Modelling psychosocial influences on the distress and impairment caused by psychotic-like experiences in children and adolescents

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Abstract Psychological understanding of psychotic-like experiences (PLEs) occurring in childhood is limited, with no recognised conceptual framework to guide appropriate intervention. We examined the contribution to PLE severity of emotional, cognitive and socio-environmental mechanisms thought to influence the development and maintenance of psychosis. Forty 8–14 year olds referred to a community Child and Adolescent Mental Health Service completed a battery of questionnaires and assessments measuring severity of PLEs, emotional problems, cognitive biases, and negative life events. 85 % of children assessed reported having experienced a PLE over the previous year; and 55 % reported more than one. 60 % had experienced at least one in the previous fortnight. Multiple linear regression demonstrated that each of the variables made a significant and independent contribution to PLE severity, after adjusting for verbal ability and age, accounting together for more than half of the variance (reasoning $B = 6.324, p = .049$; emotion $B = 1.807, p = .005$; life events $B = 4.039, p = .001$). PLEs were common in this clinical sample of children. Psychological factors implicated in the development and maintenance of psychosis in adults were also associated with PLE severity in these children. PLE severity may be reduced by targeting each of these factors in cognitive therapy, at this very early stage. Any improvements in emotional wellbeing and functioning may then increase future resilience.

Keywords Subclinical psychotic symptoms · Aetiology · CBT · CAMHS · Developmental psychopathology

Introduction

Unusual, or psychotic-like, experiences (PLEs) in childhood have been described as a vulnerability factor, a risk factor, or even a marker, for psychosis. PLEs are associated with current and future clinical risk including increased self harm, violence and a range of mental health difficulties encompassing mood, anxiety, and behavioural disorders [e.g. 1, 2, 3]. However, prevalence estimates vary greatly from 73.7 to only 6 % [4, 5] and, while some have asserted that any PLE is a risk factor for the later development of psychosis or other mental health problems [6], others have argued that the very high numbers of young people in some studies reporting PLEs imply that additional factors must...
determine risk, such as persistence, associated distress and severity [7, 8].

Irrespective of their prognostic significance, there is current consensus that distressing PLEs should be a focus of psychological intervention in their own right [9]. The development of appropriate therapies is hampered, however, by a limited psychological understanding of PLEs and the lack of a recognised conceptual framework for their emergence, persistence and resolution. Psychological models of the development of psychosis, which include PLEs as a potential vulnerability factor, suggest that a complex interaction of emotional, cognitive, and socio-environmental processes influences the trajectory towards a psychotic illness [10, 11]. We propose that these models may provide a suitable starting point for an improved psychological understanding of PLEs. A psychological model of PLEs will in turn inform the development of interventions, and enable us to maximise their effectiveness, by ensuring that they target important mechanisms underlying PLE severity, persistence and distress. In this study, we examined the extent to which Garety et al.’s [10] model of the positive symptoms of psychosis could explain the presentation of PLEs in children.

The Garety et al. cognitive model of psychosis adopts a multifactorial diathesis-stress and continuum stance. In other words, it supposes that there are a number of potential vulnerability factors for the development of psychosis (e.g. unusual experiences, adverse life events and trauma, emotional disturbance and cognitive biases) that are present in the general population and are not in themselves pathognomonic, but which may combine to increase the likelihood of psychotic illness. In the context of stressful triggering events and emotional disturbance, and via the influence of cognitive biases, unhelpful external, personal and threatening appraisals of experiences are made, leading to the development of positive symptoms of psychosis. Symptoms are maintained by ongoing unusual experiences, emotional disturbance, negative life events and aversive environments and the continued influence of cognitive biases on appraisals.

It is clear from this model that PLEs do not in isolation perpetuate the maintenance or recurrence of psychotic symptoms, but, rather, that they are exacerbated by concurrent cognitive and emotional processes, in the context of socio-environmental vulnerability. It is plausible, therefore, that these same factors exacerbate PLEs in the absence of a psychosis diagnosis. Some support for this position may be drawn from existing literature: PLEs are associated with elevated emotional disturbance in adolescent samples [12–14] and emotional distress has been linked to persisting difficulties with PLEs [15–17]. Emotional triggers for voices, a negative emotional response to voices, and a passive coping style have been associated with perceived need for help [16]. Campbell and Morrison [18] have investigated relationships between bullying, PLEs and appraisals in adolescents and report that ‘predisposition to psychotic phenomena’ was associated both with the perception of being bullied and with post-trauma cognitions about the self and the world. Having a cognitive bias towards external appraisals of locus of control has also been associated with PLE persistence [19].

