Predictors of engagement in first-episode psychosis

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Abstract

Engagement with psychiatric services is critical for ensuring successful outcomes in patients experiencing a first episode of psychosis (FEP). However, it is not known how sociodemographic factors and patient beliefs about the causes of mental illness affect engagement. This study explored predictors of engagement in a cohort of 103 FEP patients presenting to an early-intervention service. Beliefs that mental illness is caused by social stress or thinking odd thoughts predicted higher engagement scores. Patients with no qualifications were found to have higher engagement scores than those educated to a higher level. Ethnicity, gender, age and socioeconomic factors were not significantly correlated with engagement scores. Duration of untreated illness (DUI) significantly predicted higher engagement scores, but only for values greater than 1220 days. Duration of Untreated Psychosis (DUP) was not a significant predictor of patient engagement scores. Patient beliefs about the causes of mental illness are an important factor to be taken into consideration and may represent a target of interventions to increase engagement in FEP.

Key Words: Engagement, psychosis, schizophrenia, ethnicity, patient beliefs.

1. Introduction

Disengagement from psychiatric care represents a major problem for mental health services. Recent reviews suggest that approximately 30% of patients eventually

disengage from care (Kreyenbuhl et al., 2009; O'Brien et al., 2009). The problem is particularly severe for patients experiencing a first-episode of psychosis (FEP), where early disengagement is associated with poor patient outcomes (Robinson et al. 1999, 2002; Ruggeri et al. 2007; Schimmelmann et al. 2006; Turner et al. 2009). Hence, identification of the factors, which determine whether a patient engages or disengages, is an essential to improve therapeutic relationships and treatment outcomes.

Several factors have been identified as predictors of engagement in FEP, but most are in contention (Doyle et al, 2014). There is conflicting evidence regarding levels of disengagement amongst black and minority ethnic (BME) groups (Singh and Burns, 2006). Whilst some studies have found greater disengagement and less satisfaction with services (McGovern and Cope, 1991; McCreadie et al., 1997; Wang, 2007), others have found no difference or greater engagement amongst BME groups (Bindman et al., 2000; Goater et al., 1999; Takei, Persaud, Woodruff, Brockington, & Murray, 1998; Raleigh et al., 2007). Recent work suggests that immigrants are more likely than nonimmigrants to disengage from treatment (Ouellet-Plamondon et al., 2015). Childhood physical abuse, alcohol, a history of violence and a psychopathic traits have been associated with poor engagement (Spidel, A. et al. 2015). There is contradictory evidence regarding the effect of other sociodemographic factors on levels of engagement (O'Brien et al., 2009). There is no consensus on the effects of gender, age, living status, marital status, socioeconomic status or level of education on engagement (Baekeland and Lundwall, 1975). Moreover, it is not known how the emergence and chronology of emerging psychosis affects levels of engagement. Whilst some have found an association between duration of untreated psychosis (DUP) and engagement (Conus et al., 2010), others have not (Macbeth et al., 2013). Furthermore, little is known about how symptom attribution and patients' beliefs about the causes of mental illness impacts upon engagement.

Previous studies have also had some limitations. Firstly, engagement and disengagement were poorly conceptualized and defined, and patient populations and service settings heterogeneous and diverse (O'Brien et al., 2009). Secondly, the most common measure of disengagement used is drop-out, which is an unsuitable proxy for a construct as complex as engagement (Catty, 2004). This also means we have little direct data about which factors influence engagement levels when patients

first present to services. Apart from measures of contact, unvalidated scales are often employed to measure engagement (Zheng et al., 2013). In addition, despite the existence of robust statistical methods, all studies in the field of engagement research to date have used conventional techniques alone, which have are less able to detect real differences between groups (Wilcox et al., 2013).

We used the validated Singh-O'Brien Level of Engagement Scale (SOLES) to measure engagement in FEP (O'Brien, White, Fahmy & Singh, 2009) We sought to identify sociodemographic predictors of engagement, exploring the role of beliefs, attributions, and ethnicity on engagement. In addition, we examined the correlation between the chronology of psychosis onset and engagement. We employed non-parametric statistical techniques along with conventional methods.

