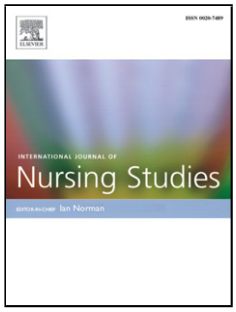

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Predictors of change in social networks, support and satisfaction following a first episode psychosis: a cohort study

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Abstract

Background

Diminished social networks are common in psychosis but few studies have measured these comprehensively and prospectively to determine how networks and support evolve during the early phase. There is little information regarding perceived support in the early phase of illness. The aim of this study was to describe social support, networks and perceived satisfaction, explore the clinical correlates of these outcomes and examine whether phases of untreated psychosis are linked with social network variables to determine potential opportunities for intervention.

Methods

During the study period, we assessed 222 people with first-episode psychosis at entry into treatment using valid and reliable measures of diagnosis, positive and negative symptoms, periods of untreated psychosis and prodrome and premorbid adjustment. For follow-up we contacted participants to conduct a second assessment (n = 158). There were 97 people who participated which represented 61% of those eligible. Social network and support information obtained at both time points included the number of friends, self-reported satisfaction with support and social network size and clinician's evaluation of the degree of support received through networks. Mixed effects modelling determined the contribution of potential explanatory variables to social support measured.

Results

A number of clinical variables were linked with social networks, support and perceived support and satisfaction. The size of networks did not change over time but those with no friends and duration of untreated psychosis was significantly longer for those with no friends at entry into treatment (n = 129, Median = 24.5mths, IQR = 7.25 – 69.25; Mann-Whitney U = 11.78, p = 0.008). Social support at baseline and at one year was predicted by homelessness (t = -2.98, p = 0.001, CI -4.74 to -1.21), duration of untreated psychosis (t = -0.86, p = 0.031, CI -1.65 to -0.08) and premorbid adjustment (t = -2.26, p = 0.017, CI -4.11 to -0.42). Social support improved over time but the duration of untreated psychosis was not linked with the rate of improvement in this outcome.

Conclusions

Improved social support could indicate greater reliance on social support or becoming more adept at mobilising resources to meet social needs. Particularly vulnerable groups with very long duration of untreated psychosis confirm the need for earlier intervention or targeted social network interventions to preserve social connectedness.

keywords: first-episode psychosis, social networks, social support, duration of untreated psychosis, social contacts

1. Introduction

Social networks and support are increasingly being viewed as relevant outcomes for service-users with first-episode psychosis (Gayer-Anderson and Morgan, 2013). This development is at least partially driven by widening parameters of outcome and an increasing interest responding to service-users concerns and priorities (McGorry et al., 2008). Social support and the quality of close relationships are both linked with illness course since increased support at the start of treatment is connected to a reduced risk of relapse after 3 years (Norman et al., 2005) and better social and occupational functioning later in the course of illness (Erickson et al., 1998). Preserved social networks and receiving support through these is linked with reduced risk of rehospitalisation, increased service use and improved quality of life (Becker et al., 1998, Becker et al., 1997). The influence of social support is also implicit in robust evidence that family and caregiver interventions can reduce the risk of relapse, rehospitalisation (Pitschel-Walz et al., 2001) and enhance social functioning (Pharoah et al., 2006) via reduced expression of negative and critical comments.

Diminished social networks are common in psychosis and fragmented social circles are apparent at first contact with services (Palumbo et al., 2015, Gayer-Anderson and Morgan, 2013, Horan et al., 2006). Several differences in social networks are seen compared to the general population including maintaining fewer relationships (Erickson et al., 1989, Macdonald et al., 2000) and interacting with these contacts on fewer occasions (Reininghaus et al., 2008, Kalla et al., 2002). The average composition of social networks is not clear but evidence points to a diminishing number of confidants (Gayer-Anderson and Morgan, 2013). The number of family members within networks is similar between people with early psychosis and healthy controls (Erickson et al., 1989) but due to diminishing friends in networks the proportion is comparatively higher meaning the social networks of people with psychosis more often comprise a majority of kin relationships.

