



# Do People with Schizophrenia Experience More Negative Emotion and Less Positive Emotion in Their Daily Lives? A Meta-analysis of Experience Sampling Studies

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## Introduction

In the laboratory, people with schizophrenia do not differ in their experience of positive and negative responses to valenced stimuli, relative to healthy controls (e.g., Cohen & Minor, 2010). While this is a consistent finding in the literature, it is less clear if people with schizophrenia report experiencing the same amount of positive and negative emotion in their daily lives.

The recent increase in Experience Sampling Method (ESM) or Ecological Momentary Assessment studies in schizophrenia allow for a clear test of whether the response to standardized stimuli is the same for people with schizophrenia as their daily life experience. ESM/EMA assesses environment-experience interactions, and avoids confounds with retrospective bias by asking participants about their experience in the moment. Several recent studies appear to indicate some differences with laboratory versus ESM/EMA studies of emotion, specifically indicating that people with schizophrenia experience *more* negative and *less* positive emotion than healthy control participants.

Therefore, we conducted a meta-analysis to examine if people with schizophrenia experienced differences in emotion relative to healthy control participants. Specifically, we included all ESM/EMA studies that assessed unipolar positive or negative emotion, with schizophrenia and healthy comparison groups.

## Method

We used Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA; Moher et al., 2009) guidelines covering PubMed, PsycINFO, and Google Scholar for the following search terms: schizophrenia, psychotic disorder, ecological momentary assessment, experience sampling method, EMA, ESM.

We used the following inclusion criteria: 1) written in English, 2) EMA/ESM used to assess emotion, 3) included a patient population with schizophrenia/psychosis, 4) included a control comparison group, and 5) emotion was measured using a unipolar rating of negative and/or positive emotion. See Figure 1. Eleven studies were excluded from the analysis as they used the same set of data as other published studies. Six studies failed to provide necessary means for data analysis. See References for a list of included studies.

We used weighted effect sizes comparing the emotion ratings of people with schizophrenia and controls for each individual study and for positive and negative emotion, respectively. More specifically, standardized mean differences (*d*) was used, given that studies often utilized different Likert scales. All meta-analyses were run using random effects models

## Results

In total, 852 people with schizophrenia and 924 healthy controls were included from 14 studies. **Overall people with schizophrenia reported significantly less positive emotion ( $d = -.68$ ;  $k = 10$ ; 95% CI [-0.899, -0.453]) and significantly more negative emotion ( $d = .73$ ;  $k = 14$ ; 95% CI [0.548, 0.913]) relative to controls.** See Figures 2 & 3 for forest plots for positive and negative emotion, respectively, and Figure 4 for summary effect of mean effect size estimates).

## Discussion

These findings highlight the importance of assessing emotion experience in schizophrenia *in vivo* and diverge from patient responses to standardized stimuli in the laboratory. The contrast of lab and EMA results implies that there are potentially important environmental or contextual differences for people with schizophrenia. Future research may wish to investigate these contextual differences, including home, neighborhood, relationship, and stressor differences.