2. Method

2.1 Participants

A total of 103 FEP patients were recruited from the Birmingham and Solihull Mental Health NHS Foundation Trust (BSMHFT) early intervention services over a 2-year period. Invitations to participate in the study were extended to all patients attending the Birmingham early intervention service, as the Solihull early intervention service had not yet been established at the time of study initiation. Each patient's community psychiatric nurse (CPN) was approached to ascertain whether the potential subject was suitable for inclusion in terms of general well-being and ability to consent. If the CPN agreed that the patient was suitable for participation, the consent form and information sheet were given to the CPN to give to the patient. With the patient's agreement, a researcher contacted the patient to explain the study and arrange a time and location to meet. Interviews were held at the patient's home or in a neutral setting, taking approximately 60-120 minutes. Patients were able to ask for their carer to be present if they wished.

Ethical approval was granted by the The Warwickshire Research Ethics Committee (WREC) and the Birmingham and Solihull Mental Health NHS Foundation Trust's (BSMHFT) Research and Development Department.

2.2 Assessment

Sociodemographic data were collected on gender, age, ethnicity, religious affiliation, place of birth, country of parent's birth, language, cultural affiliation, living and employment status, postcode and occupation. Ethnicity data were obtained in two ways. First, subjects were asked to describe their ethnicity in their own words, which was recorded verbatim. Second, participants were presented with a list of census categories and they were asked to choose the category which most accurately represented their ethnic group. As both methods were found to be consistent with one another, four groups from the standardised census categorisation method were used in analysis:

- white (white British, white Irish, white 'other')
- black (black/black British Caribbean, black/black British African)
- Asian (Asian/Asian British Pakistani, Asian/Asian British Indian, Asian/Asian British Bangladeshi)
- 'other' (mixed white/black Caribbean, mixed 'other').

In this cohort, 36 (33.0%) were categorised as White, 25 (24.2%) as Black, 34 (34.9%) as Asian and 8 (7.7%) as 'other'. In the 2-year early intervention service (EIS) intake, 31.5% were categorised as White, 20.9% as Black, 36.1% as Asian and 11.4% as 'other'.

The Nottingham Onset Schedule (NOS) was used to establish the chronology of symptom development in FEP (Singh et al., 2005). Three distinct illness phases were derived from the NOS: prodrome, duration of untreated psychosis (DUP) and duration of untreated illness (DUI). DUP was defined as the time period from first psychotic symptom to treatment compliance and DUI was defined as the interval from prodrome onset to treatment compliance. The NOS has high inter-rater and test-retest reliability, and is a standard measure of DUP employed by many early intervention services.

Engagement was measured using the SOLES questionnaire. The SOLES has good predictive validity and has been found to predict longitudinal disengagement, cross-sectional disengagement and attendance at appointments (O'Brien, White et al.

2009). In this study, analysis revealed that the 16 item SOLES had good internal consistency (Cronbach's alpha = 0.843).

Attributional responses of symptoms identified during the NOS were elicited using the Emerging Psychosis Attribution Schedule (EPAS). The EPAS is a semistructured interview which asks the patient to recall how they attributed a symptom when the symptom first arose (Singh et al. 2013). Responses were categorized into six groups informed by the anthropological work of Cecil Helman on illness and cultural beliefs (Helman, C., 1996). A standardized score was calculated for each attribution type using the method of Singh et al (Singh et al. 2013). In addition, the Beliefs About Causes of Mental Illness (BACMI) questionnaire was administered to explore beliefs about mental illness (Furnham and Wong, 2007).

2.3 Data analysis and statistics

Data were analysed with the software R for Windows (version 3.1.3) and the R package WRS (Wilcox Robust Statistics). We aimed to explore which factors predicted engagement as measured by the SOLES. When standard assumptions are violated, classical techniques for comparing groups have reduced power to detect differences between groups (Wilcox, R.R. 2012). Use of transformations to circumvent this has been shown to be inferior to using modern robust methods. We therefore employed techniques of robust estimation and hypothesis testing where skewness, non-normality and heterosecedasticity were present. For comparison of two groups, we used Student's t-test in addition to the robust Yuen's modified t-test (based on 20% trimmed means). Trimming reduces the deleterious effects on power of violations of standard assumptions. We also applied bootstrapping methods which generate critical values regardless of normality (Schug, Raine & Wilcox 2007).