In some cases loss of friendship pre-dates the onset of active psychotic symptoms and even prior to the first subtle signs that illness is emerging but in some deteriorating social networks develop during periods of untreated psychosis or weaken further as the illness progresses (Devylder and Gearing, 2013, Gayer-Anderson and Morgan, 2013). Several studies have demonstrated the link between longer duration of untreated psychosis and diminished network size (Thorup et al., 2006, Jeppesen et al., 2008, Reininghaus et al., 2008, Drake et al., 2000) at entry into treatment and after one and after one and two years of intensive treatment (Jeppesen et al., 2008, Thorup et al., 2006). However, much of what is known about how social networks evolve after the onset of psychosis has been examined using correlational tests rather than using more robust statistical tests in the presence of known confounders. Importantly, research tends to consider the beneficial aspects of social networks assuming that larger networks are more favourable, however, merely quantifying relationships does not account for the function or desirability perceived by the service-user. Perceived social support predicts mental health outcomes, in particular depression (Santini et al., 2015, Kaiser et al., 2006) and during the first-episode of psychosis, whether people perceive adequate support is also linked with depression (Sundermann et al., 2014). Satisfaction with social networks and support is generally lower than when measured in controls (Veling et al., 2010) so on this basis, social support received and satisfaction perceived by service-users are both important measures of outcome.

The overall aim was to assess whether there was a relationship between longer duration of untreated psychosis and measures of social networks support and satisfaction in the presence of other possible explanatory variables. We hypothesised that people with longer duration of untreated psychosis were less likely to experience an improvement in their social networks following presentation due to the critical period hypothesis which suggests a window of opportunity beyond which social functioning is less likely to be recovered hence impairment in social connections can become long-standing and less amenable to change. In addition, describing the social network size and support received by people with first episode psychosis at presentation and one year after diagnosis and treatment and examining clinical correlates will help identify the social needs of people with psychosis. This can potentially aid in identifying ways of preserving social connectedness and maximising the support available.

Specific objectives included calculating whether social network size continues to diminish after the initiation of treatment, measuring the degree of support received and the quality of relationship assessing associations with clinical variables. Potential opportunities for identifying the timing and target outcome of any interventions may become apparent with these analyses. In doing so we address a number of methodological limitations of previous studies by reducing the prospect of selection bias using a sample that is as representative as currently conceivable, countering information bias by using a validated instrument to measure social support and reduce the possibility of confounding by developing a mixed model including known correlates of satisfaction, functioning and support (Gayer-Anderson and Morgan, 2013).

2. **Methods**

2.1 Participants

This study comprised a discrete aspect of a larger prospective cohort study to determine the impact of untreated psychosis on outcome in first episode psychosis (Renwick et al., 2015b, Lyne et al., 2015). Between February 2009 and April 2012 we assessed individuals with first-episode psychosis comprising both in-patient and community admissions in a geographically defined catchment area (pop. 390,000 approx.) in the Republic of Ireland. Diagnostic assessments confirmed the presence of psychosis at baseline. Emphasis on over-referral encouraged completeness in the sample and approximately 50% screened did not satisfy the inclusion criteria (O'Donoghue et al., 2012). This consisted of having a psychotic disorder that had not been previously treated with antipsychotic medication (no more than 30 days prior treatment with antipsychotic medication was considered an adequate trial), satisfying admission criteria for adult mental health services, being aged between 17 and 65 and being permanently resident within the catchment area. Participants with known learning difficulties (IQ < 70) or psychosis deemed to be caused by a general medical condition were also excluded. 47 participants disengaged prior to completing the initial screen (10% of overall referrals). The remaining sample comprised 222 participants.

2.2 Measures

Diagnoses were established using the Structured Clinical Interview for Diagnostic and Statistical Manual-IV (American Psychiatric Association, 2000) comprising both affective and non-affective psychoses. Data pertaining to clinical factors that occurred prior to presentation for treatment were obtained retrospectively

either assessment with the participant, family or following a review of prior healthcare records or a combination where more than one data source was available. This included duration of untreated psychosis, prodromal duration and premorbid adjustment. Onset of psychosis was indicated by the first noted psychotic symptoms (reality distortion, disorganised speech) and as both pharmacological and psychosocial treatments were offered at inception into the clinical service, adequate treatment availability was taken as the offset of untreated psychosis. As such, we defined first-episode psychosis as the first presentation with psychotic symptoms to secondary mental health services where an adequate trial of pharmacological treatment has not been administered prior to presentation. To ensure a relatively homogenous and representative sample and to establish consensus in ambiguous cases, these operational definitions were utilised in conjunction with weekly consensus meetings chaired by a Professor of Psychiatry or designated equivalent.

