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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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ABSTRACT

Research on emotion experience in response to valenced stimuli has consistently shown that people with schizophrenia have the capacity to experience emotion. Specifically, people with schizophrenia report similar experiences to both positive and negative emotion-eliciting stimuli as individuals without the disorder. However, it is less clear if people with schizophrenia experience similar levels of positive emotion and negative emotion outside of standardized laboratory contexts, as in their daily lives. One reliable method for assessing emotion experience in schizophrenia has been the Experience Sampling Method (ESM), or Ecological Momentary Assessment (EMA). Using the PRISMA guidelines for meta-analysis, we reviewed the literature for all studies that included people with and without schizophrenia, and that included a positive or negative emotion assessment during participants' daily lives. The current study is a meta-analysis of 12 EMA studies of emotion experience, which included a total of 619 people with schizophrenia and 730 healthy controls. Results indicate that people with schizophrenia consistently report more negative and less positive emotion than healthy control participants. These findings differ from laboratory-based studies, which may be due to several factors, including environmental differences, effects of the disorder that appear more clearly in daily life, or additional concerns, such as depression, which has been shown to be related to negative emotion in schizophrenia. Importantly, these findings are in line with questionnaire-based measures of emotion experience, lending some support for their use in research and clinical settings.

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1. Introduction

Emotion impairment has long been considered one of the prominent, core features of schizophrenia (Bleuler, 1911; Kraepelin, 1919; Meehl, 1990). As the field of affective science has developed, researchers have begun to test specific questions about what aspects of emotion are impaired in the disorder. For example, researchers have tested whether people with schizophrenia have a similar capacity to experience emotion in the presence of valenced (i.e., positive and negative) stimuli.

In dozens of studies, researchers have presented standardized stimuli to people with and without schizophrenia, such as pictures and film clips. Results indicate that while people with schizophrenia tend to facially and vocally express less emotion (Berenbaum and Oltmanns, 1992; Kring et al., 1993; Kring and Neale, 1996), they show similar

psychophysiological responses to emotion-eliciting stimuli as healthy control participants (Berenbaum and Oltmanns, 1992; Horan and Blanchard, 2003; Kring et al., 1993; Kring and Neale, 1996). In addition, people with schizophrenia consistently report similar positive and negative emotional experiences to valenced stimuli as healthy individuals (for a meta-analysis see Cohen and Minor, 2010). Thus, people with schizophrenia do not appear to differ in their emotional experience and clearly do not have a diminished capacity to experience emotion.

While the research on emotion capacity has been informative, it is unclear whether these findings translate to the daily life experience of emotion in people with this disorder. That is, people with schizophrenia may not differ from healthy controls in their capacity to experience emotion, but they could still experience more or less positive and negative emotion in their everyday lives. Identification of these potential differences would be informative for better understanding the phenomenology of the disorder, as well as for identifying emotion-focused treatment targets.

One method to assess affect in the daily lives of people with schizophrenia is to utilize standardized self-report measures of emotion experience. For example, in the Positive and Negative Affect Scales (PANAS;

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Watson et al., 1988), participants rate their emotion experience, either over a specific time frame (e.g., past week), or in general, on several emotion adjectives. Interestingly, the findings in this area of research contrast with the findings of the research in emotion capacity. In these studies, people with schizophrenia have consistently reported lower PA (positive affect) and higher NA (negative affect) using the PANAS (Barch et al., 2008; Cohen et al., 2012; Strauss et al., 2011; Strauss et al., 2013). Similarly, the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) is also a self-report, which measures overall trait positive and negative emotion, and people with schizophrenia have also consistently indicated lower PA and higher NA than healthy individuals (Cohen et al., 2005; Blanchard et al., 1998). One drawback to these studies is that they often require participants to accurately assess (and calculate) their overall emotion experience retrospectively. Given the ubiquitous cognitive deficits in schizophrenia, these findings of lower PA and higher NA could be an inaccurate representation of actual emotion experience. Thus, it is unclear whether questionnaire-based measures or in-the-moment laboratory-based paradigms with high experimental control (which show no impairment in emotion experience) are a better representation of emotion experience in schizophrenia.

