Griffiths Sian (Orcid ID: 0000-0003-0031-7174)

Social and Role Outcomes in Early Psychosis

**Predictors of Social and Role Outcomes in First Episode Psychosis:
A Prospective 12-month Study of Social Cognition, Neurocognition and
Symptoms.**

Running Head: Social and Role Outcomes in Early Psychosis

**Siân Lowri Griffiths^{1*}, Max Birchwood², Aneela Khan¹ & Stephen J.
Wood^{1, 3, 4}**

¹Institute for Mental Health, University of Birmingham, Birmingham, UK; ²Warwick Medical School, University of Warwick, UK; ³Orygen, the National Centre of Excellence in Youth Mental Health, Melbourne, Australia; ⁴Centre for Youth Mental Health, University of Melbourne.

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**Correspondence:* Dr Siân Lowri Griffiths; Institute for Mental Health, University of Birmingham, Edgbaston, Birmingham, UK, B15 2TT; email: s.l.griffiths@bham.ac.uk; Tel: +44 7912497267.

Abstract

Background: Poor functioning is common in psychosis, with predictors of poor outcome including negative symptoms and deficits in neurocognition (NC) and social cognition (SC). The extent to which these variables contribute unique variance in social and role trajectories remains inconclusive. Identifying robust predictors of outcome will inform targeted interventions in early psychosis, where functional trajectories are being set.

Method: Prospective 12-month follow-up study investigating the predictive values of NC and SC on social and role functioning in individuals with first-episode psychosis (FEP), within the context of clinical variables. 98 individuals with FEP (mean age = 24; male = 77) were assessed within the first year of diagnosis on: functioning (social and role), cognition (SC and NC), and psychosis symptoms.

Results: Negative symptoms was the only significant predictor of 12-month social ($\chi^2 = 9.59$, $p = .002$, OR = 1.12) and role ($\chi^2 = 10.86$, $p < .001$, OR = 1.16) functioning in FEP. In exploratory analyses, negative symptoms mediated the relationship between baseline social knowledge and social functioning ($Z = 1.92$, $p = .05$; $d = 0.56$), and between baseline logical memory and role functioning ($Z = 2.40$, $p = .02$; $d = 0.80$) at 12-month follow-up.

Conclusion: Whilst social and role trajectories in early psychosis appear somewhat distinct, negative symptoms were the best prognostic marker of social and role outcome in FEP, and mediated the relationship between SC and social outcome, and NC and role outcome;

these relationships may be important when considering interventions to improve functional outcome in early psychosis.

Key words: Cognition; Early psychosis; Negative Symptoms; Outcome; Poor Functioning;

Introduction

Psychosis is one of the most socially disabling illnesses worldwide (an der Heiden & Häfner, 2000), and despite symptomatic recovery, poor functioning may still remain (Penn et al., 2007). Prospective studies of individuals at illness onset will provide informative data regarding predictors of long-term functional outcomes, which may lead to early, targeted interventions (Simons et al., 2016).

Whilst a number of premorbid and demographic variables are associated with poor functional outcomes in first-episode psychosis (FEP), focus has been to identify potentially modifiable treatment targets to prevent entrenchment of functioning (Fett et al., 2011; Lucas, Redoblado-Hodge, Shores, Brennan, & Harris, 2008).

Neurocognition (NC) is impaired in psychosis (Green et al., 2000), and evidence from two systematic and meta-analytic reviews have shown that NC is associated with long-term functioning in early psychosis (Allott et al., 2011; Santesteban-Echarri et al., 2017). However, within these studies, many null associations across separate domains of

NC were found. This may be attributed to methodological variability such as length of follow-up, inadequate power, and lack of control over other predictor variables (Allott et al., 2011). Indeed, in studies that controlled for symptoms (predominantly negative symptoms), cognition made no significant independent contribution to predicting functional outcome (Siegel et al., 2006).

Social Cognition (SC), defined as the mental operations underlying social interaction (Adolphs, 2009), is also impaired across the psychosis spectrum (Chung, Kang, Shin, Yoo, & Kwon, 2008; Healey, Bartholomeusz, & Penn, 2016; Janssen et al., 2004). The main abilities most frequently impaired are emotion perception, social knowledge/perception, theory of mind (ToM) and attributional style (Couture et al., 2006; Healey et al., 2016). SC is shown to be significantly related to functional outcome in psychosis, however, findings are largely based on cross-sectional research in chronic schizophrenia (Couture et al., 2006); prospective studies in FEP are also inconclusive. Horan and colleagues (Horan et al., 2012) found that baseline SC was related to 12-month work outcomes, independent living and social functioning in FEP, however, when controlling for symptoms, these relationships diminished.

Considering a range of variables, a 3-year follow-up study found no associations between NC, SC, and social functioning in FEP, but negative symptoms and general symptomatology predicted functional outcome (Simons et al., 2016). Another study failed to find a relationship between ToM and social functioning longitudinally, but neither did they find a relationship

between psychosis symptoms and later social outcome(Sullivan et al., 2014). In contrast, Stouten and colleagues found that ToM significantly predicted problems with relationships at 12-month follow-up, whilst negative and general symptoms predicted problems with work and study(Stouten et al., 2014).