Symptomotology was assessed using the Scale for Assessment of Positive Symptoms (SAPS) (Andreasen, 1984), Scale for Assessment of Negative Symptoms (SANS) (Andreasen, 1983) and Calgary Depression Scale (CDSS) (Addington et al., 1993). Global functioning was measured using the Mental Illness, Research and Clinical Center version of the global assessment of functioning scale (MIRECC-GAF) (Niv et al., 2007). Premorbid adjustment was measured using the modified version of the Premorbid Adjustment Scale (PAS) (Cannon-Spoor et al., 1982) comprising measures of social and academic adjustment spanning from childhood until prior to the emergence of the prodromal phase of illness (van Mastrigt and Addington, 2002). Prodromal phases and periods of untreated psychosis were determined using the Onset Questionnaire with both participants and nominated relative/carer where available (Beiser et al., 1993); the earliest date given was accepted as the onset date, as patients often date onset earlier than that assessed by carers (Browne et al., 2000). The initial stage assessed in the Onset Questionnaire is first noticeable signs (FNS) and contains items indicating general psychopathology including attitude/thinking, mood, behaviour and performance and somatic signs. Estimates of prodromal duration were calculated from the time of the first noticeable sign to the onset of first psychotic symptoms. Symptom remission at one year was determined using criteria from the Remission in Schizophrenia Working Group against SAPS and SANS scores (i.e. no more than 3 on global items; hallucinations, delusions, positive formal thought disorder, bizarre behaviour, affective flattening, avolition-apathy, anhedonia-asociality and alogia). Ratings of symptom severity on SAPS and SANS were made for the month prior to assessment.

2.2.1 Social Networks and Support

We measured social networks and satisfaction with social support in three ways;

a. Service-users report of the number of close friendships they currently have were obtained using the social relations domains in the Wisconsin Quality of Life Index for Clients (Becker et al., 1993).
b. Social support was measured Wisconsin Quality of Life Index for Providers (Becker et al., 1993) containing items assessing the receipt of adequate support and maintenance of friendships.
c. Satisfaction with social support and networks was measured using in the Wisconsin Quality of Life Index for Clients (Becker et al., 1993) containing items such as level of report received, attendance at social groups and satisfaction with the amount of friendships.

There were 78 matched pairs with information on social networks at baseline and follow-up but the total number of responses varied for each specific indicator. Composite scores were obtained for social support and satisfaction with social support (2 & 3) by summing items within each domain to provide an overall score for social networks and support. Scores are generated on a scale of -3 to 3 with higher scores indicating better social networks and support. Social network size is reported separately and data were measured on a nominal scale (0 = none, 1 = 1-2, 2 = 3-5, 3 = over 5).

2.3 Procedures

Data were collected as part of a larger observational study determining outcomes of an epidemiological cohort of participants with first-episode psychosis. The study raters (post-membership registrars in psychiatry and clinical nurse specialists in psychosis) received training in the use of instruments and were subject to inter-rater reliability testing. The degree of inter-observer agreement was established by concurrent assessments between raters in between 5 and 10 cases on SCID-DSM-IV, CDSS, SANS, SAPS, PAS and GAF and agreement between rater's assessments of duration of untreated illness and duration of untreated psychosis were also tested. Concordance coefficients were all within acceptable limits (Shrout and Fleiss, 1979) and are reported elsewhere for this sample (Renwick et al., 2015a). Assessments typically commenced within 48 hours of receipt of referral for assessment and treatment of first-episode psychosis and were conducted sequentially with interviewer assessments first, followed by self-reported assessments upon clinical stabilisation. Several sources of information were used to inform social network assessments including interviews with the patient and family members and clinicians rated this without prior knowledge of the participant's responses. Informed verbal consent and assent was obtained at entry into the study and written informed consent at one year. Ethical approval was granted by the Ethics Committee of the clinical services attended by patients for the collection of these data reported here and the use of these data for this analysis.

2.4 Statistical Analysis

Analyses were conducted using SPSS 22 (IBM Corp., 2013) and model diagnostics calculated for the statistical assumptions of the analysis. Duration of untreated psychosis and duration of untreated illness were both highly positively skewed and were $\log^{10}$ transformed. CDSS scores were also skewed and the square root of raw scores was used in bivariate and multivariable analysis. We summarised patient characteristics using appropriate descriptive statistics including percentages, means and standard deviations and interquartile range with median. We used the following bivariate and multivariable tests:

a. Chi-square tests and independent groups t-tests to explore differences between baseline characteristics of completers and non-completers at follow-up. Chi-square, ANOVA and Pearson's *r* were used to assess the relationships between social networks assessed by clients and clinicians, socio-demographic and clinical variables. Partial correlations were used to test the relationship between duration of untreated psychosis and social networks and support controlling for the influence of negative symptoms, prodromal length and premorbid adjustment. The McNemar-Bowker test was used to estimate the difference between distributions of proportions in social network count at baseline and one year.

b. Mixed effects modelling to assess the multivariate effect of duration of untreated psychosis and other covariates on social networks and support over time. We fitted a random effects model due to missing data at 1 year as previous analysis determined these were missing at random. The variables included in the mixed effects model were: gender, marital status, education level, occupational status, involuntary treatment status, living status, diagnosis, insight, time, negative symptoms, positive symptoms, depressive symptoms, global functioning, duration of untreated psychosis, duration of untreated illness and premorbid adjustment.

