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Facial emotion identification in early-onset and first-episode psychosis: A systematic review with meta-analysis

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ABSTRACT

Objective: Patients with chronic schizophrenia are characterized by deficits in identifying facial expressions of emotion, and these deficits relate to impaired social and occupational function. It is not yet known if these deficits are trait-like and present at the onset of psychosis, preceding a subsequent diagnosis of schizophrenia. Our objective was to systematically review and analyze the extant literature to assess if there is a consistent profile of emotion identification problems in early-onset and first-episode psychosis.
Methods: We conducted a systematic review and meta-analysis of 12 peer-reviewed studies of facial emotion identification in early-onset and first-episode psychosis, published between 1980 and March 2013. We examined the average mean difference between patients and controls on measures of facial emotion identification.
Results: Findings suggest that patients with early-onset and first-episode psychosis have impairment in identifying facial expressions of biologically salient emotion. Across the 12 studies, the onset of psychosis was distinguished by a generalized effect of significantly poorer accuracy for identifying facial expressions of emotion than healthy controls, and this difference had a substantial effect size ($d = -0.88$, $N = 378$, 95% CI $= -1.42$ to -0.32). Within this general effect some emotions were also harder for patients to identify than others, with the magnitude of impairment found to be (i) large for disgust, fear and surprise, and (ii) medium for sadness, and happiness. No between groups mean differences were found for anger or neutral facial expressions.
Conclusions: Deficits in facial emotion identification are evident at first onset of a psychotic episode. The findings suggest that, over and above a generalized deficit in identifying facial emotion, patients may find some emotions harder to identifying than others. This reflects findings with chronic schizophrenia populations and suggests that emotion identification impairment represents a trait susceptibility marker, rather than a sequeale of illness. They signal the urgent need to treat emotion identification deficits at the onset of illness, which could improve functional outcomes.

1. Introduction

Social cognition refers to the capacity to perceive, interpret and regulate responses to emotional information (Green et al., 2008). Much of this information is communicated to us in facial expressions (Fusar-Poli et al., 2009). Facial expressions provide universal signals of emotional disposition and communicate biologically salient information (Ekman, 1993) and the ability to accurately identify these emotional expressions plays a crucial role in facilitating emotional connection and effective communication. Ekman and colleagues proposed a "basic" set of emotions (anger, disgust, fear, sadness, surprise and happiness), which are each characterized by a distinct facial expression, physiology, and evolutionary history (Ekman et al., 1972; Ekman, 1993). Functional imaging studies have identified partially overlapping circuits involved in processing facial expressions of basic emotion; for example, the amygdala tends to be activated for fear (Phan et al., 2002; LeDoux, 2003; Williams et al., 2007, 2009), the insula and basal ganglia for disgust (Phillips et al., 1997, 1998), and the anterior cingulate and caudal regions for anger (Jehna et al., 2011).

Impairments in inferring emotional information from facial expressions have been observed consistently in people with chronic schizophrenia (for meta-analyses, see Salva et al., 2012; Chan et al., 2010; Kohler et al., 2010). However, little research has been undertaken with early-onset psychosis (<18 years) or first-episode psychosis (>18 years). For example, in recent reviews of facial emotion identification in patients with schizophrenia, only 2 out of 86 (Kohler et al., 2010)

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and 2 of 28 (Chan et al., 2010) studies involved people experiencing their first-episode of illness. Moreover, in a meta-analysis that evaluated several domains of social cognition, only 4 of 112 studies involved patients with first-episode psychosis, and no studies included patients with early-onset psychosis (Salva et al., 2012).

It is also unclear whether deficits in facial emotion identification in people with schizophrenia are general or emotion specific. While some studies found that patients with schizophrenia had generally impaired identification of emotion (e.g. Kucharska-Pietura et al., 2005; Silver et al., 2009), other studies provided evidence of a selective impairment, with greater difficult in correctly identifying negative facial expressions of emotion such as fear, disgust and sadness (Marwick and Hall, 2008; Kohler et al., 2010).

Functional imaging data with chronic schizophrenia reflects these findings. Widespread abnormalities in activation of brain regions involved in facial emotion processing have been found, including under recruitment of the amygdala accompanied by a lack of activation throughout the ventral temporal–basal ganglia–prefrontal cortex system (Gur et al., 2002; Takahashi et al., 2004; Li et al., 2010). In addition, specific regions of impaired activation for specific emotions have been found, such as under recruitment of the amygdala for fear (Williams et al., 2007; Anticevic et al., 2012) and anterior cingulate cortex for anger (Williams et al., 2007). Yet others still have failed to find consistent emotion-specific activation abnormalities (Quintana et al., 2003). Overall, it appears that there is impairment in common circuits for the emotional brain, as well as specific regions of impaired activation for specific emotions.

Research with adults with schizophrenia have found relationships between these functional abnormalities and impaired performance on tasks of facial emotion identification (Quintana et al., 2003; Williams et al., 2007; Habel et al., 2010), with a little done to link these measures in people at the early stages of psychotic illnesses (Seiferth et al., 2008).

