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Emotion Recognition and Social/Role Dysfunction in Non-Clinical Psychosis

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Abstract

As researchers continue to understand non-clinical psychosis (NCP- brief psychotic-like experiences occurring in 5–7% of the general population; van Os et al., 2009), it is becoming evident that functioning deficits and facial emotion recognition (FER) impairment characterize this phenomenon. However, the extent to which these domains are related remains unclear. Social/role functioning and FER were assessed in 65 adolescents/young adults exhibiting Low and High-NCP. Results indicate that FER and social/role functioning deficits were present in the High-NCP group, and that the domains were associated in this group alone. Taken together, findings suggest that a core emotive deficit is tied to broader social/role dysfunction in NCP.

Keywords

Social Functioning; Role Functioning; Emotion Recognition; Non-clinical Psychosis

1. Introduction

A growing body of evidence indicates that a proportion of individuals in the general population experience subclinical psychotic symptoms, which suggests that psychosis occurs along a continuous phenotype (Kelleher and Cannon, 2011). These fleeting psychotic symptoms (often specifically referenced as psychotic-like symptoms; Kelleher and Cannon, 2011) occur in the absence of formal psychosis, and are indicative of what is broadly termed

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Contributors

Ms. Pelletier and Dr. Mittal conceptualized the study. Ms. Pelletier conducted analyses and drafted the manuscript. Dr. Mittal obtained funding and helped to conduct analyses and aided in drafting the manuscript. Mr. Dean, Ms. Lunsford-Avery, and Ms. Smith helped to collect data, interpret results, and draft the manuscript. Dr. Orr, Mr. Millman, and Ms. Gupta helped to interpret the data and draft the manuscript.

Conflict of Interest

There are no conflicts of interest to report.

non-clinical psychosis (NCP; Mittal et al., 2011; Mittal et al., 2012). Recent research has highlighted the significance of NCP. There is some evidence that individuals experiencing NCP are at heightened risk of developing a psychotic disorder (Welham et al., 2009). In addition, NCP has been linked with a variety of risk factors for schizophrenia such as low socio-economic status, urbanicity, and cannabis use (for a review, see Kelleher and Cannon, 2011). Overall, NCP research is important due to its potential to clarify our understanding of the developmental trajectory of psychosis, and specifically, vulnerability markers associated with the onset of a psychotic disorder (Roddy et al., 2012). Because of NCP's potential to clarify risk for psychosis, and the evidence showing that individuals experiencing NCP show a significantly heightened risk for developing formal psychosis, improving the scientific understanding of NCP should be a priority (Zammit et al., 2009).

Recent research links NCP with several areas of impairment. For example, although NCP is defined by the absence of a formal psychotic disorder, the literature suggests that it is associated with other clinical disorders including depression and anxiety (Yung et al., 2006; Varghese et al., 2011), as well as behavioral issues such as problematic Internet use (Mittal et al., in press). In further support of these specific findings, there is some evidence to suggest that individuals experiencing NCP in the general population usually have at least one non-psychotic Axis I psychiatric diagnosis (Kelleher et al., 2012). Additionally, Yung et al. (2006) found that in a non-psychotic help-seeking population, NCP symptoms were associated with poorer functioning (functioning was examined in terms of general functioning, peer relationships, and family functioning).

Consistent with these broader areas of dysfunction, a recent study reported facial emotion recognition (FER) deficits in individuals reporting NCP (Roddy et al., 2012). The relationship between NCP and FER is interesting on numerous accounts. First, FER, one domain of social cognition, has been widely acknowledged to be impaired in individuals with a psychotic disorder (Pinkham et al., 2007). Despite the general agreement that deficits exist in emotion recognition in formal psychosis, there is some discrepancy as to when the impairment first develops (i.e., prodromal stage, first episode, etc.; see Green et al., 2011 for a review). It is also worth noting that the only other study (in addition to Roddy et al., 2012) to evaluate NCP and FER did not find a significant relationship between NCP and FER (Thompson et al., 2011). Thus, further evaluation of emotion recognition in an NCP population may help clarify the relationship of psychosis and social cognition from a developmental perspective. Another reason that the study of FER is warranted is due to its relationship with functioning. The ability to correctly recognize and process facial expressions is necessary in order to facilitate behavior and have successful social functioning (Amminger et al., 2012). To date, there is no investigation into this relationship in an NCP population.