3. Results

3.1 Descriptive Characteristics

The socio-demographic and clinical characteristics of the entire sample of 222 patients who took part in the study at baseline are provided in Table 1. During the study period 158 were eligible for follow-up one year later and 97 (61%) of those were seen for face-to-face interviews (those who were ineligible for follow-up had been incepted into the study <12 months before study end). There were no differences in baseline characteristics between the eligible sample and the larger sample of those who were assessed at baseline with the exception of higher levels of positive symptoms among those not yet ready to be assessed at one year (see Table 1). Of those eligible but who did not complete follow-up 15 declined (26%), 10 had moved away (17%), 2 were deceased (3%) and 4 were in prison (5%). Those who were uncontactable were most frequently uncontactable due to incorrect information/unable to be contacted despite correct information (n = 18, 31%). Of those who participated in the full assessment at follow-up, social networks and support were reported from the perspective of the client in 128 at baseline and 82 at follow-up and objective social support was obtained for 172 participants at presentation and for 96 at follow-up. The mean number of days to follow-up was 422 (SD =132.65, Mdn = 389, IQR = 372 - 426). We found no differences between participants with available information on social networks at baseline and those without.

In the time before psychosis was detected, participants principally lived with family (n = 125, 56.3%) although a small number were homeless (n = 5, 2.3%) and fifty (22.5%) were living alone. There was no statistically significant difference between the distribution of social network size (consisting of the number of friends outside of family) at entry into treatment and at follow-up (McNemar-Bowker x^2_6= 3.81, p = 0.702). Duration of untreated psychosis was significantly longer for those with no friends at entry into treatment (n = 129, Median = 24.5mths, IQR = 7.25 – 69.25; Mann-Whitney U = 11.78, p = 0.008) when compared with other groups (1-2 friends, Median = 3.50mths, IQR = 1 - 24.75; 3-5 friends, Median = 3.50mths, IQR = 1 - 20.00; over 5 friends, Median = 1mth, IQR = 0 - 6.00).

3.2 Satisfaction with Social Networks and Support

Social networks described by service-users and perceived support received was inversely correlated with negative symptoms (r = -0.376, p < 0.001), depressive symptoms (r = -0.305, p < 0.001) and duration of untreated psychosis (r = -0.255, p = 0.004) at baseline. Broad diagnoses differed in perceived social support, F = 3.02 (3, 124), p = 0.032; those with depression reported the least satisfaction with the support available to them

(Mean = 0.37, SD = 1.55). At follow-up, this difference did not persist, F = 1.36 (3, 58), p = 0.263. At baseline, we compared perceived social support score between groups with different numbers of friends in their social circles and they were significantly different, F (3,124) = 18.07, p < 0.001. Those with no friends reported the lowest level of satisfaction with the support they received (Mean = -0.06, SD = 1.68) and those with the largest social circle were most satisfied (Mean = 1.71, SD = 1.32). At one year there was no difference, F (3,78) = 1.68, p =0.177.

3.3 Social Networks and Support

Social networks and support measured by clinicians was linked with many socio-demographic and clinical outcomes at baseline and follow-up. Younger participants (r = -0.190, p = 0.012) and those who were married, t (172) = 2.07, p = 0.040 had more intact social networks at baseline. Social networks and the degree of support received also differed by living status, F (6, 167) = 5.38, p < 0.001 with homeless participants displaying worse social networks and support (Mean = -2.34, SD = 0.87). Poorer global functioning (r = 0.255, p < 0.001), increased levels of negative (r = -0.397, p < 0.001) and positive symptoms (r = -0.185, p = 0.014) at baseline were also observed in those with lower levels of social support and contact. Duration of untreated psychosis was longer for those with poorer social support (r = -0.429, p < 0.001) as was prodromal duration (r = -0.309, p < 0.001). Poorer premorbid adjustment was also linked with impaired social networks and reduced support (r = -0.432, p = 0.001) at baseline.