Deficits in emotion identification in people with schizophrenia have important clinical implications because they are associated with impairments in social functioning, interpersonal skills, work functioning and independent living (Kee et al., 2003; Couture et al., 2006; Pinkham and Penn, 2006; Williams et al., 2009; Irani et al., 2012). This connection is thought to explain the nexus between general cognitive impairment in schizophrenia and burden of illness (Brekke et al., 2005; Schmidt et al., 2011). If these impairments are present early in life, they will hamper the acquisition of socially competent behaviors, altering the developmental trajectory of that individual.

Research examining facial emotion identification deficits in people at the early stages of illness is of critical importance. If facial emotion identification deficits represent a vulnerability-linked impairment rather than an indicator of chronicity, deficits should be apparent at the early stages of illness onset. Such finding would be consistent with a neurodevelopmental hypothesis of schizophrenia, which posits that the illness is related to abnormal brain development, with various neurological, cognitive, and behavioral difficulties being present long before illness onset (Marenco and Weinberger, 2000). Indeed, studies of longitudinal brain changes in early-onset psychosis support the concept of schizophrenia spectrum illnesses as a progressive neurodevelopmental disorders with both early and late developmental abnormalities (see Arango et al., 2008), and several studies have demonstrated structural brain volume differences even before the onset of psychotic symptoms (Johnstone et al., 2005; Fornito et al., 2008; Lawrie et al., 2008). Studies involving patients with first episode schizophrenia have also found evidence of multiple neurocognive deficits, including attention, processing speed, working memory, verbal and non-verbal memory, general cognitive ability, language, executive, visuo-spatial, motor skills and areas of social cognition, other than emotion identification (for review, see Mesholam-Gately et al., 2009).

Studying people at the early stages of illness offers a unique opportunity to investigate pathogenic processes by reducing the influence of illness chronicity, extended antipsychotic treatment, multiple hospitalizations (Kirch et al., 1992), and general psychosocial deterioration (Kane and Barnes, 1995) on task performance. Finally, as significant cognitive and social deterioration have been documented in the early years of psychosis (Larsen et al, 1996; Yung and McGorry, 1996; Amminger et al., 2002), which can set the stage for later social and occupational dysfunction (Malla and Payne, 2005), understanding the role of cognitive deficits early in the course of illness can improve early-intervention efforts with an aim to ameliorate potential cognitive and functional deterioration.

Therefore, given the pivotal role of emotion identification in functional outcome of people with schizophrenia and lack of meta-analytical studies examining emotion identification accuracy in people at the early stages of illness, the objective of this review was to determine whether facial emotion identification deficits are present and emotion specific in people experiencing early-onset or first-episode psychosis.

2. Materials and methods

2.1. Identification of studies

Studies were identified through literature searches of the PsychINFO (1806 to June 2013), MEDLINE (1946 to May 2013), and EMBASE databases (1947 to June 2013). The search terms used were “emotion,” “facial,” and “affect” with different combinations of “schizophrenia,” “schizotypal,” “schizoaffective” “psychosis” or “psychotic” combined with “early” or “first.” The searches were limited to English language and peer reviewed published articles.

Our meta-analysis included studies that (i) reported original empirical research [i.e., not reviews, meta-analyses, editorials, or case studies], (ii) included patients with first-episode or early-onset psychosis and reported data of these patient groups separately if other patient groups were included, (iii) involved a control group and (iv) utilized measures of emotion recognition. Tasks of emotion identification, discrimination and recognition that reported accuracy scores were considered for this review, as large and comparable impairments were found on these tasks in patients with schizophrenia (Kohler et al., 2010). The reference lists of articles that met inclusion criteria were scrutinized for studies not indexed in the databases.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and guidelines were used to guide the summarizing of evidence and ensure appropriate and transparent reporting of results (Liberati et al., 2009).

Fig. 1 outlines the selection of studies for this review. Two hundred and ninety-four studies were identified in the initial searches. After screening titles, each of the remaining 144 abstracts was screened for relevance by two reviewers (SB, LR). Disagreements were resolved by discussion and consensus. One hundred and nineteen studies were eliminated due to incorrect subjects, lack of a control group, use of the same participants, and/or inappropriate tasks, such as use of a mood induction paradigm (Habel et al., 2006). The authors of three papers were contacted for additional data. Two additional articles were identified from the reference lists of remaining studies. Full texts of the remaining 27 articles were reviewed against the inclusion criteria. Twelve remaining studies were included in this review (see Table 1 for details).

2.2. Data analyses

Relevant data abstracted from identified studies included sample size and age of patient and control groups, task type, and main findings. When studies employed more than one measure of emotion identification, to avoid the unit-of-analysis problem, the effect size was calculated by selecting scores on one task that was determined to have the strongest psychometric properties. When studies assessed emotion identification over time, baseline data was used. Emotion specific accuracy data was extracted when available.