No study so far has examined these factors in combination, or considered their combined contribution to PLE severity. In this study, our hypothesis was that emotional disturbance, cognitive bias, and socio-environmental vulnerability indexed by negative life events would all be associated with PLE severity, with each factor making an independent contribution to the variance in PLE severity.

Method

Participants and recruitment

We selected a clinically referred group of children and young people, who were on the waiting list for community child and adolescent mental health services (CAMHS). This study was completed as part of a larger investigation of the effectiveness of a novel cognitive behavioural therapy package for young people with PLEs and emotional distress (CUES: Coping with Unusual Experiences Study). All children on the waiting list of a community Child and Adolescent Mental Health Service in south-east London aged between 8 and 14 years were invited to participate by letter sent to the main caregiver. Unless the caregiver refused, researchers followed up the letter with a telephone call to explain the study further, and, if interest was expressed, to arrange a first meeting to take caregiver consent and child assent. Of 122 families identified, 34 declined involvement, 45 were discharged by the clinical service or turned 15 and were, therefore, ineligible for participation in the study, and 43 consented to participate, with 40 completing the assessments and 3 withdrawing during data collection. The service provided interventions for children with emotional and behavioural problems who did not meet criteria for a diagnosable mental health problem. Referrals would be made to specialist mental health services if diagnosable mental health problems were identified, either when triaging prior to assignment to the service’s waiting list or at assessment by the CAMHS team. Consenting families completed a series of parent and child baseline and screening measures. Findings from the first cohort to complete screening measures (recruited during the first 12 months of the study, July 2011–July 2012) are reported here.
Measures

PLEs: the psychotic-like experiences questionnaire [20, 21]

Psychotic-like experiences were assessed using an adapted version of a self-report screen for identifying unusual experiences in a community sample of young people. The questionnaire comprises nine items, five of which were adapted by Laurens et al. [20] from the Diagnostic Interview Schedule for Children [22] and had previously been reported to be predictive of schizophreniform disorder [23]; and an additional four items assessing a broader range of hallucination-/delusion-like phenomena. The nine items load on a single latent construct in the general child population [21], and the items have been demonstrated to have good internal consistency and face, predictive and criterion validity in research studies [4, 20]. For this study, we expanded the original impact ratings for the overall scale to provide an index of PLE severity based on multi-dimensional ratings for each of the items. Thus, young people rated their lifetime experience of each PLE (conviction) on a scale from 0 (not true) to 2 (certainly true) as per Laurens et al. [20]; and, for each item, frequency, distress, and functional impairment experienced over the preceding two weeks were each scored on a four-point scale from 0 to 3. Higher scores reflected greater distress or impairment. All four subscores were summed across the nine items to create a composite measure of PLE severity in the 2 weeks prior to assessment with a range from 0 to 99.

The strengths and difficulties questionnaire (SDQ [24])

This self-report measure was developed for screening 3–16 year olds for behavioural and emotional difficulties. Four clinical sub-scales (emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems) were used here. Each sub-scale comprises five items assessing relevant symptoms. Each item is rated by participants on a three point scale (0–2) so that total scores for each subscale range from 0 to 10 [25]. The emotional symptoms subscale (SDQ-ES) was used to measure emotional disturbance. This scale assesses symptoms of depression and anxiety. The SDQ is widely used with young people and has good internal reliability, test–retest stability, and validity in children aged 8–16 years [24, 26, 27].

Cognitive bias: the probabilistic reasoning 'beads' task [28]

Cognitive bias, specifically, the jumping to conclusions data-gathering bias (JTC), was assessed employing two online versions of the beads task, with beads in an 85:15 (orange:black) and 60:40 (purple:green) ratio, and with drawn beads displayed on-screen as a memory aid. Instructions were slightly reworded to suit the age range of participants, and are available from the authors upon request. The change of wording was checked with and approved by the task’s authors to ensure the spirit of the instructions was retained. The task requires participants to decide from which of two jars a predetermined series of beads has been drawn. The JTC bias is classified as deciding after two or fewer beads [28, 29] on either version of the task and is a dichotomous variable. The task has been reliably employed with adults and young people from age 14, though there is currently no published use of it in children younger than this.