Figure 1. Information Flow of Study Selection

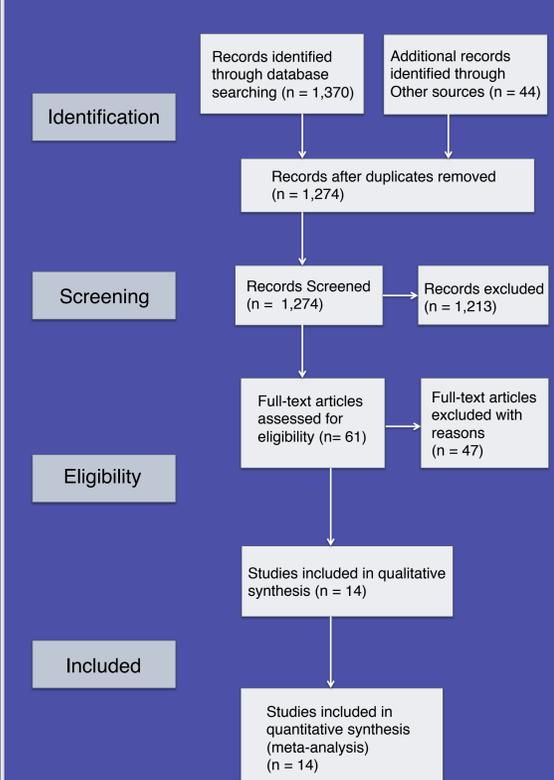


Table 1. Demographic Information for Studies that Met the Inclusion Criteria

Author	Year	Patients (N)	Diagnosis	Female (%)	Mean Age (SD)	Controls (N)	Female (%)	Mean Age (SD)
Ben-Zeev et al.	2012	24	SZ	29.2	44.87 (9.27)	26	65.4	34.23 (10.5)
Collip et al.	2011a	60	SZ spectrum	38	33.27 (10.3)	63	45	28.82 (10.0)
Collip et al.	2011b	86	SZ spectrum	33	32.26 (10.6)	109	68	40.17 (13.4)
Gard et al.	2007	15	SZ or SA	50	42.67 (8.33)	12	58	36.33 (9.85)
Janssens et al.	2012	50	SZ spectrum	24	32.70 (10.5)	67	70.1	27.40 (8.30)
Johnson et al.	2009	47	SZ	37	44.10 (10.5)	82	67	19.40(1.40)
Kimhy et al.	2006	10	SZ	40	34.50 (12.3)	10	60	26.00 (7.00)
Myin-Germeys et al.	2000	58	SZ	37.9	36.00 (9.00)	65	40	30.00 (14.0)
Myin-Germeys et al.	2001	42	SZ	47.6	31.9 (7.70)	49	51	35.20 (8.90)
Oorscot et al.	2011	149	SZ & SA	30	33.60 (10.6)	143	61	37.00 (11.7)
Oorscot et al.	2012a	177	SZ spectrum	27.1	32.70 (3.23)	148	62	36.50 (12.3)
Oorscot et al.	2012b	30	SZ spectrum	13	38.10 (10.7)	34	24	36.00 (11.6)
Sanchez et al.	2014	47	SZ & SA	26	39.55 (13.9)	41	37	36.83 (14.9)
Wigman et al.	2013	57	SZ spectrum	35	27.30 (8.20)	75	73	31.90 (10.3)

\*SZ= Schizophrenia; SA= Schizoaffective Disorder

Table 2. Mean and Standard Deviations of Emotion Ratings

Author	Year	Patients				Controls			
		Positive Emotion		Negative Emotion		Positive Emotion		Negative Emotion	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Ben-Zeev et al.	2012	1.27	0.85	0.46	0.44	2.06	0.72	0.21	0.24
Collip et al.	2011a	N/A	N/A	1.92	0.95	N/A	N/A	1.34	0.36
Collip et al.	2011b	N/A	N/A	1.21	0.34	N/A	N/A	1.23	0.28
Gard et al.	2007	1.7	1.17	0.94	0.76	1.57	1.08	0.61	0.51
Janssens et al.	2012	N/A	N/A	2.34	1.12	N/A	N/A	1.42	0.39
Johnson et al.	2009	N/A	N/A	2.54	1.48	N/A	N/A	1.85	1.28
Kimhy et al.	2006	50.2	16.8	37.7	24.5	59.5	12.8	16.2	11
Myin-Germeys et al.	2000	4.14	1.22	2.34	1.12	5.01	0.65	1.42	0.39
Myin-Germeys et al.	2001	4.4	1	1.7	0.7	5.5	0.8	1.2	0.3
Oorscot et al.	2011	4.5	0.99	1.87	0.77	5.3	0.7	1.3	0.3
Oorscot et al.	2012a	4.47	1.15	1.88	1.03	5.32	1.02	1.24	0.48
Oorscot et al.	2012b	4.2	1.5	2.3	1.3	4.5	1.5	1.9	1.2
Sanchez et al.	2014	2.23	1.47	0.83	0.93	2.39	1.32	0.47	0.64
Wigman et al.	2013	4.44	1	1.76	0.75	4.97	0.67	1.3	0.32