We tested whether these socio-demographic and clinical variables at treatment entry were linked with social support one year later as measured by clinicians and some of these relationships were maintained. Specifically, negative symptoms (r = -0.326, p < 0.001) and longer duration of untreated psychosis (r = -0.404, p < 0.001) were linked with impaired social networks and support after one year. Prodromal duration (r = -0.359, p = 0.001) and premorbid adjustment (r = -0.435, p < 0.001) were also both negatively correlated with the quality and quantity of social contacts and support. We performed partial correlations to assess the relationship between duration of untreated psychosis and social networks and support controlling for the influence of negative symptoms, prodromal length and premorbid adjustment and this remained significant (pr = -0.437, p = 0.001). Age (r = -0.205, p = 0.045) and global functioning (r = 0.230, p = 0.024) were still significantly associated but less so than at baseline. We combined remission from positive and negative symptoms and those who did not achieve remission (Mean = -0.18, SD = 1.58) displayed impaired social networks, t (94) = -6.62, p < 0.001 when compared with those who had achieved remission (Mean = 1.75, SD = 1.27). Social networks and support was also impaired at treatment entry for those who did not achieve remission one year later (Mean = -0.26, SD = 1.54 vs Mean = .68, SD = 1.53; t (75) = -2.66, p = 0.009).

3.4 Change in Social Networks and Support

There were significant changes in both self-reported and clinician-rated social networks over time but as there were few relationships between explanatory variables and self-rated social support we report the findings of our multivariable analysis for clinician-rated networks only. Mixed effects modelling was used to determine the impact of duration of untreated psychosis on social network and support over time in the presence of other possible explanatory variables, where subject was the only random effect. Residuals in the model were

not significantly non-Normal (Kolmogorov-Smirnov = 0.2, Shapiro-Wilk p = 0.26) indicating the model fit was good. A sensitivity analysis was conducted by examining a range of covariance structures, and the model minimising the AIC was chosen (AR1 = 486.4). In fact, the results were very stable irrespective of the correlation structure, also indicating a good model fit. As observable from Table 2, social networks and support were significantly higher at follow-up indicating improvement over time. Duration of untreated psychosis, time and premorbid adjustment were significant in the model (see Table 3). The strongest predictor of social networks and support was baseline living status (p = 0.001). We dichotomised this variable due to smaller numbers in some cells (living with others and living alone) and found that duration of untreated psychosis was significantly longer for those who lived alone (n = 54, Median = 8.50, IQR = 1 – 30) than for those living with family or others (n = 166, Median = 2.00, IQR = 0 – 12; Mann-Whitney U = 13.35, p < 0.001). There was no difference in prodromal duration (Mann Whitney U = 0.22, p = 0.760) or premorbid adjustment, t(116) = 0.26, p = 0.797 between living situations at baseline.

4. Discussion

A key finding of this study is that clinical factors, the degree of severity of illness and social factors are linked with the degree of support received from social networks by people with first-episode psychosis. One way to view this is that service-users become better able to mobilise their resources following illness onset which is supported by improvements in social support but this could also be perceived as an increase in assistance required due to the severity of symptoms and non-remission as shown in these data. Conceivably during the early phase of psychosis service-users depend more on families and wider networks to provide support with basic tasks, emotional assurance, recreation, functional tasks and acting in a confiding capacity as examples, and this could explain improvements without a corresponding increase in network size. There was no change in the size of social networks in this cohort which is partially consistent with the few studies that have reported this outcome (Thorup et al., 2006, Jeppesen et al., 2008). We purposely measured social networks to include friendships only given that these appear most susceptible to impairment due to illness while others have included family members in networks which tend to exceed friendship networks in size (Thorup et al., 2006) hence it is difficult to draw comparisons notwithstanding the variation that may occur in different socio-cultural an geographical settings.

We did not assess predictors of network size although bivariate analysis shows that duration of untreated psychosis is associated with the number of friends people count in their circles. People with longer delays have fewer friends and those living alone have longer delays in getting to treatment. This is likely part of a complicated picture of interconnected factors linked to delayed receipt of treatment and poorer clinical course for which we cannot determine causality due to the nature of retrospective and longitudinal observational studies. However, we did not find any differences between living status and the degree of social and academic impairment observed premorbidly nor did we find any difference in prodromal duration meaning distinguishing between those who are likely to experience long delays, diminished networks and social isolation due to living alone prior to psychosis onset becomes a much more challenging task. Once psychosis begins, living alone becomes an important variable as this differs depending on how long treatment receipt delays are and homelessness in particular is a predictor of social support received and obtained throughout the early course of illness reducing access to support that might be otherwise protective as the illness proceeds.