A limitation to these studies is that only one study assessed separate functional domains; social and role functioning may have distinct trajectories, highlighting the need to measure functional domains separately(Cornblatt et al., 2007). Further, a brief cognitive battery was used in two of these studies and they also included older participants(Simons et al., 2016; Sullivan et al., 2014). Poor functioning often emerges during adolescence; earlier interventions are more likely to be successful due to the neuroplasticity associated with ongoing neurodevelopment during adolescence (Bartholomeusz and Allott, 2012). Early identification of predictors in younger samples may be most effective for targeting interventions. Finally, there's a lack of appropriate comparison groups to determine the extent of cognitive impairment(Kline et al., 2019).

The present study aimed to test prospectively the relative contribution of SC, NC and psychosis symptoms in predicting 12-month social and role outcomes in FEP, and benchmark these cognitive dimensions against a healthy-matched community sample.

Research questions:

- (1) What are the cognitive, clinical, demographic and premorbid characteristics of the poor social and role outcome groups in FEP?

- (2) Are the FEP social and role outcome groups impaired on social cognitive and neurocognitive tasks compared to the healthy controls?
- (3) Relative to psychosis symptoms, can NC and SC predict 12-month social and role outcomes in FEP?

Method

Sampling

Individuals from the Early Intervention Service (EIS) in Birmingham were invited to take part if: (a) aged 16 – 35 years; and (b) diagnosed with a schizophrenia spectrum disorder. Exclusions included: (a) insufficient command of English language; (b) neurological

disorder; (c) learning disability; (d) severe head injury. Operational Criteria Checklist (OPCRIT) method using International Classification of Diseases (ICD-10) criteria confirmed diagnosis. The study conforms to ethical standards recognized by the Declaration of Helsinki, and was approved by the Black Country NHS research ethics committee (REC reference: 12/WM/009).

Healthy Control Sample

Healthy age-matched peers were recruited to compare cognitive abilities with FEP individuals. ACORN postcode classification (©, 2013) was used to compare age, gender, ethnicity, education and socio-economic status. Participants were recruited via a community website (Gumtree). The Mini International Neuropsychiatric Interview [(MINI); (Sheehan et al., 1998)] ruled out current or past mental health problems using the Diagnostic and Statistical Manual [(DSM-IV); (American Psychiatric Association., 2000)] classification.

Measures

Functional Outcome:

The Global Functioning: Social [(GF: Social; (Auther, 2006))] and Global Functioning: Role [(GF: Role; (Niendam, 2006))]

Clinician-rated scales, focusing on social and role functioning, taking age and phase of illness into account. GF: Social scale focuses on age-appropriate relationships outside the family, the

quantity/quality of the relationships, and level of social withdrawal from family and friends.

GF: Role rates performance in work, education or as a homemaker.

Psychopathology:

Positive and Negative Syndrome Scale [PANSS; (Kay et al., 1987)]. A 30-item-scale assessing severity of positive and negative symptoms of schizophrenia as well as general psychopathology. Seven rating-points for each item, represent increasing psychopathology.

Clinical and Premorbid measures

(i) *Duration of Untreated Psychosis (DUP)*. Defined as the delay between onset of psychosis (>4 on the PANSS positive scale, or a cluster of positive symptoms >1 and totaling 7), and onset of criteria treatment (defined as anti-psychotic treatment lasting 4 weeks at a therapeutic dose; Larsen et al., 1996).

(ii) *The Premorbid Social Adjustment Scale [(PAS); (Cannon et al., 1997)]*: 26-item interview-based measure retrospectively assessing social and role functioning from Childhood (up to 11 years), early adolescence (12-15 years) and late adolescence (16-18 years).

Neurocognitive assessments

To reduce participant burden and maximise engagement, a brief neurocognitive battery was selected. Verbal skills are shown to be most impaired in psychosis (Allott, Liu, Proffitt, &

Killackey, 2011); as such, the battery included two verbal assessments and one non-verbal cognitive domain linked to impairment in early psychosis: verbal learning and memory [(Logical Memory subtest - Wechsler Memory Scale Revised – IV; WMS-IV(Wechsler, 1987)], Verbal comprehension[(Vocabulary subtest Wechsler Adult Intelligence Scale – IV: WAIS-IV; (Wechsler, 1981)], and perceptual reasoning[(Block Design subtest WAIS-IV; (Wechsler, 1981)]. Given the range in age eligibility for this study (16-35 years), raw scores were calculated and converted into age standardized scores, ranging from 1-19.

Social Cognitive Assessments

Four SC measures were selected to assess the most commonly impaired domains in psychosis: Theory of Mind [(Picture sequencing task); (Langdon and Coltheart, 1999)] Emotion Perception [(Mayer-Salovey-Caruso Emotional Intelligence Test – Perceiving Emotions; MSCEIT);(Mayer, 2002)] Attribution Bias [(Ambiguous Intentions Hostility Questionnaire: AIHQ); (Combs et al., 2007)]; and Social Knowledge [(The Social Knowledge Questionnaire: SKQ); (Cutting and Murphy, 1988, 1990)]. Age standardized scores were used for the MSCEIT, but these were not available for the other subtests.

Procedure

Consented participants completed assessments on: premorbid functioning, psychopathology, functioning (social and role), social cognition (4 sub-domains), and neurocognition (3 sub-domains). Functioning was also assessed at 12-months.

Statistical Analyses

GF: Social and GF: Role were analysed separately. Scores of ≥ 7 indicate mild impairment to superior functioning on the GF scales and scores of ≤ 6 represent impaired functioning to extreme dysfunction (Cornblatt et al., 2007). 'Good' outcome was defined by a score between 7-10, and a 'poor' outcome was defined by a score between 1-6 at 12-month follow-up.

