

## Negative symptoms in first-episode psychosis: clinical correlates and one-year follow-up outcomes in London Early Intervention Services.

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## Abstract

**Aim:** Negative symptoms are associated with poor outcome in patients with schizophrenia but are generally resistant to treatment. There has been growing interest in the role of negative symptoms in the early stages of the illness. In this study, we examine the association between negative symptoms in patients at initial presentation with first episode psychosis and clinical outcome at 1-year.

**Methods:** Clinical data were utilized from five London Early Intervention Services included in the MiData audit database. The sample comprised 484 first-episode psychosis patients with complete Positive and Negative Syndrome Scale data at baseline and 1-year follow-up. Multiple imputation ( $N = 50$ ) was conducted to account for missing follow-up data.

**Results:** Baseline negative symptoms were associated with male gender ( $B = -1.63$ ,  $p < .05$ ), younger age of onset ( $B = -.15$ ,  $p < .05$ ), a higher level of impairment on the Global Assessment of Functioning (disability) scale at baseline ( $B = -.19$ ,  $p < .010$ ), an absence of reported substance misuse prior to baseline assessment ( $B = -3.05$ ,  $p < .001$ ), and unemployment at baseline ( $B = -.93$ ,  $p < .01$ ). At 1-year follow-up, negative symptoms at presentation were associated with worse Global Assessment of Functioning symptom ( $B = -.28$ ,  $p < .01$ ) and disability ( $B = -.27$ ,  $p < .05$ ) scales, and with hospital admission ( $OR = 1.06$ ,  $p < .01$ ).

**Conclusions:** Negative symptoms at presentation to Early Intervention Services were associated with worse functioning at entry and poorer outcomes one year later. Future research is required to better understand the aetiology and trajectories of negative symptoms in early psychosis and propose novel targeted interventions.

**Key words:** early intervention; first-episode psychosis; negative symptoms; psychosis; schizophrenia

## **Introduction**

Negative symptoms (NS) remain an unmet therapeutic need for people suffering from psychosis (Chue & Lalonde, 2014; Kirkpatrick, 2014). In first-episode psychosis (FEP) studies NS at onset have been related to poor social functioning after the first year of treatment and at 2 and even 7 years after first presentation to services (Ayesa-Arriola et al., 2013; Best, Grossman, Oyewumi, & Bowie, 2014; Milev, Ho, Arndt, & Andreasen, 2005). Moreover, Best and colleagues (2014) indicated NS as the best symptomatic predictor of functioning both cross-sectionally and longitudinally in a FEP sample, in keeping with other early psychosis (Cacciotti-Saija, Langdon, Ward, Hickie, & Guastella, 2016) and mixed chronicity (Hunter & Barry, 2012; Rabinowitz et al., 2012) studies. Research has also linked NS with symptomatic outcomes and recovery after a FEP. Among other variables, NS were reported as predictors of a continuous illness course at 5-year follow-up (Bertelsen et al., 2008) and were associated with a lower likelihood of achieving recovery (Gee et al., 2016; Novick, Haro, Suarez, Vieta, & Naber, 2009; Schubert, Clark, & Baune, 2015) and clinical remission (Díaz et al., 2013; Gaebel et al., 2014; Levine & Leucht, 2013; Üçok, Serbest, & Kandemir, 2011; Verma, Subramaniam, Abdin, Poon, & Chong, 2012).

Although evidence for the role of negative symptoms in predicting outcome in first episode psychosis is growing, there are relatively few studies at present that investigate this association in real world clinical settings. In this naturalistic study, we investigate the relationship between negative symptoms in patients presenting to specialist Early Intervention Services (EIS) in London to baseline socio-demographic and clinical correlates and to clinical and functional outcomes at 1-year follow-up.

## **Methods**

### **Setting**

This study was a naturalistic cohort of consecutive referrals to seven London EIS in the UK, assessed within one month of entry and followed up after one year. The teams were based in the following National Health Service (NHS) Mental Health Trusts: Camden and Islington (C&I EIS); South London and Maudsley (Lewisham EIS & STEP); East London and the City (EQUIP); Central and North West London (Brent and Kensington, Chelsea & Westminster EIS) and South West London and St. George's (ETHOS).