The relationship between untreated psychosis and social support reinforces the hypothesis that greater levels of social support reduce long delays as they may either seek help earlier or their symptoms are detected earlier by concerned family members which shortens untreated periods of illness (Drake et al., 2000). This can be interpreted as an indicator of sensible use of the resources available given that social support is protective (Erickson et al., 1998, Norman et al., 2005) or alternatively that untreated periods of psychosis leads to greater reliance on social support. In either circumstance poor social connectedness in those with longer duration of untreated psychosis evidenced by living alone and the absence of friends may be harbingers of poor outcome. This remains a key argument of the need for earlier intervention and targeted social networks interventions as duration of untreated psychosis was substantially longer for those with no friends (approx. 10% in this sample). As we found no time interaction with untreated psychosis, whether improvements in social support (or indeed more reliance on socials support) is consistent with the critical period hypothesis is equivoical depending on how the improvements in social support are interpreted (Birchwood et al., 1998, Crumlish et al., 2009, Hill et al., 2012).

In keeping with the early intervention paradigm, the ability of duration of untreated psychosis to predict outcome is important for intervention research and while we show that longer delays are linked with social support at baseline and one year, the mechanism of action remains unclear. We found that premorbid adjustment was associated with social support and it has been considered this variable is more apt to explain changes in social outcomes for people with psychosis (Jeppesen et al., 2008) more consistent with neurodevelopmental hypotheses (Murray and Lewis, 1987) and multifactorial threshold models of illness onset where genetic and environmental etiological influences are both at play (Sullivan et al., 2003). The value of incorporating premorbid adjustment is that it allows interpretation of the relationship between untreated psychosis once this known predictor of outcome is controlled for in the analyses thus we can assume that the relationship between duration of untreated psychosis is independent of premorbid adjustment, the former being a modifiable predictor of outcome.

Returning to the issue that lengthy delays and social support may be interpreted as a positive or indeed, less favourable outcome the importance in measuring satisfaction with social networks and support becomes immediately clear due to this dilemma. We found significantly lower levels of satisfaction with networks in the group of people who had no friends at baseline and those who had longer untreated psychosis indicating that friendlessness is an unwanted situation among service-users. Although people were mostly satisfied with their networks, isolation and perceived lack of support are factors that need to be emphasised in terms of providing greater psychosocial treatment consistent with early intervention models. There were few clinical variables linked with this outcome at one year but at baseline perceived support is linked to depression which is similar to other research (Sundermann et al., 2014) but opposes the finding from a similar study that depression is not linked with social support satisfaction (Malla et al., 2004). We found similar levels of depression in our cohort when compared to similar first-episode psychosis cohorts indicating that greater levels of depression do not explain this finding (Malla et al., 2004, Sönmez et al., 2013). At one year, depression was not linked with perceived social support although an overall reduction in clinically significant depression from 20% to 3% in the entire sample may partially explain this finding despite a greater need to consider depressive symptoms as a treatment target during the acute phase of treatment (Renwick et al., 2012).

4.1 Strengths and Limitations

In summary, we found that untreated psychosis and premorbid adjustment measured retrospectively were linked with social support over the course of early psychosis although homelessness was the strongest predictor which can be considered in the complex interconnected factors that influence the outcome of illness. We also found that those with longer duration of untreated psychosis had fewer friends and reported less satisfaction with these relationships and while clinical factors were associated with satisfaction to a lesser extent, there were a number of clinical correlates of social support that could indicate either a greater need among people with first episode psychosis or better mobilisation of available resources. These findings must be considered within the strengths and limitations of the study. There is wide methodological variation in studies of social networks in early psychosis, and we have addressed previous shortcomings by providing information about social networks in a treated sample obtained prospectively using epidemiological methods, comprising patients from inpatient and community settings (Gayer-Anderson and Morgan, 2013). We have demonstrated reasonably low attrition rates in line with other studies and used standardised assessments for all key study parameters that were subject to rigorous reliability testing. We have also used a validated instrument to measure social networks, support and perceived support and included variables that may also explain poorer social connectedness (i.e. premorbid adjustment). Nonetheless, obtaining data on premorbid adjustment was difficult retrospectively and may impact our findings as people who had information on premorbid adjustment from family are also likely to have received social support potentially inflating the magnitude of the relationship between these two variables. There was also unavoidable attrition at one year and analysis revealed that those lost to follow-up did not bias the sample by a specific attribute examined in the study with the exception of positive symptoms although this was lower in the sample that participated meaning any relationship is under-emphasised. We implemented a multimode recruitment process which resulted in a reasonably high follow-up rate for first-episode psychosis cohorts but there were varying levels of data returned for some variables despite our best efforts.