Using SPSS, a t-test for continuous, and chi-square for categorical variables compared differences on clinical and premorbid / demographic characteristics between the 'poor' and 'good' functioning groups. An analysis of variance (ANOVA) compared the healthy control and FEP groups. Separate logistic regressions were employed to predict the categorical dichotomy of the GF scales' clinical cut-off at 12 months for social and role functioning (Cornblatt et al., 2007). Backward method was selected to find the most parsimonious predictors of outcome. Nagelkerke pseudo R^2 (R^2_N) statistic was reported as an approximate measure of the proportion of explained variation (Nagelkerke, 1991).

Results

The Sample

FEP

One-hundred participants consented. One participant withdrew and another became ineligible due to an autoimmune disorder affecting the brain, leaving a final sample of 98

(Mean time in EI = 7-months; Median DUP = 8.4 weeks). (Table 1). Seventy-six participants (77.6%) completed follow-up assessments. Those who did not return for follow-up, information on functioning was collected from online medical notes; thus, data were available for 89 (90.8%) participants at follow-up.

Healthy Controls

Thirty healthy controls consented. There were no significant differences between the control and FEP sample in age, gender, ethnicity and education. The groups significantly differed on socio-economic and employment status (Table 1).

*****Please insert Table 1 here *****

Defining 'poor' and 'good' functioning groups at 12-month follow-up

Using the clinical cut-off scores of the GF scales (Cornblatt et al., 2007), 52 participants were classified as having 'poor' role functioning at follow-up, and 37 with 'good' role functioning at 12 months. Forty participants were classified as having 'poor' social functioning at follow-up, and 49 as 'good' social functioning at follow-up. Forty-nine percent of individuals met criteria for poor role and social functioning; 21% had functional impairment on only one scale at follow-up.

Group characteristics and comparisons

There were no differences between the poor and good (social and role) outcome groups on age, sex, education and socio-economic status (Table 2). Individuals with poor role outcomes at 12-months had poorer premorbid scholastic performance and peer relations in late adolescence, and were more socially withdrawn (Table 2). Individuals with poor social outcomes had predominately poor premorbid social functioning in the following areas: socio-sexual relationships, adaption to school in late adolescence, and social withdrawal in early and late adolescence (Table 2).

*****Please insert Table 2 here*****

The groups did not significantly differ on clinical characteristics such as age at onset of psychosis, DUP, or positive symptoms (Table 3), but the poor outcome groups had significantly higher levels of negative symptoms and general symptomatology at baseline (Table 3).

*****Please insert Table 3 here*****

Role Outcome: The FEP poor role outcome group performed significantly worse than the healthy controls on 2 neurocognitive domains (verbal learning and memory, and verbal comprehension), and 2 social cognitive domains (social knowledge and ToM). The good role outcome groups were also significantly worse than the healthy controls on verbal learning and memory (Table 4).

Social Outcome: The 'poor' social outcome group had significantly poorer performance social knowledge compared to healthy controls (Table 4). Poor and good outcome groups performed significantly worse compared to healthy controls on verbal learning and memory, and verbal comprehension.

In summary, whilst some NC impairments were found across the poor and good FEP outcome groups, SC impairments by contrast were *only* evident in the poor outcome groups.

*****Please insert Table 4 here *****

Prediction of outcome

All cognitive variables were first entered into the regression model to assess their independent contribution to social and role outcome. Negative and general symptoms were then added in a separate block. Only significant terms were entered into the final model to avoid saturation.

Role Outcome

When considered alone, verbal learning and memory significantly predicted group membership at 12 months ($r = -.184$, $p = .033$, $R^2_N = .076$). Those with better verbal memory are less likely to have poor role functioning (OR = 0.83). This association was no longer significant once symptoms were included in the full model. Negative symptoms was the sole

significant predictor of (poor) role outcome ($\chi^2 = 13.82$; $OR = 1.16$; $p = <.001$), explaining 20% ($R^2_N = .202$) of variance.

Social Outcome

Baseline social knowledge significantly predicted social functioning at 12-months ($r = -.275$, $p = .049$, $R^2_N = .064$). Those with better social knowledge at baseline were less likely to be in the poor functioning group at follow-up ($OR = .76$). Once symptoms were included, this effect was no longer significant; negative symptoms was the only independent significant predictor ($\chi^2 = 11.02$; $OR = 1.12$; $p = .001$), accounting for 15.9% ($R^2_N = 0.159$) of the overall variance. Participants with more negative symptoms at baseline had greater odds of being in the poor social outcome group.

Exploratory Analyses

Previous research demonstrates that negative symptoms mediate the relationship between cognition and functional outcomes in established psychosis (Gard et al., 2009; Madeira et al., 2016; Mehta et al., 2014; Meyer et al., 2014). In this study, a possible mediation effect was detected given the non-significant effect of social knowledge and logical memory after including negative symptoms. As such, exploratory mediation analyses were conducted following the steps of Baron and Kenny (Baron and Kenny, 1986) to investigate whether negative symptoms mediate the relationship between: (1) social knowledge and social

outcome, and, 2) logical memory and role outcome at 12-months. The Sobel test (Sobel, 1982) was used to determine if the indirect (mediation) effect was significant.

*****Please insert Figure 1 here*****

Figure 1 displays the direct and indirect pathways of the mediation model for 12-month social and role outcomes. A Sobel test revealed a significant partial mediation ($Z = 1.92, p = .05$) in social outcome, with a large effect ($d = 0.56$). A significant partial mediation was also found for the role outcome model ($Z = 2.40, p = .02$) with large effect ($d = 0.80$).