Negative life events: the life events questionnaire (LEI, [30])

This questionnaire assesses the occurrence over the last year of ten specific negative life events including bereavements, accidents and environmental hazards, and social changes. A final item asks about any other adverse life experience occurring during the last year. Each endorsed item is rated for emotional impact [rated 1 (very good/pleasant/happy) through 3 (neither good nor bad) to 5 (very bad/ unpleasant/sad/painful)] and duration of impact (rated dichotomously according to whether or not the upset persisted for more than 2 weeks). Events that had a moderately or severely undesirable impact, and that had lasted for 2 weeks or more, were summed to provide a total negative life events score (range 0–11).

Procedure

The measures listed above were completed with a researcher, with the order of administration of questionnaires varied to maximise each young person’s engagement. Young people’s responses were collected on a handheld tablet computer using online survey software (SelectSurvey.NET 2.8.5).

Ethical and local approvals for the research were granted by the National Research Ethics Service (London-Hampstead Research Ethics Committee Ref 11/LO/0023) and the South London and Maudsley NHS Foundation Trust, respectively.

Analysis

Associations of PLEs with demographic variables were ascertained using correlational analyses. The main analysis was a multiple linear regression, with PLE severity as the dependent variable and the hypothesised psychological mechanisms (emotional disturbance; cognitive bias;
negative life events) as independent variables. A hierarchical method was used to assess the predictive value of each variable when controlling for other associations. Demographic variables adjusted for were age in months and receptive verbal ability measured via the British Picture Vocabulary Scale [31]. Given the range in age of participants within the sample, the standardised score from the BPVS was used to assess verbal ability independently of age. The assumptions of multiple regression analysis were met. No multi-collinearity was identified (all Variance inflation factors \( < 1.33 \), all tolerance \( > 0.75 \), and all predictor inter-correlations \( r < 0.35 \)), indicating that the factors were relatively independent. Examination of the residuals revealed a normal distribution without any extreme cases. Finally, inspection of a scatter plot of residuals indicated that the assumptions of linearity and homoscedasticity were met.

### Results

#### Participants

Forty young people and their parents consented to participate and completed screening measures. Demographic and clinical information, with norms for reference, are presented in Tables 1, 2.

#### Psychotic-like experiences

All but six participants \((n = 34, 85\%)\) reported a PLE (conviction), with two-thirds having experienced two or more different PLEs. 30\% of the sample endorsed only one ‘certain’ or ‘probable PLE, 7.5\% endorsed two, and 47.5\% endorsed three or more PLEs. Overall endorsement rates and rates for each PLE are shown in Table 3.

60\% of the sample confirmed that these PLEs had occurred at least once over the last fortnight (frequency). In contrast, parents reported only 35\% of children \((n = 14)\) having had any PLE, and only 15\% \((n = 6)\) in the fortnight prior to assessment.

The composite PLE severity measure (mean 11.10, S.D. 12.44) was not associated with age, gender, ethnicity, or IQ (see Table 1), and so these variables were not controlled in subsequent analyses.

#### Predictors of PLEs

Each of the three psychological factors (emotional disturbance, cognitive bias, and negative life events) was significantly correlated with PLE severity (see Table 1). Table 4 illustrates the results of the regression analysis.
The linear regression was significant \((r = 0.740, p < 0.001)\). Age and verbal ability did not contribute significantly to PLE severity. All three predictor variables, SDQ-ES, LEI and JTC bias, were significant predictors of PLE severity, accounting for around 55 \% of the variance in PLE severity \((R^2 = 0.547, p < 0.001)\), after controlling for age and verbal ability.

**Discussion**

This study tested a psychological model for PLEs, adapted from models describing the development and maintenance of psychosis \([10, 11]\), that might inform the development of targeted interventions to reduce current distress and improve functioning, and potentially increase resilience to future problems. This study presents the first examination of PLEs and psychological processes in a group of clinically referred children aged 8–14. The results indicate that PLE severity is associated with the key psychological processes in Garety et al.’s model: emotional disturbance, cognitive biases and negative life events. Each of these factors made an independent contribution to the variance in severity of PLEs, and together accounted for just over half of the variance in PLE severity. The findings indicate that psychological models of psychosis in adults can be adapted to understand PLE severity in children.