The patient inclusion criteria for EIS services were: (i) aged between 14 and 35 years old, (ii) presenting to the EIS for the first time with a psychotic episode lasting at least 7 days, and (iii) resident within the EIS catchment area (Fisher et al., 2008). Patients with psychotic symptoms due to acute drug intoxication were excluded.

Data were collected using the MiData audit tool, a standardized computerised assessment package of a minimum set of assessments used in routine clinical practice in EIS. Assessment measures were completed by trained clinicians as part of their routine assessments within 1 month of entry to the EIS (baseline) and at 1 year (follow-up) (Fisher et al., 2008).

#### **Assessment measures.**

*Socio-demographic information.* Basic demographic data were obtained at baseline, including gender, age at onset of psychosis, employment status, ethnicity based on the 2001 UK national census categories, degree of social support ('good', 'limited' or 'none'), and the presence or absence of a history of psychosis in a first-degree relative.

*Clinical measures.* At baseline, duration of untreated psychosis (DUP) was assessed with a revised version of the Nottingham Onset Schedule (Singh et al., 2005). The following measures were completed at both entry to the service and after 1 year in contact with the service: the Positive and Negative Syndrome Scale (PANSS) (Kay, Fiszbein, & Opler, 1987) including positive (PANSS-P), negative (PANSS-N) and general (PANSS-G) subscales; the Global Assessment of Functioning Scale for

symptoms (GAF-s) and disability (GAF-d) (Endicott, Spitzer, Fleiss, & Cohen, 1976); and the Combined Alcohol and Drug Use Scale (Drake & Wallach, 1989). International Classification of Diseases 10th edition (ICD-10) (World Health Organization, 1993) diagnosis was recorded at 1-year follow-up and was extracted from clinical records and confirmed with EIS consultant psychiatrists. Diagnoses were grouped into schizophrenia-spectrum disorders (ICD-10 codes F20-29), affective psychoses (F30.2, F31.2, F31.5, F32.3, F33.3 or F39), and other disorders (all other codes).

During the 1-year follow-up period, the occurrence of psychiatric admission to an in-patient ward, the use of a crisis or Home Treatment team (HTT), and the occurrence of any suicide attempts or of any violent incidents was determined from the clinical records. Adherence to treatment was ascertained using the treatment adherence subscale of the Service Engagement Scale (Tait, Birchwood, & Trower, 2002), scored on a 4-point Likert-type scale, with higher scores reflecting patients' greater levels of non-compliance.

Two new composite variables were created. PANSS-D yielded presence of depression at baseline when patients had a score greater than 3 for all the following PANSS-G items: somatic concerns (G1), anxiety (G2), guilty feelings (G3) and depression (G6) (Kay & Sevy, 1990; Kjelby, Jørgensen, Kroken, Løberg, & Johnsen, 2011). This measure was created to ensure that the NS explored were not secondary to depression. Based on follow-up PANSS data, overall symptomatic Remission was defined as scores  $\leq 3$  on all of the following PANSS items: delusions (P1), unusual thought content (G9), hallucinations (P3), conceptual disorganization (P2), mannerisms and posturing (G5), blunted affect (N1), social withdrawal (N4), and lack of spontaneity (N6). Overall symptomatic Remission was also calculated at baseline, using PANSS baseline data. Positive Symptom Remission was defined as scores  $\leq 3$  for the P1, P2, and P3 items at 1-year follow-up (Andreasen et al., 2005).

## **Preliminary analysis**

Normality and outliers testing was carried out for all continuous variables used in the analysis. Collinearity between independent variables was tested for with the variance inflation factor (VIF) (Field, 2009). Missing values were imputed using Multiple Imputation (MI) creating 50 imputed data sets. (See the Supplementary materials A, B and C for further details).

## **Main analyses**

Hierarchical linear regression was conducted to explore associations with socio-demographic or key baseline clinical variables and baseline NS, with PANSS-N being the dependent variable. To investigate the relationship of baseline PANSS-N with outcomes at 1-year, multiple linear regressions and binomial logistic regressions were carried out for continuous and categorical outcome variables respectively, using baseline PANSS-N as the predictor in each case. Associations were then adjusted for relevant clinical and demographic covariates, namely ethnicity, social support at baseline, family history of psychosis, gender, age at onset, employment status at baseline, DUP, clinical diagnosis at 1-year follow-up, adherence to medication, and substance abuse or dependence 6 months prior to baseline assessment. PANSS-D, PANSS-P and Remission status at baseline were included as covariates to control for depression and severity of psychotic symptoms at baseline. Lastly, since the data were drawn from different EIS across London, team allocation was also included as a covariate in the adjusted model. All analyses were carried out using SPSS version 22 (IBM).