Discussion

This is the first study to assess a range of predictor variables (including social cognition, neurocognition and psychosis symptoms) in understanding variability in the early trajectories of social and role functioning in FEP, and benchmark these cognitive dimensions against a healthy-matched community sample. The principal findings were as follows:

The 'poor' social and role outcome groups were characterized by widespread impairments in premorbid functioning, suggesting these early trajectories are a continuation of those in adolescence and likely to be an enduring trait. The sub-groups with poor outcomes differed from those with good outcomes in terms of greater negative and general symptoms at baseline, and more severe cognitive impairments.

Trajectories of social and role functioning are somewhat distinct. Poor *social* functioning at 12-months was closely associated with SC (social knowledge). Poor *role* outcome at 12-months was predicted by NC (logical memory). This seems internally congruent, namely that individuals with poor understanding of their social world appear to struggle with interpersonal relationships, and those with poorer verbal memory seem to struggle to maintain performance in roles such as work or education. However, when negative symptoms were included in the regression model, cognition failed to contribute additional variance in outcome beyond negative symptoms.

Exploratory mediation analyses showed that negative symptoms mediated the relationship between verbal learning and memory and role functioning, and between social knowledge and 12-month social functioning, supporting previous research in established psychosis (Madeira et al., 2016; Mehta et al., 2014; Meyer et al., 2014; Ventura et al., 2013). Furthermore, in studies targeting cognitive impairment as means of improving functioning, improvements in cognition, negative symptoms, and functioning were reported (Roder et al., 2006; Roder et al., 2011), perhaps suggesting that negative symptoms and cognition are phenomenologically related. This relationship in early psychosis has important implications for intervention, where targeting impaired cognition could directly impact negative symptoms, and in turn improve functioning (Gard et al., 2009).

Nevertheless, the findings are in-line with other studies showing negative symptoms as an important determinant of poor functional outcome in early psychosis (Cacciotti-Saija,

Langdon, Ward, Hickie, & Guastella, 2016; Gee et al., 2016; Rammou et al., 2019). Cognition may play a subordinate role in predicting functional outcome in early psychosis, compared to chronic samples, where findings may be influenced by chronicity factors (e.g. multiple episodes and anti-psychotic treatment). This is in line with the proposed notion of clinical staging in psychosis (McGorry, 2007).

It is particularly interesting that SC impairment, specifically in ToM and social knowledge, were only evident in the poor outcome groups, suggesting that SC impairments only affect a subgroup of individuals with FEP. In contrast, the FEP groups *as a whole* were impaired on verbal learning and memory, consistent with previous findings showing a marked impairment in verbal learning in psychosis (Green et al., 2000).

It is important to note that several SC (emotion perception, attribution of blame bias) and NC (visual-spatial processing) domains were not significantly different in the psychosis groups compared to controls. This is confirmed by other studies in early psychosis where some individuals are likely to have intact cognitive function (Ludwig et al., 2017; Simons et al., 2016); likely reflecting the heterogeneous profiles in FEP. However, contrary to these findings, a recent review showed evidence of consistent SC deficits in FEP, comparable to individuals with chronic schizophrenia (Healey et al., 2016).

The strength of this research is the prospective exploration of social and role outcome in relation to social cognition, neurocognition and clinical variables, in a large, diverse first-

episode sample, with a matched healthy comparison group. FEP participants were recruited within a year of entering EIS, ruling out confounding effects of illness chronicity. The study benefitted from low attrition. Nevertheless, limitations should be considered.

First, the effects of medication on functioning and cognition was not controlled for, although others have argued that the effect of medication at this early stage is likely to be minimal (Mishara and Goldberg, 2004), and the effect would have to be more pronounced in the poor outcome groups to be a confounder, which seems unlikely. Second, whilst SC was comprehensively assessed, in line with the MATRICS consensus cognitive battery (Green et al., 2008), three domains – working memory, attention and vigilance, and visual learning – were not assessed in this study. Third, whilst we report similar rates of variance (17-20%) to other FEP studies (Allott et al., 2011; Stouten et al., 2014), the bulk of variance remains unexplained. Finally, we did not control for other treatment modalities; engagement with social rehabilitation services, for example, may have influenced functional outcomes.

Conclusion

Those with poor outcomes in early psychosis are characterized by having more negative and general symptoms, as well as greater SC and NC impairment. Social and role trajectories in the early phase of illness appear somewhat distinct but internally continuous: those with poor social outcomes may have interpersonal problems stemming from adolescence, and seem more likely to have social cognitive impairment. Those with poor *role* outcome are perhaps

more likely to have had greater academic problems during adolescence, which may be explained by NC impairment.

Finally, whilst cognition may play a more subordinate role in predicting outcomes in FEP, the phenomenological relationship between cognition and negative symptoms may be important when considering interventions to improve functional outcome in early psychosis.

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Conflicts of interest.

There are no conflicts of interest.