The prevalence of PLEs in this clinical sample is somewhat lower than that self-reported in community samples from the same geographical area \([20, 21, 32]\), although comparable with other community samples \([4]\). Reasons for this are not clear; it is possible that our clinically referred group are more guarded about disclosing PLEs because they are in receipt of a service which has not always been solicited, either by the family or the young person themselves, and they may have concerns about the stigma associated with mental illness and others perceptions of them. There are also methodological differences between this study and earlier reports of prevalence \([20, 21, 32]\). In this study, children completed the PLE questionnaire individually with a researcher, compared with other research in which a researcher read the questionnaire to a class of children who completed it independently. It may be that completing it individually, as in our research, eliminated some false positives in reporting. Alternatively, it may be that the comparative anonymity of the class-based completion allowed children to disclose more than they felt able to when completing it alone with a researcher.

Our findings extend the literature on the prevalence and the psychosocial correlates of PLEs by demonstrating that associations previously reported in the general population are replicated in a clinically referred group of young people. Reassuringly, and in common with the literature on the

### Table 3 Percentage of sample reporting conviction in each psychotic-like Experience

<table>
<thead>
<tr>
<th>Psychotic-like experience</th>
<th>PLE conviction</th>
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<tbody>
<tr>
<td></td>
<td>% Not true % Somewhat true % Certainly true</td>
</tr>
<tr>
<td>Some people believe that their thoughts can be read. Have other people ever read your thoughts?</td>
<td>67.5 27.5 5.0</td>
</tr>
<tr>
<td>Have you ever believed that you were being sent special messages through the television?</td>
<td>82.5 12.5 5.0</td>
</tr>
<tr>
<td>Have you ever thought that you were being followed or spied on?</td>
<td>55.0 25.0 20.0</td>
</tr>
<tr>
<td>Have you ever heard voices that other people could not hear?</td>
<td>65.0 20.0 15.0</td>
</tr>
<tr>
<td>Have you ever felt that you were under the control of some special power?</td>
<td>75.0 15.0 10.0</td>
</tr>
<tr>
<td>Have you ever known what another person was thinking even though that person wasn’t speaking?</td>
<td>67.5 20.0 10.0</td>
</tr>
<tr>
<td>Have you ever felt as though your body has been changed in some way that you could not understand?</td>
<td>82.5 10.0 7.5</td>
</tr>
<tr>
<td>Do you have any special powers that other people don’t have?</td>
<td>72.5 10.0 15.0</td>
</tr>
<tr>
<td>Have you ever seen something or someone that other people could not see?</td>
<td>57.5 25.0 17.5</td>
</tr>
<tr>
<td>Total endorsing at least one PLE</td>
<td>15.0 50.0 35.0</td>
</tr>
<tr>
<td>Total endorsing at least one PLE (in past two weeks)</td>
<td>40.0 32.5 27.5</td>
</tr>
</tbody>
</table>

### Table 4 Regression analysis of factors predictive of frequency, distress and impairment PLEs

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>(\beta)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.532</td>
<td>15.743</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.013</td>
<td>0.068</td>
<td>0.024</td>
<td>0.855</td>
</tr>
<tr>
<td>British Picture Vocabulary Scale</td>
<td>−0.087</td>
<td>0.101</td>
<td>−0.115</td>
<td>0.393</td>
</tr>
<tr>
<td>SDQ Emotional Symptoms scale*</td>
<td>1.807</td>
<td>0.600</td>
<td>0.396</td>
<td>0.005</td>
</tr>
<tr>
<td>Life events interview*</td>
<td>4.039</td>
<td>1.110</td>
<td>0.453</td>
<td>0.001</td>
</tr>
<tr>
<td>Jumping to conclusions cognitive bias*</td>
<td>6.325</td>
<td>3.103</td>
<td>0.256</td>
<td>0.049</td>
</tr>
</tbody>
</table>

*SDQ Strengths and difficulties questionnaire

\(*\) Effect sizes and \(p\) values after adjusting for age and verbal ability
nitive bias is consistent with adult psychosis samples [29].

