A longitudinal investigation of childhood communication ability and adolescent psychotic experiences in a community sample

CrossMark

Sarah A. Sullivan [a,b,*], Linda Hollen [c], Yvonne Wren [d], Andrew D. Thompson [e], Glyn Lewis [f], Stan Zammit [a,g]

[a] Centre for Academic Mental Health, University of Bristol, Oakfield House, Oakfield Grove, Bristol, UK
[b] CLAHRC West, Whitefriars, Lewins Mead, Bristol, UK
[c] Centre for Child and Adolescent Health, University of Bristol, Oakfield House, Oakfield Grove, Bristol, UK
[d] Bristol Speech and Language Therapy Research Unit, North Bristol NHS Trust, Frenchay Hospital, Bristol, UK
[e] Division of Mental Health and Wellbeing, University of Warwick, Coventry, UK
[f] Division of Psychiatry, University College London Charles Bell House, Gower St, London, UK
[g] Institute of Psychological Medicine and Clinical Neurosciences, University of Cardiff, Haydn Ellis Building, Maindy Road, Cardiff, UK

ARTICLE INFO

ABSTRACT

Background: Some childhood speech and language impairments precede psychosis but it is not clear whether they also precede adolescent psychotic experiences and whether this association is specific to psychotic experiences.
Methods: Pragmatic language and expressive speech and language (parent-assessed using the Children's Communication Checklist) at age 9 and psychotic experiences and depression at ages 12 and 18 were investigated in 7659 participants from the Avon Longitudinal Study of Parents and Children. Associations were investigated using multivariate modelling.
Results: Poorer pragmatic language at 9 years was associated with psychotic experiences at both ages (12 years OR 1.22, 95% CI 1.11, 1.34; 18 years OR 1.25, 95% CI 1.10, 1.41) but only with depression at 18 years (OR 1.10, 95% CI 1.00, 1.22). Poorer expressive speech and language ability was not associated with psychotic experiences or depression at either age. There was evidence that pragmatic language was specifically associated with psychotic experiences at age 12 but no evidence that the strength of any of the associations changed over time.
Conclusions: Deficits in pragmatic language precede early and late adolescent psychotic experiences and early adolescent depression. Interventions aimed at helping children improve pragmatic language skills may reduce the incidence of adolescent psychopathology and associated psychological disorder and dysfunction later in life.

1. Introduction

Psychotic experiences (PEs) are attenuated psychotic phenomena, similar to those experienced by those with a clinical disorder, and occurring in healthy populations. They have a prevalence of between approximately 3 and 30% in community samples (van Os et al., 2009) and are part of the continuum of psychosis (Linscott and van Os, 2010; van Os et al., 2009). Although these experiences are transient and harmless for many, they are also important because they are persistent for some, predictive of later psychotic disorder and are associated with dysfunction (Zammit et al., 2013) and disorders such as depression (Dhossche et al., 2002; Kounali et al., 2014; Scott et al., 2009a; Sullivan et al., 2014; van Rossum et al., 2011).

There is a rich literature on the association between schizophrenia and language (Crow, 2000). Childhood speech and language difficulties e.g. with using language in a social context and speaking in a fluent and intelligible way are associated with adult psychosis (Bearden et al., 2000; Green, 1996; Jones et al., 1994; Welham et al., 2009). However, it is unclear from the current evidence whether antecedent speech and language problems are in expressive speech and language (i.e. the use of sounds, words and sentences at an age appropriate level) or pragmatic language (i.e. the use of language in socially appropriate ways).

Poor pragmatic language (PL) has been defined as "verbosity, excessive topic switching, tendency to dominate verbal interactions, poor adjustment to listener's prior knowledge and limited application of inference" (Adams et al., 2012). A child with poor pragmatic language ability would find it difficult to use language that is appropriate to the social context. Social cognitive ability is required for effective pragmatic language use since, in order to understand the social context of

* Corresponding author at: CLAHRC West, 9th Floor, Whitefriars, Lewins Mead, Bristol BS1 2NT, UK.
E-mail addresses: sarah.sullivan@bristol.ac.uk (S.A. Sullivan), linda.hollen@bristol.ac.uk (L. Hollen), yvonne.wren@speech-therapy.org.uk (Y. Wren), Andrew.D.Thompson@warwick.ac.uk (A.D. Thompson), glyn.lewis@ucl.ac.uk (G. Lewis), stan.zammit@bristol.ac.uk, ZammitS@cardiff.ac.uk (S. Zammit).

interactions, an understanding of the mental state of the conversational partner is required (Mazza et al., 2008). There is convincing evidence of associations between social cognitive deficits or bias and both psychosis (Clemmensen et al., 2014; Sprong et al., 2007) and PEs (Polanczyk et al., 2010) and, to a lesser extent, depression (Weightman et al., 2014), although the associations with depression are weaker. Pragmatic language problems have been described as a type of social communication disorder and the terms are often used interchangeably. Pragmatic language problems are also a feature of high-functioning autism, however difficulties with pragmatic language alone is not sufficient for a diagnosis of autism since there are other symptoms which are also characteristic of this condition, such as repetitive and stereotyped behaviour (Adams et al., 2012; Law et al., 2015).