For comparison of more than two groups, we used ANOVA in addition to comparison of trimmed means and comparison of medians. For continuous variables, we performed Pearson correlations together with robust Winsorized correlations. Robust regression was implemented using the Theil-Sen estimator. Standard methods work on the assumption that the regression line is straight, but often this is inadequate. Nonparametric regression estimators, also known as smoothers, were used when this assumption was not met.

3. Results

3.1 Sociodemographic predictors of engagement

See table 1 for summary statistics for the sample and mean SOLES scores.

3.1.1 Gender

SOLES scores amongst males (*n*=73, mean=7.65, s.d= 1.65) did not differ significantly from females (*n*=30, mean=7.57, s.d.= 1.79) when independent means were compared (*t*(103)=-.21, *p*=.83). Boxplots revealed significant skewness, and thus robust measures were used. Yuen's method with 20% trimmed means failed to find a significant difference *(Y*(103)=-.27, p=.77) as did percentile t-bootstrap methods (*p*=0.27), comparisons of medians (*p*=0.82) and comparisons based on M-estimates of location (*p*=0.69).

3.1.2 Ethnicity

One-way analysis of variance (ANOVA) was employed to assess differences in engagement scores between ethnic groupings. There was no significant difference between ethnic groups (*F*(4)=2.63, *p* = 0.054). Boxplots were highly skewed and heterosecedasticity detected. A percentile bootstrap method suggested that there was no significant difference between groups (*p* = 0.35) and a robust comparison of medians revealed no significant difference (*p* = 0.74).

3.1.3 Level of Education

ANOVA revealed a significant difference between patients' engagement scores based on level of education (*F*(4) = 4.06, p<0.009). *Post hoc* (Bonferroni-corrected) tests indicated that the 'no qualifications' (*n* = 23, mean = 8.35, s.d.= 1.36) group had significantly higher engagement scores than those who were in the 'further level' group (*n* = 38, mean = 7.01, s.d = 1.91, *p* = 0.015).

Comparison of trimmed means (*p* = 0.02), bootstrap-t methods (*p* = 0.03) and percentile bootstrap (*p* = 0.01) were all significant. Robust *post hoc* tests indicated that the 'no qualifications' group scored significantly higher than both the 'further level' (p=0.003) and 'higher level' group (p=0.039). The 'further level' group scored significantly higher than the 'higher level' group (*p* = 0.022).

3.1.4 Age

Age at assessment showed no significant correlation with engagement score (Pearson's $\rho = .118$, $p = .236$). Robust methods did not show a significant correlation (Winsorized correlation = .16 , $p = .108$).

3.1.5 Living Status

Independent comparison of means revealed that patients living with others (n=78, mean=7.83, s.d= 1.47) had significantly higher scores than those living alone (n=25, mean=7.00, s.d= 2.15, t(103)=-2.17, $p = .032$). Robust measures failed to find a significant difference ($Y(103)=0.27$, $p < 0.05$).

3.1.6 Socioeconomic status

There were no significant differences between socioeconomic groups ($F(103) = 0.937$, $p = 0.43$). A percentile bootstrap method failed to find a significant difference ($p = 0.35$).

3.1.7 Marital status

Married patients (n=10, mean = 8.37, s.d. = 1.13) did not have significantly different scores to non-married patients (n=93, mean= 7.54, s.d = 1.72, t(103)=-2.17, p=.032). Yuen's method with 20% trimmed means did not demonstrate a significant difference ($Y(103)=-.79$, $p = 0.46$).

3.2 Symptom attribution, beliefs about mental illness and engagement

3.2.1 Symptom attributes and engagement

Engagement scores correlated significantly with both 'individual' attributions (Pearson's $\rho = .279$, $p = 0.008$) and 'natural world' attributions (Pearson's $\rho = -.27$, $p = 0.01$). However, in Theil-Sen regression analysis neither 'individual' attributions ($p = 0.26$) or 'natural world' attributions ($p = 0.28$) were significant predictors.