Overall, the sample size obtained was sufficient to detect differences and the use of validated instruments rendered the outcome variables sensitive to change. We acknowledge the challenge in measuring some of the important variables retrospectively and we conducted assessments in a consistently reliable manner with a number of quality checks embedded to ensure the increased accuracy of these data. There is also significant variation in methods used to analyse social networks, support and satisfaction due to the complexity of this area of study. Our study is thus limited somewhat by a narrow definition of social networks as there are a range of other network members including weak/diffuse ties, recreational contacts, healthcare professional and pets that are also implicated in the self-management of mental health conditions but this was beyond the scope of this study. Studies using more comprehensive methods of social network profiling and analysis would be useful in determining a more exact estimate of the typical composition of social networks (McCallister and Fischer, 1978, Sokolovsky and Cohen, 1981) alongside more robust methods of measuring the degree of satisfaction and desirability of social support in terms of social needs.

Conflict of interest

The authors have no conflicts of interest to disclose. The first author was funded by a fellowship grant from the Health Research Board of Ireland (NM/2008/15) and the overall project has received funding from non-commercial organisations.

Contributors

Laoise Renwick developed the idea for and wrote the article. John Lyne, Brian O'Donoghue, Liz Owens and Eric Roche contributed to data management and overall project management. Jonathan Drennan and Ann Sheridan acted in a supervisory capacity and contributed to analysis and interpretation of the data alongside revising content. Mark Pilling conducted all statistical analyses collaboratively with Laoise Renwick. Mary Clarke had overall research governance and has contributed to the revisions of the manuscript. The late Professor Eadbhard O'Callaghan conceived of the idea for this research and the overall programme of research. All authors have contributed to and approved the final manuscript.

Contribution

What is already known about this topic?

People with first episode psychosis typically have smaller social networks than healthy controls

Reduced social networks and support seem to pre-date the onset of psychotic illness

There is evidence that longer periods of untreated psychosis carry a greater risk of being socially withdrawn and diminishing network size

What this paper adds?

Social support delivered and participant's views of their networks and the degree of assistance received increases during the first year of treatment

The size of social networks do not differ between entry into treatment and one year later

Longer untreated psychosis is associated with having no friends at entry into treatment and predicts social support alongside premorbid adjustment and being homeless

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Social Networks Paper Tables

Table 1: Socio-demographic and Clinical Characteristics

	Baseline (n = 222)	*Baseline (n = 158)*	*Test statistic**	*Year1 (n = 97)*
Demographic Information	*Mean (SD)*	*Mean (SD)*	*t-test (df)*	*Mean (SD)*
Age	33.3 (11.9)	33.5 (12.5)	.378 (220)	35.2 (12.3)
				n (%)
Gender	*n (%)*	*n (%)*	$\chi^2(df)$	
Male	129 (58.1)	90 (57.0)	0.296 (1)	63 (64.9)
Female	93 (41.9)	68 (43.0)		34 (35.1)
Marital Status				
Married	42 (19.0)	32 (20.3)	0.636 (1)	36 (20.2)
Not Married	180 (81.0)	126 (79.7)		142 (79.8)
Sample Characteristics	*Mean(SD)*	*Mean (SD)*	*t-test (df)*	*Mean (SD)*
Age of onset of psychosis (years)	31.5 (11.4)	31.1 (11.7)	0.095 (218)	-
Global Functioning	33.5 (11.8)	33.6 (11.8)	0.126 (220)	65.0 (18.8)
Positive Symptoms (SAPS)	7.5 (3.5)	7.0 (3.3)	-3.124 (218) **	1.6 (2.8)
Negative Symptoms (SANS)	4.5 (4.8)	4.4 (4.7)	-0.232 (218)	4.6 (5.8)
Depressive Symptoms (CDSS)	4.2 (5.8)	4.0 (5.9)	-0.858 (216)	1.7 (2.9)
	Median (IQR)	*Median (IQR)*		