There is growing evidence suggesting that deficits and vulnerability markers linked with psychosis are present in NCP (Mittal et al., 2012); however, the research is still new, and associations between core deficits such as FER and broader processes such as global social/role functioning remain unclear. The present study examined global social/role functioning (GF:S and GF:R, respectively) and FER in 65 non-clinical adolescents/young adults reporting high and low NCP to determine whether any deficits were present, and if so, the extent to which FER and GF:S/GF:R were related. The current investigation differs from the Yung et al. (2006) study in that we have chosen to examine functioning in regards to specific social and role domains commonly evaluated in psychosis-risk populations (Cornblatt et al., 2007), rather than peer, social, and general functioning. Furthermore, to the authors' knowledge, the only two studies to assess FER in an NCP population evaluated individuals with a mean age 11.5 (Thompson et al., 2011; Roddy et al., 2012). The current

study attempts to expand on these findings by assessing an older sample (older adolescents and young adults) and examine functioning and FER in the sample.

2. Method

2.1. Participants

All participants were adolescents/young adults (mean age = 19.1) recruited through the Adolescent Development and Preventive Treatment (ADAPT) research program at the University of Colorado, Boulder (CU Boulder). Individuals in an undergraduate research pool ($n = 1,248$) were screened using the Launay-Slade Hallucination Scale (LSHS) (Bentall and Slade, 1985). The option to participate in the study was made available to those scoring in the top and bottom 10th percentile (scores of 23 or 3 respectively). The research pool is a volunteer research database in which undergraduate students enrolled in an introductory psychology course participate in research studies for course credit. Several studies recruit from this subject pool and to limit potential sampling bias (i.e., individuals knowingly selecting studies for which they are most suited or in which they are most interested), available studies are listed as numbers without descriptions (study details were provided and informed consent was obtained upon arrival to ADAPT). From the possible 250 invited at total of 65 elected to participate (undergraduate volunteers choose randomly from a variety of studies in which they are invited to participate), and upon arrival to ADAPT no one declined to participate after learning the details of the study.

2.2. Clinical Measures

The LSHS is a 12-item self-report scale used to measure hallucinatory predisposition by assessing clinical and sub-clinical hallucinatory phenomena (the scores for each item range from 0–4 and the range for the total scale is 0–48). The scale has been validated (Bentall and Slade, 1985), and is one of the most widely used instruments in examining symptoms of non-clinical psychosis in healthy populations (van 't Wout et al., 2004; Vellante et al., 2012). It should be noted that the LSHS is specifically designed to gauge hallucination proneness, and that there are other facets to the overall construct of non-clinical psychosis including unusual thoughts and suspiciousness. However, the items on this scale have been reliably to be linked to the non-clinical end of a psychosis spectrum (Levitin, Ward, Catts, and Hemsley, 1996; Serper, Dill, Chang, Kot, and Elliot, 2005). It is also one of the more widely used instruments that is validated for assessing symptoms of non-clinical psychosis (van't Wout et al., 2004; Vellante, et al., 2012). Individuals who selected our study were instructed to indicate NCP symptoms (as captured by the LSHS) in the past month, and asked not to include experiences that occurred solely while under the influence of alcohol, drugs, or non-prescribed medications.

As noted, the LSHS results were then screened to select for those students scoring in the top and bottom 10th percentile of the LSHS (scores of 23 or 3 respectively), and these individuals were given the option to participate. The choice of design (selecting two extreme groups; the top and bottom 10th percentiles) was made in order to optimize our ability to detect potentially subtle differences between individuals endorsing NCP and the general population without these symptoms. The 65 participants were placed into groups: High-NCP ($n = 35$) and Low-NCP ($n = 30$). The Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1976) was administered to ensure that participants exhibiting formally psychotic symptoms would not be included, as this could potentially confound results (no participants were excluded based on this screening). The BPRS was chosen due its use a brief clinical interview designed to track currently present psychotic symptoms. Scores on the BPRS range from 18–126. Based on methods established in our previous work (Mittal et al., 2012), a score of 4 (“moderate”) or higher on any item was grounds for exclusion, although as

noted, it was not necessary to exclude any participants from the study. The Institutional Review Board approved the protocol and informed consent procedures.

2.3 Social and Role Functioning

Social and role functioning were administered by trained graduate students using the Global Functioning Scale: Social (GF:S; Auther et al., 2006) and the Global Functioning Scale: Role (GF:R; Niendam et al., 2006). These instruments are valid and reliable in assessing psychosocial functioning in high-risk populations and were developed specifically for adolescents/young adults (Cornblatt et al., 2007). These scales provide ratings of social/role functioning on two separate 10-point Likert scales, which are scored independent of symptom severity (higher scores correspond to better functioning).