3.2.2 Engagement and beliefs about the causes of mental illness

Significantly higher engagement scores were found in patients who held a stronger belief that social stress was an important cause of mental illness (BACMI question 10, $\rho = .312$, $p = 0.002$) and that odd thoughts were an important factor in mental illness (BACMI question 9, $\rho = .263$, $p = 0.008$). Both remained significant predictors when assessed with a Theil-Sen regression estimator ($p = 0.048$ and $p < 0.005$ respectively). Beliefs that family or expressed emotion were causes of mental illness were not significant predictors.

We found no relationship between engagement scores and belief that mental illness is caused by genetics, complications at birth, brain chemical imbalances or anatomical variation. In addition, there was no significant relationship with belief that mental illness is caused by supernatural deities (Gods, Satan/bhoot/devil/evil spirits), fate, karma, Yin Yang or Vastu.

3.3 Clinical predictors of engagement

3.3.1 Diagnosis and engagement

ANOVA showed no difference in engagement scores amongst diagnostic groups ($F(103) = .806$, $p = .604$). Boxplots demonstrated significant skewness, but a percentile bootstrap method revealed no significant difference between groups ($p = 0.059$).

3.3.2 Chronology of symptom onset and engagement scores

DUI was significantly correlated with engagement scores ($\rho = .22$, $p = 0.025$) whereas length of prodrome ($\rho = .168$, $p > 0.1$) and DUP ($\rho = .146$, $p > 0.1$) were not. Winsorized correlations were significant for DUI with SOLES ($p < 0.05$) but not for DUP or length of prodrome ($p > 0.05$).

Figure 1 shows the regression line for predicting engagement scores given DUI using a smoother (using R package WRS2). A bend in the regression line is apparent at a DUI of 1220. The hypothesis that the regression line is straight can be rejected ($p = 0.008$). The regression line is significant for values above 1220 ($p = 0.64$) but not for values below ($p = 0.33$).

3.4 Regression models using combinations of predictors

We used the WRS2 function “regpre” to create regression models using combinations of predictors. The regression estimator used is the Theil-Sen estimator. The predictors entered were the belief that social stress causes mental illness, the belief that thinking odd thoughts causes mental illness, and duration of untreated illness. With three predictors, we created 8 different models based on the combinations described in table 2. The best model only included the belief that social stress causes mental illness (BACMI Q.10), whilst the second and third best models included combinations of BACMI Q.10 with DUI or BACMI Q.9 (that thinking odd thoughts causes mental illness) respectively. The worst model included none of the predictors.

4. Discussion

Any intervention is only as effective as the willingness of those who need it choosing to engage with it. Disengagement from mental health care is a major concern for services. Within EIS, there is a specific focus on therapeutic engagement, and disengagement is considered a performance measure for the quality of service provided (Addington et al, 2005). For ethnic minority groups, disengagement from metal health care is a particular cause of concern (Singh et al, 2007). About 30% patients with FEP disengage from care, and the strongest association of disengagement is with symptom severity at baseline, duration of untreated psychosis, insight, comorbid substance abuse and levels of family support (Doyle et al, 2014). However other than comorbid substance abuse which predicts higher disengagement, the findings in relation to other predictors are conflicting and contentious.

We explored predictors of engagement in a cohort of FEP patients. We found that lower educational levels were associated with higher engagement scores. Attribution of illness analysis revealed that the beliefs that social stress and odd thoughts were important factors in mental illness were significant predictors of engagement. With respect to clinical predictors, duration of untreated psychosis was not found to be predictive of engagement but duration of untreated illness was.

We found no association between ethnicity and engagement in FEP. Our sample was representative of the ethnic make-up of the local FEP service intake. Although some previous studies have suggested higher disengagement rates for ethnic minority groups (McGovern and Cope, 1991; McCreadie et al., 1997; Wang, 2007), our results are consistent with others which have found no difference amongst BME groups (Takei et al., 1998; Goater et al., 1999; Bindman et al., 2000). It has suggested that BME disengagement with services may worsen over time (Singh et al, 2007). Further work is required to measure engagement in ethnic minority groups in a serial fashion to confirm or refute this.