## **Ethical Approval**

Data collection by each EIS was conducted in accordance with local audit procedures, which do not require patient consent. Any information that could lead to patient identification was removed. Multi-centre ethical approval was obtained from the Wandsworth Research Ethics Committee, which granted permission for secondary research use of the data for a specific set of research questions, including NS and clinical outcomes.

## Results

### Sample characteristics at baseline assessment

Socio-demographic and clinical characteristics of the sample ( $N = 484$ ) are summarised in Table 1. Both pooled estimates from the 50 imputed datasets and the original dataset are presented. This sample comprised 315 males (61.5%) and the mean age of psychosis onset was 22.9 years ( $SD = 5.12$ ).

### Baseline Negative Symptoms and characteristics at presentation to EIS

An exploratory forced entry hierarchical linear regression analysis revealed a significant association between baseline PANSS-N score and gender, age of onset, substance use in the preceding 6 months, occupation status and GAF-d score ( $R^2 = .31$ ,  $F(21, 462) = 12.75$ ,  $p < .001$ ; Table 2). Female participants had lower PANSS-N scores at baseline than males ( $p = .020$ ); those with any substance use in the past 6 months before baseline assessment had lower PANSS-N than those that had not used ( $p < .001$ ); participants that were employed or in education at baseline scored lower on PANSS-N than those who were unemployed ( $p = .014$ ); those with more impaired functioning had higher NS ( $p < .001$ ); and younger age of onset was also associated with higher PANSS-N scores ( $p = .035$ ). Post-hoc analysis of the relationship between PANSS-N at baseline and individual substance use including opioid, cannabinoid, alcohol, nicotine, cocaine and stimulant use in the model, revealed that only cannabinoid abuse or dependence was associated with lower PANSS-N scores ( $B = -2.17$ ,  $B SE = .94$ ,  $t = -2.39$ , 95% CI  $-4.01 - -.33$ ,  $p = .021$ ; Supplementary Materials D).

### Baseline NS and clinical outcomes at 1-year follow-up

PANSS-N at baseline was significantly associated with worse symptoms (GAF-s;  $B = -.28$ ,  $p = .007$ ) and impaired functioning (GAF-d;  $B = -.21$ ,  $p = .01$ ) at 1-year follow-up (Table 3). PANSS-N at baseline was also associated with higher likelihood of patients being admitted to a psychiatric ward during 1-year follow-up, with one point increase in PANSS-N increasing the odds of being admitted during 1-year

follow-up by 6%, (OR = 1.06, 95% CI 1.03 – 1.10, Wald statistic = 14.77,  $p = .001$ ; Table 4). The mean (SD) PANSS-N of those who were admitted (N = 206) was 18.70 (9.47) compared to 14.99 (7.34) for those who were not admitted (N = 278). However, no significant associations were found between NS at baseline and Remission of symptoms at 1-year follow-up, nor with risk behaviors or use of HTT or Crisis teams during this period.

## Discussion

### Negative symptoms: baseline correlates

Participants with higher levels of baseline NS were much more likely to be male, in accordance with previous literature in both cross-sectional (Drake et al., 2016; Thorup et al., 2007) and follow-up FEP studies (Stone et al., 2014; Thorup et al., 2014). Although earlier investigations of gender-specific patterns of negative psychopathology have been contradictory (Ochoa, Usall, Cobo, Labad, & Kulkarni, 2012), most early psychosis studies are consistent with our findings (Köhler et al., 2009; Køster, Lajer, Lindhardt, & Rosenbaum, 2008; Thorup et al., 2014; Thorup et al., 2007; Willhite et al., 2008), including studies of individuals at-risk for psychosis (Rietschel et al., 2015). In our study, severity of baseline NS was related to a younger age of psychosis onset, which is consistent with most (Ballageer, Malla, Manchanda, Takhar, & Haricharan, 2005; Dominguez, Saka, Lieb, Wittchen, & van Os, 2010; Drake et al., 2016; Üçok & Ergül, 2014), but not all (Schultz et al., 1997), previous findings.