2.4 Emotion Recognition

The Penn Emotion Recognition-40 Test (ER-40; Gur et al., 2001) is comprised of adult faces displaying one of four emotions (i.e., happy, sad, anger, fear) or a neutral expression. The facial images are presented in a random order via computer and require the participant to determine which emotion is being expressed. The ER-40 has demonstrated good test-retest reliability (Carter et al., 2009), and was selected due to its use in a variety of studies across the psychosis spectrum, as this would facilitate comparison of results (e.g., Dickey et al., 2011; Roddy et al., 2012). Furthermore, evaluation of specific emotions in the FER task was warranted as previous studies have shown one emotion can drive results (Amminger et al., 2012). See Table 1 for demographic characteristics and assessment information regarding this sample.

2.5 Statistical Analysis

Demographics were analyzed to test for significant group differences using Pearson chi-square tests for categorical variables and independent t-tests for continuous variables (see table 1 for demographic results). A logarithmic transformation was applied to normalize the distribution of the data for the GF:S and GF:R (see figure 1 for uncorrected functioning scores). Group differences in FER and social/role functioning were analyzed using independent t-tests. Significant differences discovered in FER and social/role functioning were then analyzed in each group separately using post-hoc bivariate correlational analyses. Fisher r-to-z transformations were applied to determine whether any significant differences appeared in the post-hoc correlational analyses.

3. Results

There were no significant group differences on demographic characteristics including age, ethnicity, and parental education. Furthermore, although the study was did not match based on demographics, there was no significant group difference in gender, which permitted analyses without covarying for demographic discrepancies.

Group differences in GF:S, GF:R, and ER-40 were analyzed using independent t-tests. Results indicated significant differences, showing that the High-NCP group scored lower on the GF:S, $t(63) = 3.14, p = .003$, and the GF:R, $t(63) = 3.75, p < .001$. In addition, there was a trend suggesting that the High-NCP group performed more poorly on the ER-40 task, $t(63) = 1.44, p = .07$. This difference appeared to be driven by a deficit in the ability to recognize fear ($t(63) = 2.14, p = .03$), as there were no significant group differences on the other three emotions or the neutral expression (in any direction).

Post hoc correlations were examined in the groups separately due to the recruitment strategy and focused on the social/role functioning scales and the areas of facial recognition that

were significantly different (i.e., ER-40 total and fear). Findings indicated no significant correlations between the separate measures of function or between the functioning scales and the ER-40 task in the Low-NCP group. In the High-NCP group, there were significant associations between ER-40 total and the GF:S, $r = .29$, $p = .04$, as well as the GF:R, $r = .38$, $p = .01$. The ER-40 total was not associated to a greater extent with one functioning scale over the other ($z = -.57$, $p = .569$). Further, results indicated a significant relationship between the fear subtotal and the GF:R scale, $r = .32$, $p = .03$, but not the GF:S, $r = .14$, $p = .22$, although the difference in these correlations was not significant ($z = 1.06$, $p = .289$). The social and role functioning scales were highly associated, $r = .49$, $p = .001$. This relationship between social and role scales is similar to the correlation documented by Cornblatt et al. (2007; $r = .31$, $p < .001$), which highlighted that the link between the two measures is likely due a shared general impairment component and is moderate compared to the unique variance in the specific scales.

4. Discussion

Consistent with the results from a help-seeking sample reporting NCP (Yung et al., 2006), the present study observed functional impairments in non-clinical psychosis. Taken together, this evidence supports the notion that social and role functioning deficits occur across a psychosis continuum. These findings are particularly relevant to informing our understanding of psychosis-risk as the results coincide with a large body of literature reporting impairment in functioning in the prodrome as well as in formal psychosis (e.g., Addington et al., 2008; Green et al., 2000; Cornblatt et al., 2011).

The trending poorer performance of FER in the High-NCP group is consistent with findings of emotion recognition deficits in groups across the psychosis spectrum (Pinkham et al., 2007; Addington, et al., 2008; Roddy et al., 2012; Dickey et al., 2012) and suggests that FER may be a vulnerability marker for psychosis. The fact that this finding is at the trend level instead of significant is not surprising given that the present study did not evaluate a clinical sample. However, it does coincide with a growing body of evidence suggesting impaired social cognitive and neurocognitive performance in individuals experiencing NCP (Blanchard et al., 2010; Roddy et al., 2012).