In accord with several other studies, we found no significant association between gender and engagement levels (O'Brien et al., 2009). Age was not a significant correlate of engagement scores. Whilst some studies have suggested that younger patients may be harder to engage (Baekeland and Lundwall, 1975), others have found no difference (Edlund et al., 2002). However, the young demographic of the patients in this study limits our ability to assess the effect of age on engagement.

Level of education was a significant predictor of early engagement scores. Interestingly, those with no qualifications had significantly higher scores than those qualified to a further or higher level. In contrast, a previous study in a psychosis setting in Singapore found that patients with fewer than 6 years of education were significantly more likely to disengage (Zheng et al., 2013). We do not know what explains these differences. Patients with lower educational status may be more compliant with clinical advice or may have other social adversity which makes clinical services more assertive and focussed in engaging this group. Clinicians should therefore consider initiatives to engage patients with higher levels of education. For example, discussions with the patient about management plans could be tailored to the individual's level of education. A 'one size fits all' approach may not satisfy the expectations of patients from different academic backgrounds.

The 'further level' education group had higher engagement scores than the 'higher level' education group, which is consistent with previous studies (Jellinek, 1978; Romney, 1988). So the relationship between educational level and engagement may

in fact be bimodal, with patients at both the highest and lowest educational attainment being most likely to engage.

Using conventional methods, patients living with others had significantly higher engagement scores than those living alone. However, robust measures failed to find a significant difference. Socioeconomic status and marital status had no significant effect on levels of early engagement. Whereas some studies have previously suggested that divorce, living conditions and socioeconomic status are significant predictors of disengagement (Baekeland and Lundwall, 1975; Bender and Pilling, 1985), our results are consistent with studies which show no association (Edlund et al., 2002; Rossi et al., 2002; Wang, 2007). The SOLES has good predictive value for eventual disengagement but further research is required to assess engagement scores in these groups at serial time points.

Little work has been done on how symptom attribution and beliefs about mental illness impact upon engagement. As far as we know, this is the first study to explore how beliefs about the causes of mental illness impact upon engagement in FEP. We found that engagement scores correlated significantly with both 'individual' attributions and 'natural world' attributions of mental illness. However, robust regression analysis revealed that neither were significant predictors. Regarding beliefs about the causes of mental illness, patients who held a stronger belief that social stress was an important cause of mental illness and that odd thoughts were an important factor in mental illness had significantly higher engagement scores. Both remained significant predictors following robust regression analysis. Social attributions of mental illness may lessen the impact of stigma, thus facilitating engagement. While this needs further exploration, discussing patient attribution of their experiences in a non-judgemental, pluralistic, multidimensional manner is likely to improve the quality of therapeutic relationship with clinicians and hence improve engagement (Spencer et al. 2001; Singh et al, 2013; van Schalkwyk, G., 2015). Further investigation is also required to explore the relationship between symptom attribution and metacognitive impairments, which are common in FEP samples (MacBeth et al. 2015). Metacognitive deficits can be fractionated into cognitive, emotional, differentiation, integration and decentration aspects. One study found that

cognitive and decentration aspects of metacognition were associated with help-seeking in an FEP cohort (MacBeth at al. 2015).

Duration of untreated illness (DUI) was significantly correlated with engagement scores whereas length of prodrome and duration of untreated psychosis were not. Research into psychosis onset and engagement is in its infancy, and so far has yielded conflicting results. Some have found an association whereas others have not (Conus et al., 2010; Macbeth et al., 2013). A potential limitation in this study was that as the CPN decided which patients were suitable for inclusion, patients with more severe symptoms may have been excluded. This could account for the lack of correlation between DUP and engagement scores.

Interestingly, we found that engagement scores were higher for greater DUI values. However, using a smoother, it was evident that there was a bend in the regression line. Thus, it was demonstrated that the relationship between SOLES score and DUI only held for DUI values greater than 1220 days. Hence, there seems to be a relationship between DUI and engagement but only for DUI values greater than 1220. Perhaps patients who have DUI values greater than 1220 days are more engaged because, whilst not fully compliant, are more likely to either be partially compliant or to have accumulated various sources of support. Another explanation is that engagements levels fluctuate within individuals to a greater extent than was modelled by our data capture method and that the function describing this within-individual fluctuation is complex. This is supported by recent evidence that suggests that engagement can be described by a ‘push-pull’ dynamic and that levels experience shifts in time (Tindall, R., et al. 2015).