Duration of Untreated Psychosis [DUP] (mths)	3 (1 – 19.8)	3 (1 – 18.0)	0.264 (218) ***	-
Duration of Untreated Illness [DUI] (mths)	11 (3 – 38.0)	10 - (3 – 38.0)	0.454 (189) ***	-
Diagnosis	*n (%)*	*n (%)*	*χ2(df)*	*n (%)*
Primary Psychotic Disorder	148 (66.7)	20 (12.7)		74 (76.3)
Primary Mood Disorder (Mania)	30 (13.5)	12 (7.6)		10 (10.3)
Primary Mood Disorder (Depression)	18 (8.1)	107 (67.7)	0.612 (3)	7 (7.2)
Substance Induced Psychosis	26 (11.7)	19 (12.0)		6 (6.2)
Treatment Characteristics				
Admission Status				
In-patient	136 (61.3)	100 (63.3)	0.952 (1)	4 (4.1)
Out-patient	86 (38.7)	58 (36.7)		93 (95.9)
Involuntary Admission	28 (20.6)	50 (50.0)	2.964 (1)	-
Voluntary Admission	108 (79.4)	50 (50.0)		-

Note 1: Primary Psychotic Disorder includes Schizophrenia, Schizophreniform, Delusional Disorder, Schizoaffective Disorder, Brief Psychosis, Psychosis NOS; Primary Mood Disorder (Mania) includes Bipolar I & II where current episode is mania, Primary Mood Disorder (Depression) includes Bipolar I & II where current episode is depression and Major Depressive Episodes with psychotic features. *Difference in baseline characteristics between those assessed and those eligible for one-year follow-up. **significant at the level $p < .01$. ***DUP transformed to the log Base10.

Table 2: Size of Social Networks

Friends (count)	*None*	*1-2*	*2-3*	*Over 5*
	n (%)	*n (%)*	*n (%)*	*n (%)*
Baseline	12 (9.3)	27 (12.2)	28 (12.5)	62 (48.1)
One year follow-up	9 (11.0)	16 (19.5)	17 (20.7)	40 (48.4)

Table 3: Mixed model for predicting social networks and support: estimates of fixed effects

					Confidence Interval	
Parameter	*Estimate*	*Std. Error*	*df*	*sig*	*Lower*	*Upper*
Intercept	3.19	1.86	85.06			
Gender (Male)	0.20	0.25	71.24	0.407	-0.284	0.693
Marital Status (Married)	0.32	0.38	64.64	0.411	-0.446	1.077
Education (Primary)	-0.02	0.28	69.34	0.950	-0.586	0.550
Occupational Status (Unemployed)	-0.42	0.29	69.53	0.149	-1.004	0.156
Treatment (Out-patient)	0.16	0.32	67.49	0.620	-0.482	0.802
Treatment (In-patient Voluntary)	0.06	0.30	65.91	0.848	-0.537	0.652
Living Status (Family)	-0.23	0.53	108.17	0.668	-1.276	0.821
Living Status (Alone)	-0.53	0.56	102.60	0.347	-1.631	0.578
Living Status (Homeless)	-2.98	0.89	88.28	**0.001**	-4.741	-1.211
Living Status (Renting Others)	-0.36	0.65	98.67	0.577	-1.627	0.929
Living Status (Co-habiting)	-0.26	0.72	75.66	0.722	-1.696	1.181
Primary Psychotic Disorder	0.74	0.52	82.11	0.156	0.289	1.773
Primary Mood Disorder (Mania)	0.31	0.59	87.26	0.603	-0.869	1.488
Primary Mood Disorder (Depression)	0.01	0.80	79.05	0.986	-1.573	1.601
Schizophrenia Only	-0.02	0.35	72.12	0.947	-0.713	0.667
Insight	-0.37	0.26	70.55	0.162	-0.889	0.152
Time (Baseline)	-0.86	0.35	78.88	**0.016**	-1.559	-0.168
Negative Symptoms	-0.01	0.03	68.27	0.686	-0.074	0.049

Positive Symptoms	0.01	0.04	76.27	0.792	-0.073	0.094
Depressive Symptoms	-0.07	0.10	75.28	0.477	-0.266	0.125
Global Functioning	-0.01	0.02	85.95	0.912	-0.033	0.029
Duration of Untreated Psychosis [DUP] (log10)	-0.86	0.40	102.51	**0.031**	-1.647	-0.079
Duration of Untreated Illness [DUI] (log10)	-0.02	0.33	72.5	0.943	-0.675	0.628
Premorbid Adjustment	-2.26	0.92	61.62	**0.017**	-4.112	-0.416
Time*DUP Interaction	0.26	0.34	75.52	0.461	-0.432	0.942

Note 2*significant at the level $p < .05$, *** significant at the level $p < .001$.