This association between FER ability and social/role functioning represents the first empirical evidence to suggest that a core emotion recognition deficit, characteristic of patients with formal psychotic disorder (albeit more strongly so), is tied to broader areas of social and role dysfunction seen in a non-clinical population exhibiting NCP. This result adds to the accumulating literature indicating that psychosis occurs on a continuum. Furthermore, this finding illustrates a relationship commonly seen in formal psychosis (Pinkham et al., 2007). Although the relationship is trending, and causality cannot be definitely determined, the present results highlight an informative relationship between FER performance and social/role functioning for the High-NCP group.

It is noteworthy that the individuals experiencing NCP exhibited dysregulated fear processing, as this deficit may complicate functioning and behavior, and potentially cause stress and significant difficulties with communication. Notably, the only other study to our knowledge to assess FER in a NCP sample found sadness, and not fear, to be the main driver of differences in ER-40 performance between groups (Roddy et al., 2012). This discrepancy may be accounted for by the present study's lower n or by developmental differences, as the current sample was representative of older adolescents/young adults (mean age = 19.1) and closer to the risk-age for formal psychosis, whereas the mean age in the study conducted by Roddy and colleagues was 11.5. Furthermore, the present finding is consistent with a report by Amminger et al. (2012) indicating that an aggregate of fear and sadness recognition was

predominately impaired in a clinical high-risk population, as well as the schizophrenia literature citing impaired fear recognition (Morris et al., 2009). Also, although there was a significant correlation between GF:R/fear and not GF:S/fear, the associations were not significantly different. The finding that fear is significantly related to role but not social functioning is likely a product of low statistical power and should be followed up in future studies with a larger sample in order to determine if there is any significance to this preliminary result.

The present study benefits from several methodological strengths such as screening out elevated psychosis and using a well validated emotion recognition measure. Furthermore, functioning scales can be particularly unreliable, and every effort was made to choose scales designed and validated for the present population and ensure only trained graduate students in clinical psychology administered the assessments. However, the findings should be viewed as preliminary due to the relatively small sample size and utilization of an undergraduate population (which may limit generalizability). Future studies should assess multiple time points in a larger sample, assess for gender differences, and incorporate additional tasks and modalities such as neuroimaging. Specifically, examining the relationship of FER and functioning in larger NCP sample in a continuous fashion will help to determine if there is truly an arbitrary cutoff in regards to NCP symptoms (e.g., differences between the top 10 and 15 percentile). Such endeavors would increase our ability to investigate other social cognitive domains (e.g., theory of mind) and further our understanding of the psychosis continuum.

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Figure 1.
Frequency of Global Functioning Scales (Social and Role) by Group

Table 1
Participant Demographics, Global Social/Role Functioning, and Emotion Recognition

	High-NCP (N=35)	Low-NCP (N=30)	Grand Total (N=65)	χ^2	p
<u>Gender n(%)</u>	13(37.1)	15(50)	28(43.1)	1.09	.297
Males					
	Mean(SD)	Mean(SD)	Mean(SD)	t	p
<u>Age</u>	19.0(1.5)	19.2(1.5)	19.1(1.5)	.458	.648
<u>Parent Education</u>	15.9(1.5)	14.9(3.4)	15.4(2.6)	1.56	.125
<u>BPRS</u>	19.6(1.8)	19.0(1.8)	19.4(1.3)	1.82	.074
<u>Functioning Score</u>					
GF:S	8.0(.8)	8.6(.6)	8.3(.7)	3.14	.003
GF:R	7.9(.8)	8.5(.5)	8.2(.7)	3.75	<.001
<u>ER-40 Scores</u>					
Total	33.9(2.8)	34.8(2.4)	34.3(2.6)	1.44	.075
Fear	7.0(1)	7.4(.7)	7.2(.9)	2.14	.036
Anger	5.8(1.1)	5.8(1)	5.8(1)	.084	.934
Sad	6.9(1)	6.9(1.1)	6.9(1)	.000	1.00
Happy	6.9(1)	6.9(1.1)	6.9(1)	.000	1.00
Neutral	6.4(1.4)	6.6(1.4)	6.5(1.4)	1.07	.289

Note: ER-40 total is out of a possible 40, while subtotals are out of a possible 8.