Data Availability

The corresponding and senior authors had full access to study data and had final responsibility for the decision to submit for publication. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

- Acorn©, A., 2013. ACORN - A Classification of Residential Neighborhoods postcode.
- Adolphs, R., 2009. The Social Brain: Neural Basis of Social Knowledge. 60(1), 693-716.
- Allott, K., Liu, P., Proffitt, T.M., Killackey, E., 2011. Cognition at illness onset as a predictor of later functional outcome in early psychosis: systematic review and methodological critique. *Schizophr Res* 125(2-3), 221-235.
- American Psychiatric Association., American Psychiatric, A., Task Force on, D.-I., 2000. Diagnostic and statistical manual of mental disorders : DSM-IV-TR. American Psychiatric Association, Washington, DC.
- an der Heiden, W., & Häfner, H. (2000). The epidemiology of onset and course of schizophrenia. *European archives of psychiatry and clinical neuroscience*, 250(6), 292-303. doi:10.1007/s004060070004
- Author, A., Smith, C., & Cornblatt, B. , 2006. Global Functioning: Social Scale (GF: Social).
- Ayesa-Arriola, R., Manuel Rodríguez-Sánchez, J., Pérez-Iglesias, R., González-Blanch, C., Pardo-García, G., Tabares-Seisdedos, R., Vázquez-Barquero, J.L., Crespo-Facorro, B., 2013. The relevance of cognitive, clinical and premorbid variables in predicting functional outcome for individuals with first-episode psychosis: A 3 year longitudinal study. *Psychiatry Research* 209(3), 302-308.
- Baron, R.M., Kenny, D.A., 1986. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of personality and social psychology* 51(6), 1173-1182.
- Bartholomeusz, C., Allott, K., 2012. Neurocognitive and Social Cognitive Approaches for Improving Functional Outcome in Early Psychosis: Theoretical Considerations and Current State of Evidence.
- Cacciotti-Saija, C., Langdon, R., Ward, P.B., Hickie, I.B., Guastella, A.J., 2016. Clinical symptoms predict concurrent social and global functioning in an early psychosis sample. *Early Intervention in Psychiatry*, n/a–n/a.

- Chung, Y.S., Kang, D.H., Shin, N.Y., Yoo, S.Y., Kwon, J.S., 2008. Deficit of theory of mind in individuals at ultra-high-risk for schizophrenia. *Schizophr Res* 99(1-3), 111-118.
- Combs, D.R., Adams, S.D., Penn, D.L., Roberts, D., Tiegreen, J., Stem, P., 2007. Social Cognition and Interaction Training (SCIT) for inpatients with schizophrenia spectrum disorders: Preliminary findings. *Schizophrenia Research* 91(1), 112-116.
- Cornblatt, B.A., Auther, A.M., Niendam, T., Smith, C.W., Zinberg, J., Bearden, C.E., Cannon, T.D., 2007. Preliminary Findings for Two New Measures of Social and Role Functioning in the Prodromal Phase of Schizophrenia. *Schizophrenia Bulletin* 33(3), 688-702.
- Couture, S.M., Penn, D.L., Roberts, D.L., 2006. The Functional Significance of Social Cognition in Schizophrenia: A Review. *Schizophrenia Bulletin* 32(suppl_1), S44-S63.
- Cutting, J., Murphy, D., 1988. Schizophrenic thought disorder. A psychological and organic interpretation. *The British Journal of Psychiatry* 152(3), 310-319.
- Cutting, J., Murphy, D., 1990. Impaired ability of schizophrenics, relative to manics or depressives, to appreciate social knowledge about their culture.
- Fett, A.-K.J., Viechtbauer, W., Dominguez, M.-d.-G., Penn, D.L., van Os, J., Krabbendam, L., 2011. The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: A meta-analysis. *Neuroscience & Biobehavioral Reviews* 35(3), 573-588.
- Gard, D.E., Fisher, M., Garrett, C., Genevsky, A., Vinogradov, S., 2009. Motivation and its relationship to neurocognition, social cognition, and functional outcome in schizophrenia. *Schizophrenia research* 115(1), 74-81.
- Gee, B., Hodgekins, J., Fowler, D., Marshall, M., Everard, L., Lester, H., Jones, P.B., Amos, T., P. Singh, S., Sharma, V., Freemantle, N., Birchwood, M., 2016. The course of negative symptom in first episode psychosis and the relationship with social recovery. *Schizophrenia Research* 174(1), 165-171.
- Green, M.F., Kern, R.S., Braff, D.L., Mintz, J., 2000. Neurocognitive Deficits and Functional Outcome in Schizophrenia: Are We Measuring the “Right Stuff”? *Schizophrenia Bulletin* 26(1), 119-136.