One way to minimize retrospective reports in schizophrenia is through the use of in-the-moment sampling of behavior and experience. The Experience Sampling Method (ESM), or Ecological Momentary Assessment (EMA), is a method that utilizes technology (e.g., pagers, cell phones) to collect participant report of experiences as they are occurring (Csikszentmihalyi and Larson, 1987; Oorschot et al., 2009). Typically, researchers will prompt participants multiple times a day over several days in order to gather variable data. Several EMA studies have been completed in schizophrenia, including studies on symptoms, stressors, medication adherence, social functioning, cannabis use, and others (e.g., Collip et al., 2011; Collip et al., 2013; Granholm et al., 2013; Henquet et al., 2009; Janssens et al., 2012; Lataster et al., 2011; Lataster et al., 2013; Murray et al., 2007; Oorschot et al., 2009; Peters et al., 2012). In addition to avoiding retrospective bias, EMA also allows for a more ecologically-valid view of participants' experience, since that experience is not occurring in a laboratory, but instead is reported in the immediate daily life of the participant. Thus, EMA/ESM offers a methodology with high external validity that can generalize to the daily lives of individuals with schizophrenia.

Given that EMA typically avoids the bias of retrospective report, and is an in-the-moment report of the daily lives of participants, we completed a meta-analysis of studies that included positive and/or negative emotion assessment with both schizophrenia and healthy control participants. If the laboratory-based research were an accurate reflection of the amount of positive and negative emotion that people with schizophrenia experienced, we would expect no group differences in overall PA or NA experienced in daily life. However, if the self-reported questionnaire-based measures are an accurate measure of patient emotional experience, we would expect lower PA and higher NA in patient experience.

2. Method

2.1. Literature search

The primary aim for this meta-analysis of EMA/ESM studies was to examine if people with schizophrenia experience and report in-the-moment positive or negative emotion differently from people without schizophrenia in their daily lives, and whether the emotion experience of people with schizophrenia was best reflected in the findings of laboratory studies or self-report questionnaires. In this meta-analysis, we limited our search to studies that included unipolar negative or positive emotion ratings only (e.g., How happy are you right now- 0 = not at all, 5 = extremely). We excluded studies that exclusively measured a valenced spectrum of emotion (e.g., 'mood' or 'How unhappy to happy

are you on a scale of 0–5'). We did this 1) to directly compare our results to the vast majority of emotion capacity studies, and self-report questionnaire studies (such as the PANAS) in schizophrenia, and 2) because research has shown that unipolar measures of positive and negative emotion experience have provided the most nuanced representation of emotion experience in schizophrenia (Cohen and Minor, 2010).

2.2. Search strategy

In line with previous research, we used the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA; Moher et al., 2009) guidelines. The electronic databases of PubMed and PsycINFO were primarily searched for any combinations of the following search key word terms: "schizophrenia", "psychotic disorder", "ecological momentary assessment", "experience sampling method", "EMA", "ESM", "mood", "affect", and "emotion". The search was limited to the studies published between January 1995 and July 2016.

In addition, the reference sections of each manuscript that qualified for inclusion were also added into our search in order to find studies that might have been inadvertently excluded from the database search. Google scholar was used as a supplemental search engine. Finally, we contacted authors who co-authored on multiple qualified studies in order to remove studies with repeated samples.

Our initial search yielded 533 potential study matches. For each study, we reviewed the title and abstract and eliminated those that included a different clinical group (e.g., major depressive disorder), or used methods of data collection other than EMA or ESM (e.g., daily diary studies). A total of 84 studies remained from this initial pool of 533.

2.3. Eligibility criteria

For inclusion, studies must have: 1) been written or translated in English; 2) used the EMA or ESM procedure to assess emotion; 3) an adult patient population with a psychotic disorder (e.g., schizophrenia, schizoaffective disorder); 4) an adult healthy control comparison group; 5) the emotion (e.g., negative or positive) rating measured on a unipolar scale (e.g., from 1 indicating not happy at all to 7 indicating extremely happy; as opposed to a 'negative to positive' bipolar scale); and 6) have collected and reported the mean and standard deviation values to be used for analysis. If there were no values reported in the manuscript but the data for emotion ratings were clearly collected, we contacted the corresponding authors to request the values for our analysis.

2.4. Study selection and data extraction

With the 84 studies remaining, each study was screened and full text was reviewed to confirm that all eligibility criteria were satisfied. Seventy-two of the 84 studies were not included for a variety of reasons, including a lack of a clear diagnostic or healthy comparison group, a lack of a unipolar measure of emotion, or where data overlapped with previously published studies. From the remaining 12 studies, we extracted all means and standard deviations of positive and/or negative emotion ratings (see Table 1). All 12 studies included utilized language about the emotion experience that referenced the current moment - and not retrospective report (e.g., "right now", "immediately after the cue/beep", "at the moment", and "current"). The details of the selection procedure for the studies are demonstrated in the PRISMA diagram (Fig. 1).

2.5. Data coding

Although there was some variability, most of the emotion ratings were measured on a 7-point Likert scale assessing positive (e.g., happy, content, cheerful) and/or negative (e.g., anxious, sad, guilty) emotions. An average of the positive or negative emotion ratings

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