49.79	32.32	61.44	55.19	50.04
Not reported	0	0	3.14	3.73	15.78
Behavioral Performance/Rating					
Yes	34.72	67.83	57.05	55.1	34.46
No	65.28	32.17	42.95	44.9	65.54
Imaging Modality					
Functional MRI	89.23	95.54	94.96	91.99	96.27
PET	10.77	4.46	5.04	8.01	3.73
SPECT	0	0	0	0	0
Task Process					
Reactivity	83.2	91.92	85.8	75.32	74.77
Regulation	11.11	3.27	2.93	2.96	10.84
Compound	5.7	4.81	11.27	21.72	14.39
Valence					
Emotional	7.82	16.6	3.59	7.3	4.81
Pleasant	29.49	32.45	52.44	5.74	11.16
Unpleasant	62.69	50.96	43.97	86.96	84.04
Task Type					
Picture processing	64.58	54.7	43.43	57.47	50.45
Script processing	3.69	10.27	19.95	4.59	20.66

Emotional Stroop	0.59	3	8.07	9.55	4.78
Fear Conditioning	0	0.46	0.37	2.22	3.59
Stimulus Type					
Faces	48.31	47.25	36.18	45.04	22.83
Scenes	25.59	25.45	14.86	29.19	40.63
Words	0.59	11.45	18.35	12.16	4.78
Scripts	3.69	10.27	19.95	4.59	20.66
Shapes	8.4	2.47	4.43	1.84	0

Contributions by task and stimulus type are reported for categories that contained at least 12 unique contrasts.

TABLE S8. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of transdiagnostic patient hyper- and hypoactivation (i.e., pooled across disorders) during functional neuroimaging of emotional processing by task process

Disorder/Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Control > Patient					
Compound					
Right putamen	223	4.19	18	14	-8
Reactivity					
Right amygdala	242	6.49	26	-4	-18
Right ventrolateral prefrontal cortex	374	5.29	38	32	-12
Dorsomedial thalamus	529	4.75	-2	-18	2
Patient > Control					
Compound					
Left amygdala/ hippocampal/ parahippocampal gyrus	272	4.71	-28	-8	-16
Reactivity					
Left Amygdala	848	5.92	-20	-2	-16
Ventromedial prefrontal cortex/ subgenual cingulate	303	4.96	-8	32	-16

TABLE S9. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of hyper and hypoactivation during functional neuroimaging of emotional processing separately for psychotic and non-psychotic samples.

Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Control > Patient Non-Psychotic					
Anterior cingulate/ ventromedial prefrontal cortex	291	4.31	-6	38	-4
Right ventrolateral prefrontal cortex	461	5.47	38	32	-12
Control > Patient Psychotic					
Right fusiform gyrus	244	7.74	32	-78	-6
Left fusiform gyrus	343	7.12	-36	-70	-8
Dorsomedial thalamus	416	5.34	-2	-18	2
Patient Non-Psychotic > Control					
Left amygdala	-26	7.02	-26	-6	-18
Patient Psychotic > Control					
Cuneus/ calcarine fissure	301	7.76	8	-82	16

TABLE S10. Peak coordinates of clusters derived from Activation Likelihood Estimation (ALE) meta-analysis of patient hyper- and hypoactivation during functional neuroimaging of emotional processing by broad disorder grouping.

Disorder/Contrast/ Region	Cluster Size (voxels)	Peak Intensity (Z)	MNI Coordinates X	Y	Z
Control > Patient Bipolar					
Right inferior frontal gyrus/ ventrolateral prefrontal cortex	389	4.54	38	36	-12
Control > Patient MDD					
Cerebellum	254	4.17	-2	-28	6
Control > Patient SCZ					
Right fusiform gyrus	244	7.74	32	-78	-6
Left fusiform gyrus	343	7.12	-36	-70	-8
Thalamus	416	5.34	-2	-18	2
Control > Patient SUD					
Right inferior frontal gyrus/ventrolateral prefrontal cortex	182	5.21	50	42	-4
Patient ANX > Control					
Left amygdala	659	5.47	-26	-6	-18
Patient MDD > Control					
Left amygdala/ hippocampus	234	4.54	-26	-8	-18
Patient SCZ > Control					
Cuneus/ calcarine fissure	301	7.76	8	-82	16

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