We found that patients with a higher level of NS had worse social and vocational functioning at entry to EIS. This is in keeping with previous work in FEP patients by Best *et al.* (Best et al., 2014). Poor premorbid functioning in those with prominent levels of NS at first presentation with psychosis could explain the poor social functioning found at baseline (Chang et al., 2016). Thus, patients with NS might have already suffered functional deterioration during the prodromal phase of psychosis (Corcoran et al., 2011; Kim et al., 2013; Meyer et al., 2014).



We found that substance abuse or dependence in the 6-month period preceding entry to EIS was associated with lower levels of NS at presentation. Although there is a lack of FEP research on this relationship, existing studies are conflicting, with some being in agreement with the present result (J. Addington & Addington, 1998) and others finding no difference in NS symptoms between substance users and non-users (Sevy et al., 2008). In a post-hoc analyses, only abuse of cannabinoids emerged as a significant association with lower baseline NS levels, accounting for other recent substance abuse (opioids, alcohol, nicotine, stimulants, cocaine). It has been suggested that those experiencing a FEP may use cannabis to self-medicate (Khantzian, 1997), possibly alleviating some NS such as anhedonia (Gregg, Barrowclough, & Haddock, 2007; Potvin, Sepehry, & Stip, 2005; Simon, Belzeaux, Adida, & Azorin, 2015), or higher NS could imply less hedonic capacity which in turn could reduce drug-seeking (Compton, Whicker, & Hochman, 2007). Another possible explanation is that those with less severe NS use more cannabis due to better functioning, i.e. are more capable of obtaining substances or more prone to substance abuse, as it has been indicated that FEP patients with cannabis abuse disorder show a stronger premorbid social functioning (Carr et al., 2009; Potvin et al., 2005). Nevertheless, there is still paucity of research, especially in FEP and more research is needed to clarify this association (Seddon et al., 2016; Simon et al., 2015).

### **Negative symptoms: clinical and functional outcomes**

Baseline NS were related to higher possibility of admission to a psychiatric ward, used as a proxy of deterioration or relapse (Addington, Patten, McKenzie, & Addington, 2013). Previous studies generally support this finding (Morgan, Korten, & Jablensky, 2006; Patel et al., 2015; Sapos, 2001), although one study did not replicate this finding (Addington et al., 2010). We found baseline NS were also associated with worse symptoms at 1-year follow-up, as reflected in GAF-s and did not predict symptomatic remission at follow-up, being in accordance with previous studies (Cesková, Radovan, Tomás, & Hana, 2007)(Chang et al., 2012).

Risk behaviours, i.e. suicidality and violence incidents, were not predicted by NS levels. Our results are consistent with another FEP study that failed to find an association between NS and suicide attempts (Bertelsen et al., 2007) and studies that have linked mainly positive (Foley et al., 2007; Winsper et al., 2013) or manic symptoms (Dean et al., 2007; Large & Nielssen, 2011) to violent behavior during FEP.

Higher NS at baseline were associated with worse functioning at 1-year follow-up as reflected by the GAF-d scores. This finding is consistent with most FEP studies to date that show NS as a critical determinant of both global and social functioning (Cacciotti-Saija et al., 2016) as well as real-world functioning (Robertson et al., 2014), for at least 2 years after the FEP (Bergé et al., 2016). Recent research has supported this link at the at-risk for psychosis stage as well (Meyer et al., 2014). Thus, it could be that those with high negative symptoms at presentation, even when these symptoms decrease, are less likely to achieve recovery, which could be explained by highly disrupted premorbid functioning (Gee et al., 2016).

### **Strengths and limitations**

This study has several strengths. The FEP sample was large, naturalistic, from different EIS within well-defined catchment areas, with minimal confounding effects of chronicity, institutionalization and prolonged exposure to antipsychotic treatment. Previous studies have indicated that FEP patients with higher NS might be at greater risk of dropping out (AlAqeel & Margolese, 2012; Thompson et al., 2011; Üçok & Ergül, 2014). Thus, although there was a considerable amount of missing data due to the naturalistic follow-up study design, MI was applied in order to correct for biases due to non-completion (Schafer & Graham, 2002). The differences between the original dataset and the pooled estimates showed that MI considered that those with missing follow-up data might have had high NS scores.