Figure 2. Forest Plot for Positive Emotion

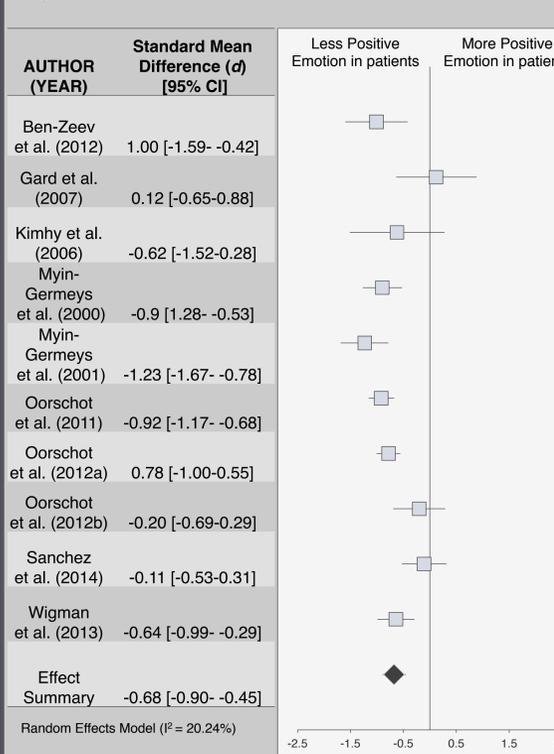


Figure 3. Forest Plot for Negative Emotion

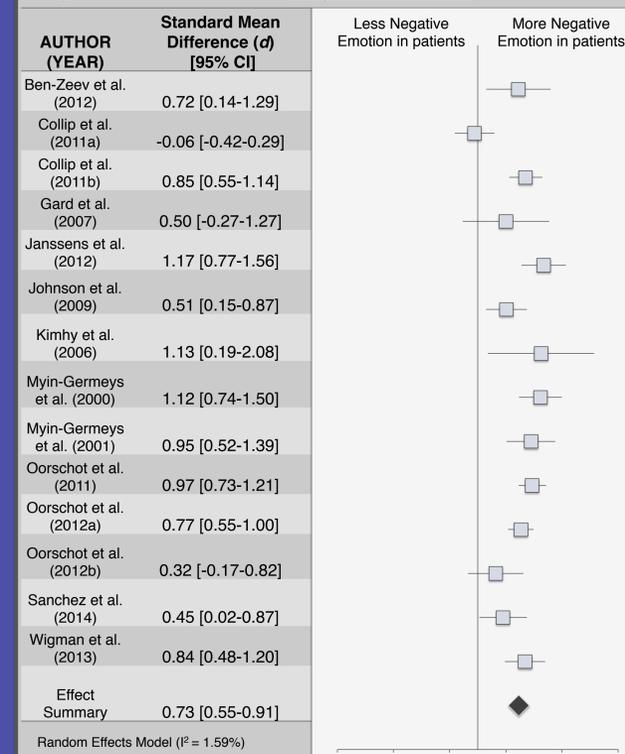
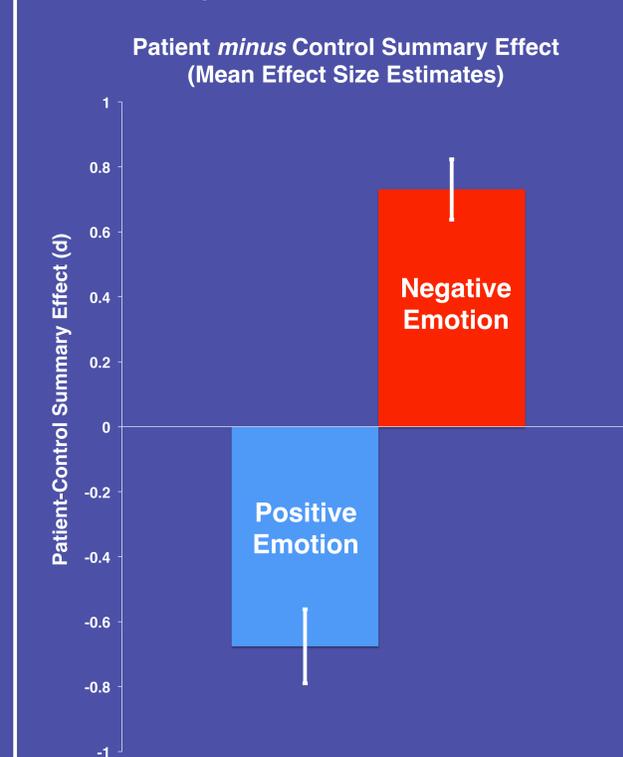


Figure 4. Patient-Control Summary Effect of Positive Emotion and Negative Emotion



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