Levels of emotional symptoms were higher than in community samples, and our finding that emotional factors are associated with PLE severity extends previous research in community and birth cohort studies [12–14] into a younger, and clinically referred cohort. The data presented here are consistent with a number of plausible relationships between PLEs and emotional distress, and the cross-sectional nature of the data does not allow us to distinguish between them. Psychotic-like experiences may be a marker of general distress, such that higher levels of emotional distress and more severe PLEs both reflect a variety of underlying difficulties. This is consistent with prior literature indicating that the PLEs are associated with other clinically concerning presentations including self harm [2] and multiple co-morbidities [33]. Alternatively, having an experience of persistent and distressing PLEs may lead to higher levels of emotional distress. Finally, higher levels of emotional distress may causally predict the level of PLE-related distress and impairment.

The frequency of negative life events was also high, and higher than in the depressed group of young people in Wilkinson and colleague’s study [30]. This may reflect not only the clinical nature of the group, relative to Wilkinson et al.’s general population sample, but also the high baseline for socio-environmental adversity in the deprived inner London borough from which participants were sampled. Again, our finding of an association between PLEs and life events is consistent with past research [34, 35] and extends this to a clinically referred sample. We also build on previous findings of an association by utilising a contemporaneous self-report measure of PLEs, rather than relying on retrospective parental report. The relationship between PLEs and negative life events suggests that these may play a similar role in childhood to that of trauma and trauma sequelae in psychosis in adults [36, 37].

We also found the first evidence of the involvement of the JTC bias in PLEs in childhood, suggesting that cognitive information processing biases may influence appraisals of the meaning of PLEs and the distress caused by them. The proportion of children in this sample responding with this cognitive bias is consistent with adult psychosis samples [29].

Clinical implications

The results suggest that PLE-related distress and impairment is influenced by each of the hypothesised psychosocial vulnerability factors. Together, the identified factors provide a coherent psychological framework to guide understanding of PLEs, and how, despite being highly prevalent in childhood, they may lead to continuing distress, impairment and a need for intervention in a subset of young people. Moreover, the predictive power of emotional disturbance, cognitive biases and negative life events indicates potential targets for treatment providing a rationale for the use of cognitive behavioural therapy approaches to help young people with distressing or impairing PLEs.

While PLEs may constitute a suitable target for very early preventive intervention, the evidence base does not justify offering medication at such an early stage to prevent future ill health. In contrast, the offer of psychological intervention to reduce current distress, and to improve coping and functioning is accepted as routine in community child health services, and may increase resilience to the future development of an at-risk mental state, and its associated impairments [1]. An early case series by our group in non-help-seeking children from the general population with PLEs and distress has supported this: medium within-subject effect sizes were obtained for reductions in emotional distress and PLEs following completion of an innovative adapted CBT package, which focussed on managing distressing appraisals and difficult life events or interpersonal relationships. Moreover, feedback from both young people and their families was positive, indicating that they found it acceptable both to be offered and to receive it [38].

Limitations

The study has a number of limitations. Firstly, the sample was recruited from a relatively deprived area of south London, and thus, prevalence estimates may not be representative of the country as a whole, given the relationships reported in adult samples between social fragmentation and economic deprivation and PLEs [39, 40]. Secondly, the research was cross-sectional, and it is, therefore, not possible to make any causal inference about the relationships between the factors reported here. Thirdly, the beads task has not previously been used with children as young as those included in this research, and whilst it has been demonstrated that even very young children have some understanding of probability under appropriate task requirements [41, 42], this task does require further validation with pre-adolescents. Finally, the sample size is small, and while adequately powered for this analysis, it requires replication and further evaluation of generalisability.

Conclusions

The severity of PLEs in children was associated with cognitive and emotional processes and by negative life events in this clinical group. Each of these components can be targeted in cognitive behavioural therapy to reduce contemporaneous distress and impairment, and early indications are that such therapy is feasible, acceptable and helpful. Further research should include a longitudinal
study of the predictive power of these processes, and of the role of appraisal in PLE persistence and the development of later difficulties.

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Conflict of interests On behalf of all authors, the corresponding author states that there is no conflict of interest.

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