Nonetheless, a few caveats need to be considered. Firstly, due to the design of this study, some ethnic minorities and clinical subgroups might have been over/under-represented, which potentially limits the

generalizability of the findings. Patients with lower severity of positive symptoms were more likely to have a fully completed PANSS at baseline, leading to over-representation of cases with lower positive symptoms. However, their mean difference was less than 3 points, possibly not representing a clinically significant difference. Additionally, cross-sectional remission rate estimation at baseline and follow-up tends to be more vulnerable to confounding variables and lacks specificity. Lastly, regarding controlling for secondary NS, although this study controlled for positive symptoms and depression, it did not take into account extra-pyramidal side-effects (EPS) since there was no measure available (Millan et al., 2014).

### **Clinical implications**

The present findings suggest that NS are associated poorer global functioning and symptomatic outcomes and increased likelihood of admission, leading to several clinical implications. This is noteworthy since social and occupational functioning have been indicated as the most important recovery markers by both field experts (Kane et al., 2003) and experts by lived experience (Pitt, Kilbride, Nothard, Welford, & Morrison, 2007). Based on the relative fluctuation of NS in FEP and their increasing stability after the first year (Chang et al., 2011; Ventura et al., 2015), this period might be a therapeutic window to ameliorate negative symptomatology, prevent disability and maximize functional outcome. Further investigations should examine the prognostic significance of timely, intensive and integrated intervention in NS during this potential critical period in preventing emergence of persistence. Careful monitoring of those showing higher NS at presentation warrants the attention of EIS (Gee et al., 2016), if possible from the at-risk stage of the illness when NS often occur (Fusar-Poli et al., 2013). While emphasizing the need for specific treatment approaches for reducing the burden of NS (Schennach-Wolff et al., 2011; Verdoux et al., 2001), it might be important to distinguish between primary NS and secondary NS, as the latter can be subject to treatment changes (Carbon & Correll, 2014).

### **Conclusion**

Negative symptoms in FEP are a significant problem, leading to worse functional and clinical outcomes even amongst patients treated by specialist services. Since pharmacological treatments (Fusar-Poli et al., 2015) and psychosocial interventions (Jauhar et al., 2014; Østergaard Christensen et al., 2014) have shown to have little or no effect, further studies are needed in order to tackle NS, early and effectively, maximizing the long-term recovery for FEP patients.

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Table 1. *Socio-demographic and baseline clinical characteristics of the sample, for both pooled estimates from imputed data and original data*

| Variable                    | Pooled       |        | Original   |                 | N of missing cases (%) |
|-----------------------------|--------------|--------|------------|-----------------|------------------------|
|                             | N (%)        | M (SD) | N (%)      | M (Min-Max; SD) |                        |
| Gender                      |              |        |            |                 | 0                      |
| Male                        | 315 (65.1)   |        | 315 (65.1) |                 |                        |
| Female                      | 169 (34.9)   |        | 169 (34.9) |                 |                        |
| Ethnicity                   |              |        |            |                 | 0                      |
| White British               | 96 (19.8)    |        | 96 (19.8)  |                 |                        |
| White Other                 | 61 (12.6)    |        | 61 (12.6)  |                 |                        |
| Black Caribbean             | 48 (9.9)     |        | 48 (9.9)   |                 |                        |
| Black African               | 126 (26.0)   |        | 126 (26.0) |                 |                        |
| Black Other                 | 22 (4.5)     |        | 22 (4.5)   |                 |                        |
| Asian                       | 72 (14.9)    |        | 72 (14.9)  |                 |                        |
| Mixed                       | 44 (9.1)     |        | 44 (9.1)   |                 |                        |
| Other                       | 15 (3.1)     |        | 15 (3.1)   |                 |                        |
| Family history of psychosis | 120.6 (24.7) |        | 120 (24.8) |                 | 2 (0.4)                |
| Social Support              |              |        |            |                 | 5 (1)                  |