4.1 Conclusion

In this cohort of FEP patients, level of education and duration of untreated illness (DUI) were significant predictors of engagement. Clinicians should consider initiatives to engage FEP patients with higher levels of education, such as tailoring information about management plans and aetiology. There was no link between ethnicity and levels of engagement. DUI was only significant as a predictor for values greater than 1220 days. In addition, the beliefs that social stress and odd thoughts were important factors in mental illness were significant predictors of engagement. These results indicate that beliefs about the causes of mental illness are an

important aspect to consider in engaging FEP patients and may represent a factor amenable to intervention. For example, engagement could be improved by multidimensional discussions with patients in a non-judgemental manner about symptom attributions. Further research is required to understand the link between DUI and engagement, especially regarding how patients who experience very long DUI interact with care services.

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Figure 1. Regression line predicting mean SOLES score given DUI using a smoother

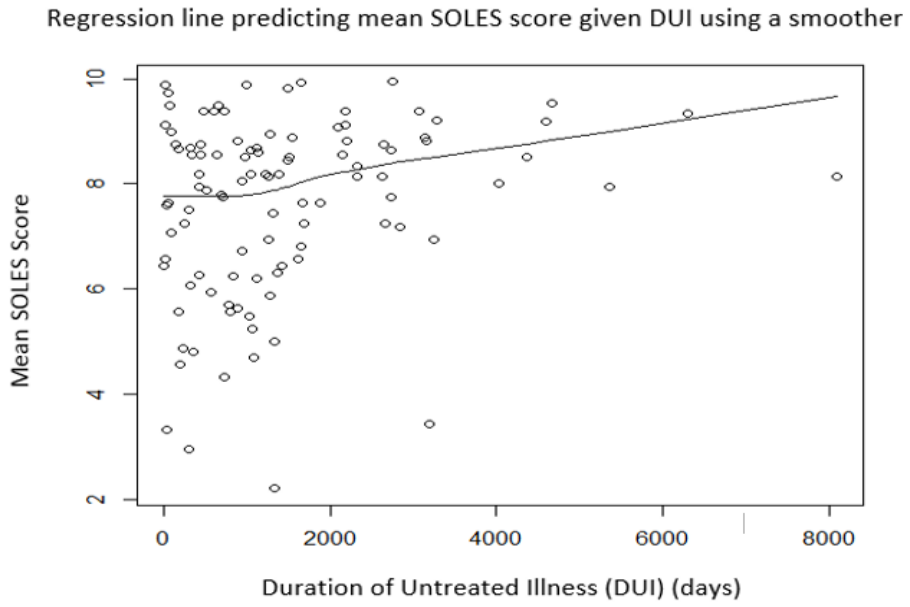

Table 1. Summary statistics for the sample (*n* = 103) and mean SOLES score.

		N	Mean (SD)	Mean SOLES score (SD)
Gender	Male	73		7.65
	Female	30		7.57
Ethnicity	Asian	34		7.91
	Black	25		6.89
	White	36		7.79
	Other	8		8.17
Living status	With others	73		
	Alone	30		
Age		103	23	
Socioeconomic status (IMD)	Decile 1	52		7.67
	Decile 2	19		7.44
	Decile 3	8		6.91
	Deciles 4-10	18		8.06
Level of education	Secondary	32		7.55

	Higher	8		8.47
	Further	38		7.01
	No qualifications	23		8.35
Duration of Untreated Illness (days)		103	1463	
Prodrome (days)		103	805	
Duration of Untreated Psychosis (days)		103	657	

Table 2. Models using combinations of predictors. (Var 1 = BACMI 9, Var 2 = BACMI 10, Var 3 = DUI.)

Model number	**Variables used**	**Rank**
1	1	4
2	2	1
3	3	5
4	1, 2	3
5	1, 3	6
6	2, 3	2
7	1, 2, 3	7
8	0	8