- Green, M.F., Penn, D.L., Bentall, R., Carpenter, W.T., Gaebel, W., Gur, R.C., Kring, A.M., Park, S., Silverstein, S.M., Heinssen, R., 2008. Social Cognition in Schizophrenia: An NIMH Workshop on Definitions, Assessment, and Research Opportunities. *Schizophrenia Bulletin* 34(6), 1211-1220.
- Healey, K.M., Bartholomeusz, C.F., Penn, D.L., 2016. Deficits in social cognition in first episode psychosis: A review of the literature. *Clinical Psychology Review* 50(Supplement C), 108-137.
- Horan, W.P., Green, M.F., DeGroot, M., Fiske, A., Hellemann, G., Kee, K., Kern, R.S., Lee, J., Sergi, M.J., Subotnik, K.L., Sugar, C.A., Ventura, J., Nuechterlein, K.H., 2012. Social Cognition in Schizophrenia, Part 2: 12-Month Stability and Prediction of Functional Outcome in First-Episode Patients. *Schizophrenia Bulletin* 38(4), 865-872.
- Janssen, I., Krabbendam, L., Bak, M., Hanssen, M., Vollebergh, W., Graaf, R., Os, J., 2004. Childhood abuse as a risk factor for psychotic experiences. *Acta Psychiatrica Scandinavica* 109(1), 38-45.
- Kay, S.R., Fiszbein, A., Opler, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr Bull* 13(2), 261-276.
- Langdon, R., Coltheart, M., 1999. Mentalising, schizotypy, and schizophrenia. *Cognition* 71(1), 43-71.
- Langdon, R., Connors, M.H., Still, M., Ward, P.B., Catts, S., 2014. Theory of mind and neurocognition in early psychosis: a quasi-experimental study. *BMC Psychiatry* 14(1), 316.
- Larsen, T.K., McGlashan, T.H., Moe, L.C., 1996. First-episode Schizophrenia: I. Early Course Parameters. *Schizophrenia Bulletin* 22(2), 241-256.
- Lucas, S., Redoblado-Hodge, M.A., Shores, A., Brennan, J., Harris, A., 2008. Predictors of outcome three years after diagnosis of first episode psychosis. *Psychiatry Research* 161(1), 11-18.
- Ludwig, K.A., Pinkham, A.E., Harvey, P.D., Kelsven, S., Penn, D.L., 2017. Social cognition psychometric evaluation (SCOPE) in people with early psychosis: A preliminary study. *Schizophrenia Research* 190(Supplement C), 136-143.

- Madeira, N., Caldeira, S., Bajouco, M., Pereira, A., Martins, M., Macedo, A., 2016. Social Cognition, Negative Symptoms and Psychosocial Functioning in Schizophrenia.
- Cannon, M., Jones, P.B., Gilvarry, C., Rifkin, L., McKenzie, K., Foerster, A., Murray, R.M. 1997. Premorbid Social Functioning in Schizophrenia and Bipolar Disorder: Similarities and Differences. 154(11), 1544-1550.
- Mayer, J.D., Salovey, P., & Caruso, D. R. , 2002. Mayer– Salovey–Caruso Emotional Intelligence Test (MSCEIT) item booklet. Multi-Health Systems In Publishers, Toronto, Ontario, Canada.
- McGorry, P.D., 2007. Issues for DSM-V: Clinical Staging: A Heuristic Pathway to Valid Nosology and Safer, More Effective Treatment in Psychiatry. American Journal of Psychiatry 164(6), 859-860.
- Mehta, U.M., Bhagyavathi, H.D., Thirthalli, J., 2014. Understanding the interplay between motivation and social cognition performance in schizophrenia. Australian & New Zealand Journal of Psychiatry 49(3), 296-297.
- Meyer, E.C., Carrión, R.E., Cornblatt, B.A., Addington, J., Cadenhead, K.S., Cannon, T.D., McGlashan, T.H., Perkins, D.O., Tsuang, M.T., Walker, E.F., Woods, S.W., Heinssen, R., Seidman, L.J., 2014. The Relationship of Neurocognition and Negative Symptoms to Social and Role Functioning Over Time in Individuals at Clinical High Risk in the First Phase of the North American Prodrome Longitudinal Study. Schizophrenia Bulletin 40(6), 1452-1461.
- Mishara, A.L., Goldberg, T.E., 2004. A meta-analysis and critical review of the effects of conventional neuroleptic treatment on cognition in schizophrenia: opening a closed book. Biol Psychiatry 55(10), 1013-1022.
- Nagelkerke, N.J.D., 1991. A note on a general definition of the coefficient of determination. Biometrika 78(3), 691-692.
- Niendam, T.A., Bearden, C. E., Johnson, J. K., & Cannon, T. D. , 2006. Global Functioning: Role Scale (GF: Role).
- Penn, D.L., Roberts, D.L., Combs, D., Sterne, A., 2007. Best Practices: The Development of the Social Cognition and Interaction Training Program for Schizophrenia Spectrum Disorders. Psychiatric Services 58(4), 449-451.
- Rammou, A., Fisher, H. L., Johnson, S., Major, B., Rahaman, N., Chamberlain-Kent, N., & Stone, J. M. (2019). Negative symptoms in first-episode psychosis: Clinical correlates and 1 year follow-up outcomes in London Early Intervention Services. *Early Intervention in*

Psychiatry, 13(3), 443-452. doi:10.1111/eip.12502

Roder, V., Mueller, D.R., Mueser, K.T., Brenner, H.D., 2006. Integrated Psychological Therapy (IPT) for Schizophrenia: Is It Effective? *Schizophrenia Bulletin* 32(suppl_1), S81-S93.

Roder, V., Mueller, D.R., Schmidt, S.J., 2011. Effectiveness of Integrated Psychological Therapy (IPT) for Schizophrenia Patients: A Research Update. *Schizophrenia Bulletin* 37(suppl_2), S71-S79.

Santesteban-Echarri, O., Paino, M., Rice, S., González-Blanch, C., McGorry, P., Gleeson, J., Alvarez-Jimenez, M., 2017. Predictors of functional recovery in first-episode psychosis: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review* 58, 59-75.

Sheehan, D., Lecrubier, Y., Harnett-Sheehan, K., A. Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., C. L. Dunbar, G., 1998. The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10.

Simons, C., Bartels-Velthuis, A., Pijnenborg, G., Risk, G., of Psychosis (GROUP) investigators, O., 2016. Cognitive Performance and Long-Term Social Functioning in Psychotic Disorder: A Three-Year Follow-Up Study.

Sobel, M.E., 1982. Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology* 13, 290-312.

Siegel, S.J., Irani, F., Brensinger, C.M., Kohler, C.G., Bilker, W.B. Ragland, J.D., Kanes, S.J., Gur, R.C., and, Gur, R.E. 2006. Prognostic Variables at Intake and Long-Term Level of Function in Schizophrenia. 163(3), 433-441.

Stouten, L.H., Veling, W., Laan, W., van der Helm, M., van der Gaag, M., 2014. Psychotic symptoms, cognition and affect as predictors of psychosocial problems and functional change in first-episode psychosis. *Schizophrenia Research* 158(1), 113-119.

Sullivan, S., Lewis, G., Mohr, C., Herzig, D., Corcoran, R., Drake, R., Evans, J., 2014. The longitudinal association between social functioning and theory of mind in first-episode psychosis. *Cognitive Neuropsychiatry* 19(1), 58-80.

Ventura, J., Wood, R.C., Helleman, G.S., 2013. Symptom domains and neurocognitive functioning can help differentiate social cognitive processes in schizophrenia: a meta-analysis. *Schizophrenia bulletin* 39(1), 102-111.

Wechsler, D., 1981. WAIS-R manual: Wechsler Adult Intelligence Scale-Revised. . Psychological Corporation., New York.

Wechsler, D., 1987. WMS-R : Wechsler Memory Scale--Revised : manual. Psychological Corp. : Harcourt Brace Jovanovich, San Antonio.

Williams, L.M., Whitford, T.J., Flynn, G., Wong, W., Liddell, B.J., Silverstein, S., Galletly, Harris, A.W.F., Gordon, E., 2008. General and social cognition in first episode schizophrenia: Identification of separable factors and prediction of functional outcome using the IntegNeuro test battery. *Schizophrenia Research* 99(1), 182-191.

Table 1. Demographic and clinical characteristics of the psychosis group and healthy control group at baseline

	FEP (N= 98)	Healthy Controls (N = 30)	Statistical Significance
Mean Age (years; mean / SD)	23.6 (4.7)	22 (4.7)	NS [†]
Males (n; %)	77; 79	15; 50	NS [‡]
Years in Education (mean / SD)	12.40 (2.4)	12.7 (2.18)	NS [†]
Qualifications (%)			
No qualifications	9.2	3.3	NS [‡]
School Qualifications	36.7	40	
Further education	36.7	36.7	
Higher Education	17.3	20	
Employment Status (%)			
Unemployed	60.2	6.7	<0.001 [‡]
Ethnicity (%)			
Caucasian	45	40	NS [‡]
Asian	35	33.3	
Black	14	10	
Other	6	16.7	
OPCRIT ICD-10 Diagnosis			
Non-affective psychosis (%)	90	n/a	n/a
Affective psychosis (%)	10	n/a	
ACORN Classification			
Living in areas of socio-economic deprivation (%)	77	53	.016 [‡]

FEP = First episode psychosis. NS = Non-significant. [†]Independent samples t-test. [‡]Chi-Square test.

Social and Role Outcomes in Early Psychosis

Table 2. Comparison of the demographic characteristics and premorbid functioning of the FEP ‘poor’ and ‘good’ social and role outcome groups.

	Poor Role Outcome (N = 52)	Good Role Outcome (N = 37)			Poor Social Outcome (N = 40)	Good Social Outcome (N = 49)		
	M±SD	M±SD	<i>t</i>	<i>p</i> – value	M±SD	M±SD	<i>t</i>	<i>p</i> - value
Age (years)	24.06; 5.00	22.68; 4.09	1.38	0.17	23.90; 4.67	23.18; 4.65	0.72	0.47
Years in Education	12.23; 2.53	12.54; 2.04	-0.62	0.54	11.93; 2.66	12.71; 1.97	-1.56 [†]	0.12
Socio-economic status	—	—	<0.001 ^b	1.000	—	—	2.92 ^b	5.89
Gender	—	—	.281 ^b	0.60	—	—	1.22 ^b	0.73
Childhood SociabilityWithdrawal	1.30; 1.56	1.53; 1.93	-0.577	0.566	1.58; 1.80	1.21; 1.67	0.98	0.33
Childhood PeerRelationships	1.61;1.60	1 54; 1.76	0.176	0.861	1.78; 1.71	1.38; 1.60	1.085	0.281
Childhood Scholastic ¹ Performance	2.63; 1.67	1.53; 1.93	2.42	0.02	2.64; 1.76	1.96;1.71	1.77	0.08
Childhood AdaptionSchool	1.59; 1.57	1.56; 1.73	0.076	0.940	1.89; 1.75	1.32; 1.49	1.574	0.120

Social and Role Outcomes in Early Psychosis

EarlyAdolescenceSociability Withdrawal	1.60; 1.44	1.11; 1.58	1.48	.144	2.17; 1.71	0.86; 1.40	2.37 [†]	0.02
EarlyAdolescencePeer Relationships	1.69; 1.26	1.2973; 1.37	1.347	0.182	1.74; 1.38	1.31; 1.24	1.452	0.150
EarlyAdolescence Scholastic Performance	3.29; 1.66	2.30; 1.66	2.73	0.01	3.28; 1.85	2.59; 1.62	1.82	0.07
EarlyAdolescenceAdaptionSc hool	2.35; 1.90	1.97; 1.88	0.923	0.359	2.44; 1.87	1.59; 1.65	1.137	0.259
EarlyAdolescenceSocio- Sexual Relationships	1.34; 1.63	1.38; 1.67	-0.11	0.92	2.17; 1.71	0.86; 1.40	3.75 [†]	<0.01
LateAdolescence Sociability and Withdrawal [§]	1.68; 1.51	0.87; 1.31	2.35	0.02	1.81; 1.58	0.90; 1.25	2.73	0.01
LateAdolescence Peer Relationships	2.05; 1.28	1.27; 1.36	2.47	0.02	2.00; 1.32	1.48; 1.36	1.65	0.10
LateAdolescence Scholastic Performance	2.35; 1.90	2.28; 1.87	2.15	0.04	3.09; 1.77	2.59; 1.67	1.24	0.22
LA Adaption to School	2.15; 1.59	1.59; 1.90	1.34	.185	2.44; 1.87	1.59; 1.65	2.03	0.05
LA Socio-Sexual Relationships	1.88; 1.91	1.55; 2.10	0.68	.502	2.66; 2.10	0.95; 1.50	3.85 [†]	<0.01

EA= Early Adolescence; LA= Late Adolescence; [†]Premorbid Adjustment Scale; M= Mean. SD = Standard Deviation. [†]Violation of the assumption of equal variance (Levene's Test for Equality of Variances $p = <.05$). Compensatory t-value reported. [‡]Yates' Correction for Continuity statistic was reported as it compensates for the overestimation of the chi-square value in 2x2 design.

Table 3. Comparison of baseline symptoms and clinical variables for the FEP 'poor' vs 'good' social and role outcome groups.

Social and Role Outcomes in Early Psychosis

	Poor Role Outcome (N = 52)	Good Role Outcome (N = 37)			Poor Social Outcome (N = 40)	Good Social Outcome (N = 49)		
	M±SD	M±SD	<i>t</i>	<i>p</i> – value	M±SD	M±SD	<i>t</i>	<i>p</i> - value
Baseline Clinical Variables								
PANSS Negative Symptoms	16.61; 6.47	11.50; 5.27	4.05 ^a	<0.001	17.18; 7.43	12.52; 5.17	-3.32 [†]	.001
PANSS Positive Symptoms	12.92; 5.28	11.58; 4.70	1.22	0.23	13.18; 5.74	11.56; 4.14	-1.47 [†]	0.15
PANSS General Symptoms	30.51; 8.13	25.33; 8.25	2.91	0.01**	30.85; 8.99	26.67; 8.27	-2.24	.027
Delay of Untreated Psychosis	1.73; 0.85	1.67; 0.67	0.33	0.74	1.76; .84	1.67; .75	0.54	0.59
Age of onset of psychosis (years)	22.77; 4.97	21.59; 4.21	1.17	0.25	22.45; 4.72	22.14; 4.70	0.31	0.76

[†]Violation of the assumption of equal variance (Levene's Test for Equality of Variances $p = <.05$). Compensatory *t*-value reported. PANSS = Positive and Negative Syndrome Scale.

Table 4. Comparisons of cognitive scores between the healthy control group with the FEP 'poor' and 'good' social and role outcome groups.

Social and Role Outcomes in Early Psychosis

	Poor Role Outcome (N = 52)	Good Role Outcome (N = 37)	Healthy control Group (N = 30)			Poor Social Outcome (N = 40)	Good Social Outcome (N = 49)	Healthy control Group (N = 30)		
	M±SD	M±SD	M±SD	<i>F</i>	<i>P</i>	M±SD	M±SD	M±SD	<i>F</i>	<i>p</i>
Baseline Cognitive variables										
Verbal learning and memory	5.96; 2.33	7.39; 3.07	9.83; 3.68	16.39	<0.01	6.00; 2.78	7.02; 2.62	9.83; 3.68	14.86	<0.01
Verbal Comprehension	7.06; 2.67	8.28; 2.88	9.70; 2.69	8.87	<0.01	7.44; 3.03	7.63; 2.66	9.70; 2.69	6.69	<0.01
Non-verbal Problem Solving	7.69; 2.39	8.43; 2.93	9.13; 2.75	2.87	0.06	8.08; 2.84	7.92; 2.50	9.13; 2.75	2.07	0.13
Theory of Mind	3.53; 1.62	4.11; 1.47	4.34; 1.12	7.21	0.04	3.69; 1.77	3.76; 1.43	4.34; 1.12	1.94	0.15
Social Knowledge	6.44; 1.72	6.89; 1.60	7.43; 1.57	9.44	0.03	6.20; 1.79	6.92; 1.57	7.43; 1.57	5.02	0.01
Attribution bias	2.75; 0.72	2.69; 0.91	2.69; 0.67	0.10	0.90	2.69; 0.74	2.71; 0.76	2.69; 0.67	0.01	0.99
Emotion perception	90.42; 17.79	94.83; 16.83	97.99; 13.81	2.11	0.11	92.86; 19.21	91.02; 16.70	97.99; 13.81	1.61	0.21

M = Mean. SD = Standard Deviation.

Figure 1 - Legend

Figure 1. (a) Unstandardized regression coefficients for the relationship between social knowledge and Global functioning (GF): Social Follow-up, as mediated by negative symptoms. (b) Unstandardized regression coefficients for the relationship between logical memory and GF: Role Follow-up, as mediated by negative symptoms. *Note.* * $p < .05$ ** $p < .01$.

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Author/s:

Griffiths, SL;Birchwood, M;Khan, A;Wood, SJ

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