| Variable   | Pooled       |               | Original   |                       | N of missing cases (%) |
|--|--------------|---------------|------------|-----------------------|------------------------|
|  | N (%)        | M (SD)        | N (%)      | M (Min-Max; SD)       |                        |
| Good   | 345.9 (71.5) |               | 345 (71.3) |                       |                        |
| Limited/none                                     | 115.7 (23.9) |               | 84 (17.4)  |                       |                        |
| GAF- s   |              | 46.9 (20.08)  |            | 46.8 (8-90; 20.09)    | 13 (2.7)               |
| GAF- d   |              | 50.82 (17.07) |            | 50.71 (1-95; 17.07)   | 13 (2.7)               |
| PANSS-P  |              | 17.91 (7.76)  |            | 17.91 (7-42; 7.76)    | 0                      |
| PANSS-N  |              | 16.57 (8.28)  |            | 16.57 (7-43; 8.28)    | 0                      |
| PANSS-G  |              | 36.84 (12.50) |            | 36.84 (16-75; 12.50)  | 0                      |
| PANSS total                                      |              | 71.32 (24.25) |            | 71.32 (30-149; 24.25) | 0                      |
| Age of psychosis onset                           |              | 22.97 (5.12)  |            | 23.07 (6.06-35.63; 5) | 39 (8.1)               |
| Any substance abuse/ dependence in past 6 months | 159.3 (32.9) |               | 133 (27.5) |                       | 75 (15.5)              |
| Employed/ student                                | 177.8 (36.7) |               | 168 (34.7) |                       | 28 (5.8)               |
| Long DUP (>=3 months)                            | 252.9 (52.3) |               | 222 (45.9) |                       | 63 (13)                |

*Note.* M = mean, SD = standard deviation, N = number of patients, DUP = duration of untreated psychosis, GAF = Global Assessment of Functioning scale, GAF-d = disability subscale, GAF-s = symptom subscale, PANSS = Positive and Negative Syndrome Scale, PANSS-P = positive subscale, PANSS-N = negative subscale, PANSS-G = general psychopathology subscale.

Table 2. Multiple linear regression results for the predictor variables of PANSS-N scores at baseline

| Predictor baseline variables | B     | SE B | 95% CI for B | t        |
|------------------------------|-------|------|--------------|----------|
| Team                         | .16   | .21  | -.25 – .58   | .76      |
| Gender                       | -1.63 | .70  | -3.00 – -.26 | -2.33*   |
| Age of Onset                 | -.15  | .07  | -.29 – -.01  | -2.10*   |
| Ethnicity <sup>a</sup>       |       |      |              |          |
| White Other                  | -.14  | 1.21 | -2.51 – 2.23 | -.12     |
| Mixed                        | 2.14  | 1.32 | -.44 – 4.72  | 1.63     |
| Asian                        | -.25  | 1.15 | -2.50 – 2.01 | -.21     |
| Black Caribbean              | 1.67  | 1.29 | -.85 – 4.19  | 1.30     |
| Black African                | 1.38  | .99  | -.54 – 3.32  | 1.41     |
| Black Other                  | 1.60  | 1.70 | -1.73 – 4.93 | .94      |
| Other                        | 3.13  | 2.00 | -.80 – 7.06  | 1.56     |
| Family history of psychosis  | .012  | .77  | -1.49 – 1.52 | .02      |
| Social support <sup>b</sup>  |       |      |              |          |
| Limited                      | -1.11 | .89  | -2.85 – .63  | -1.25    |
| None                         | .88   | 1.42 | -1.91 – 3.67 | .62      |
| Employed/Student             | -1.76 | .72  | -3.17 – -.35 | -2.45*   |
| Dichotomised DUP             | .14   | .70  | -1.24 – 1.52 | .20      |
| GAF-s                        | .003  | .03  | -.05 – .06   | .10      |
| GAF-d                        | -.19  | .03  | -.24 – -.13  | -6.42*** |

| Predictor baseline variables         | B     | SE B | 95% CI for B  | t        |
|--------------------------------------|-------|------|---------------|----------|
| Substance abuse in the past 6 months | -3.05 | .78  | -4.58 – -1.52 | -3.91*** |

*Note.* B = unstandardized regression coefficient, SE = standard error,  $R^2$  = proportion of the variance explained, F = F-ratio, t = t-test, CI = confidence intervals, GAF = Global Assessment of Functioning scale, GAF-d = disability subscale, GAF-s = symptom subscale, PANSS-N = Positive and Negative Syndrome Scale – negative subscale score, df = degrees of freedom, DUP = duration of untreated psychosis (DUP was dichotomized at 3 months).

<sup>a</sup> All ethnic groups were compared to White British; <sup>b</sup> Level of support were compared to Good Level

Model  $R^2$ = .31; Model Adjusted  $R^2$ = .28; F(df)= 12.75 (462),  $p < .001$

Model's constant, B= 28.38; B SE= 3.09; t= 9.18;  $p < .001$ ; 95% CI 22.32 – 34.45.