Expressive speech and language (ESL) problems, e.g. speech sound substitutions, low intelligibility, reduced vocabulary, difficulty with producing complex sentences and using inappropriate tenses, may be due to verbal memory deficits which are common in psychosis (Keefe et al., 2006). Prospective evidence for the association between antecedent ESL problems and schizophrenia is inconsistent. One study (Bearden et al., 2000) of speech-pathologist assessed ESL at age 7 found strong evidence of an association with schizophrenia in adulthood. However, another study (Cannon et al., 2002) which assessed ESL and receptive language, using a trained psychometrist and a standardised protocol, reported that ESL problems at 3 and 5 years did not predict schizophreniform disorder in adulthood in a cohort of 976 participants. A further study (Reichenberg et al., 2002) of 16 and 17 year old Israelis eligible for military service (n = 635) collected assessments of fluency and speech quality rated by a trained assessor, also found that impaired ESL did not predict a diagnosis of schizophrenia.

There has been only one prospective study of antecedent language problems and PEs in community samples (Cannon et al., 2002) which did not find an association between ESL problems at 3 and 5 years and PEs at 11 years. The authors are not aware of any study to investigate antecedent PL problems and later PEs.

The strong overlap between PEs and depression (Dhossche et al., 2002; Kelleher et al., 2012) means that any association between poor childhood speech and language and adolescent PEs may not be specific but a result of co-morbidity with depression.

The majority of evidence to date suggests that poor childhood ESL is not associated with later schizophrenia. It is possible however that ESL problems are more likely to be associated with depression since there is cross-sectional evidence (Conti-Ramsden and Botting, 2008; Irwin et al., 2002; Maggio et al., 2014) and one prospective study (Bornstein et al., 2013) reporting associations, although others have not found an association (Cannon et al., 2002). There is convincing evidence (Drury et al., 1998; Green and Leitman, 2008) of poor social cognitive ability in schizophrenia suggesting that pragmatic language deficits which reflect difficulties in social cognitive ability may also precede PEs. The evidence of an association between social cognition and depression is much weaker and mostly for clinical depression rather than for subclinical depressive symptoms recorded in the general population cohort used for this study. Our primary hypothesis is that PL problems in childhood will be associated with PEs but not depression at 12 and 18 years and that ESL problems will be associated with depression but not PEs at 12 and 18 years. As a secondary analysis, within psychopathologies, we will investigate whether the associations are stronger at 18 years when compared with 12 years.

Prospective birth cohort data on ESL and PL and repeated measures of PEs and depression in adolescence provided the opportunity to investigate these associations. Unfortunately there were no data available on receptive language. Multivariate probit modelling is a technique that allows for simultaneous but separate modelling of more than one outcome in order to directly compare the strength of associations whilst allowing for covariance between outcomes. This method will allow examination of whether communication ability, as assessed by ESL and PL

are specific risk factors or whether they infer added risk of both PEs and depressive symptoms.

The authors are not aware of any previous studies using this method to investigate the prospective association between speech and language ability and PEs.

2. Methods

2.1. Avon Longitudinal Study of Parents and Children (ALSPAC)

The study sample consists of ALSPAC (http://www.bristol.ac.uk/alspac/) participants (Boyd et al., 2012; Fraser et al., 2013). The study website contains details of all the data that is available through a fully searchable data dictionary http://www.bris.ac.uk/alspac/researchers/data-access/data-dictionary//.

The sample is representative of those born at that time in the former county of Avon during this period (Golding et al., 2001).

2.2. Ethics

Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees.

2.3. Dataset

We used a subsample of (n = 7659) the ALSPAC cohort who had provided data on *either* PEs *and/or* depression at 12 or 18 years *and/or* childhood speech and language ability at age 9 *and* data on at least one of the confounding variables. Missing outcome and risk factor data was imputed (see Section 2.7).

2.4. Outcome measures

2.4.1. PEs at 12 and 18 years

The Psychosis-Like Symptom interview (PLIKSi) (Horwood et al., 2008a) is a semi-structured instrument that uses the principles of standardised clinical examination developed for the Schedule for Clinical Assessment in Psychiatry (SCAN) (Wing et al., 1990). It includes 12 'core' questions eliciting key PEs. At 18 years participants were asked about their experiences since their 12th birthday, whereas at 12 years participants were asked about experiences since their last birthday. If an experience was rated as suspected or definite the participant was asked whether the experiences reported were always attributable to the effects of sleep (hypnopompic or hypnogogic experiences), fever, or substance use (occurring only within 2 h of intoxication with drugs or alcohol). If this was the case the experience was rated as not present. For the purposes of this analysis a binary variable was used (no, versus suspected or definitely present). This was necessary due to the distribution of this variable and the fact that the majority of respondents did not report any experiences.

At the 18 year assessments the average kappa value for inter-rater reliability across the time-period of data collection was 0.83 which is considered high using standard benchmarks (Zammit et al., 2013). At the 12 year assessments the inter-rater reliability across all interviewers was 'very good' (Kappa = 0.72) according to standard benchmarks (Horwood et al., 2008a).

2.4.2. Depression at 12 and 18 years

Depression was measured using the Moods and Feelings Questionnaire (MFQ) (Angold et al., 1995a) at both ages. At 12 years the questionnaire was parent-rated and at 18 years it was self-rated. Since depression can be considered a continuum the depressive symptom scores were dichotomised to indicate the presence of depression (Kounali et al., 2014). A cut off at a score of 11 or above has been previously used (Joinson et al., 2013). Dichotomisation also allowed the joint modelling with PEs as a binary variable.