The model was controlled for PANSS Depression factor and PANSS positive subscale score.

\*  $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 3. *Summary of linear regressions examining the effect of the level of baseline negative symptoms on continuous outcome variables at 1-year follow-up.*

| Variables at 1-year follow-up | B (SE)     | 95% CI for B | $R^2$ | Adjusted $R^2$ <sup>a</sup> | Durbin Watson d | F (df1, df2)       | t       |
|-------------------------------|------------|--------------|-------|-----------------------------|-----------------|--------------------|---------|
| GAF-s                         | -.28 (.10) | -.49 – -.08  | .02   | .57                         | 2.16            | 24.48 (15, 277)*** | -2.70** |
| GAF-d                         | -.27 (.11) | -.48 – -.06  | .02   | .49                         | 2.01            | 17.90 (15, 277)*** | -2.57*  |

*Note.* B = unstandardized regression coefficient, SE = standard error,  $R^2$  = proportion of the variance explained, Durbin Watson d = test statistic of autocorrelation, F = F-ratio, t = t-test, CI = confidence intervals, GAF = Global Assessment of Functioning scale, GAF-d = disability subscale, GAF-s = symptom subscale, df1 = regression degrees of freedom, df2 = residual degrees of freedom.

<sup>a</sup> adjusted for team, age at psychosis onset, ethnicity, family history of psychosis, social support at baseline, employed/student at baseline, dichotomized duration of untreated psychosis, Positive and Negative Syndrome Scale (PANSS) depression factor at baseline, PANSS positive subscale score at baseline, remission at baseline, diagnosis at 1-year follow-up, treatment adherence at 1-year follow-up, any substance

| Variables at 1-year follow-up                          | B (SE) | 95% CI for B | R <sup>2</sup> | Adjusted R <sup>2</sup> <sup>a</sup> | Durbin Watson d | F (df1, df2) | t |
|--|--------|--------------|----------------|--------------------------------------|-----------------|--------------|---|
| abuse or dependence in the 6 months prior to baseline. |        |              |                |                                      |                 |              |   |
| * p < .05, **p < .01, ***p < .001.                     |        |              |                |                                      |                 |              |   |

Table 4. *Summary of binary logistic regressions examining the effect of the level of baseline negative symptoms on categorical outcome variables at 1-year follow-up.*

| Variables at 1-year follow-up  | B (SE)     | Wald statistic | Unadjusted OR (95% CI) | Adjusted <sup>a</sup> OR (95% CI) |
|--------------------------------|------------|----------------|------------------------|-----------------------------------|
| Remission                      | -.01 (.02) | .40            | .99 (.96 -1.01)        | .99 (.96-1.03)                    |
| Positive Symptom Remission     | .02 (.02)  | 1.18           | 1.00 (.97 -1.02)       | 1.02 (.98- 1.06)                  |
| Admitted to a psychiatric ward | .06 (.02)  | 11.09          | 1.06 (1.03 -1.08)***   | 1.06 (1.02-1.10)**                |
| Used HTT or Crisis team        | .001 (.02) | .11            | 1.00 (.97-1.02)        | 1.00 (.96-1.04)                   |

| Variables at 1-year follow-up       | B (SE)      | Wald statistic | Unadjusted OR (95% CI) | Adjusted <sup>a</sup> OR (95% CI) |
|-------------------------------------|-------------|----------------|------------------------|-----------------------------------|
| Any suicide attempts                | -.004 (.05) | .26            | .98 (.94-1.04)         | 1.00 (.90-1.10)                   |
| Any violent incident towards others | .01 (.03)   | .25            | 1.01 (.98-1.04)        | 1.01 (.96-1.06)                   |

*Note.* PANSS = Positive and Negative Syndrome Scale, HTT = Home Treatment Team, OR = odds ratio, B = regression coefficient on the independent variable, CI = confidence interval.

<sup>a</sup> adjusted for team, age at psychosis onset, ethnicity, family history of psychosis, social support at baseline, employed/student at baseline, duration of untreated psychosis median split (<3 is short, > or =3 months is long), PANSS-D (depression subscale) at baseline, PANSS-P (positive subscale) at baseline, remission at baseline, diagnosis at 1-year follow-up, treatment adherence at 1-year follow-up, any substance abuse or dependence in the 6 months prior to baseline.

\*  $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .