European Child & Adolescent Psychiatry
https://doi.org/10.1007/s00787-018-1257-2

ORIGINAL CONTRIBUTION

Psychotic symptoms in adolescents with borderline personality disorder features

Katherine N. Thompson[1,2] · **Marialuisa Cavelti**[1,2,4] · **Andrew M. Chanen**[1,2,3]

Received: 23 April 2018 / Accepted: 14 November 2018

Abstract

Psychotic symptoms have been found to be relatively common among adults with borderline personality disorder (BPD), and to be a marker of BPD severity, but are not recognised in daily clinical practice in these patients. This study is the first to examine the prevalence of psychotic symptoms in 15–18-year olds with BPD features. It was hypothesised that adolescents with full-threshold BPD would have significantly more psychotic symptoms than adolescents with sub-threshold BPD features, and that both these groups would have significantly more psychotic symptoms than adolescents with no BPD features. A total of 171 psychiatric outpatients, aged 15–18 years, were assessed using a structured interview for DSM-IV personality disorder and categorised into three groups: no BPD features ($n=48$), sub-threshold BPD features ($n=80$), and full-threshold BPD ($n=43$). The groups were compared on measures of psychopathology and functioning (e.g. Youth Self Report, Symptom Check List-90-R, SOFAS). Adolescents with full-threshold BPD reported more psychotic symptoms than the sub-threshold BPD group ($p<.001$), and both these groups reported more psychotic symptoms than those with no BPD features ($p<.001$). Adolescents with full-threshold BPD reported more confusion ($p<.01$), paranoia ($p<.001$), visual hallucinations ($p<.001$) and strange thoughts ($p<.01$), than the other two groups. Psychotic symptoms predicted group membership, determined by BPD severity, after adjusting for other psychopathology and functional impairment ($p<.01$). Assessment of unusual perceptual experiences, paranoia or odd thoughts is highly clinically relevant in adolescents with BPD features, as these symptoms are associated with a more severe clinical presentation of BPD.

Keywords Adolescence · Borderline personality disorder · Psychosis · Hallucinations · Paranoia

Introduction

Psychotic symptoms are commonly reported among adult individuals with borderline personality disorder (BPD) [1, 2]. Historically, their clinical significance has often been dismissed, in part because they were believed to be of short duration, *transient* in nature, and to not significantly affect patients' lives [2]. Consequently, there is little information about the frequency and character of psychotic symptoms, and their functional consequences, during the clinical onset of BPD. This is especially important for early detection and treatment because the transition from childhood to adulthood is the peak period for the onset of BPD and the major psychotic disorders and it is also the period during which BPD features are at their most severe [3–5].

Recent studies of adults with BPD have used standardised instruments assessing for psychotic symptoms. Auditory verbal hallucinations (AVHs) were found to occur in 22–50% of patients with BPD and to be phenomenologically

✉ Andrew M. Chanen
andrew.chanen@orygen.org.au

Katherine N. Thompson
katherine.thompson@orygen.org.au

Marialuisa Cavelti
marialuisa.cavelti@orygen.org.au

1 Orygen, The National Centre of Excellence in Youth Mental Health, Locked Bag 10, Parkville, VIC 3052, Australia

2 Centre for Youth Mental Health, University of Melbourne, Melbourne, Australia

3 Orygen Youth Health, Melbourne, Australia

4 Translational Research Centre, University Hospital of Psychiatry and Psychotherapy, University of Bern, Bern, Switzerland

Published online: 03 December 2018

indistinguishable from, and significantly more distressing and negative in content than, AVHs among individuals with schizophrenia [2, 6–9]. When present in BPD, AVHs were also found to be associated with greater suicidal ideation and more suicide attempts and hospitalisations [10]. Retrospective assessment indicates that the mean age of onset AVHs in BPD is 16 years and that they are commonly enduring, and not transient in nature [2, 6, 11].

Delusions and unusual thought content have also been found to be correlated with AVHs among adults with BPD [12]. One study found that sub-threshold and full-threshold psychotic symptoms were most prevalent earlier in the course of BPD, when BPD features were at their most severe and which diminished over 16-year follow-up [13].

Among samples of adolescents in the community and in psychiatric outpatient and inpatient settings, psychotic symptoms (attenuated or full-threshold) have been reported to be common across multiple diagnoses and to be an important marker of severity of psychopathology, poor functioning, greater number of co-occurring disorders, and suicidality [14–17]. Among youth meeting 'ultra-high-risk' criteria for transition to psychosis, the presence of co-occurring BPD was not associated with any change in the rate of transition to psychosis, thereby suggesting that these diagnoses might co-occur and progress independently [18]. However, comparatively, little is known about the precise rates of psychotic symptoms in adolescents with BPD. This is in part due to the dismissal of these symptoms as being *pseudo* or *quasi* in nature, as they have not been recognised as *true* psychotic symptoms [13].

This study is the first to examine psychotic symptoms among three groups of 15–18-year olds: those with no BPD features, those with sub-threshold BPD features, and those with full-syndrome BPD. It was hypothesised that: (1) the sub-threshold BPD and full-threshold BPD groups would have significantly more psychotic symptoms than the no BPD group; (2) the full-threshold BPD group would have significantly more psychotic symptoms than the sub-threshold BPD group; (3) psychotic symptoms would be a significant predictor of group membership (i.e. no BPD, sub-threshold BPD, full-threshold BPD) after adjusting for other psychopathology and functional impairment.

Method

Participants

The sample is described in detail elsewhere [19]. Briefly, participants were outpatients recruited from Orygen Youth Health, the State Government-funded specialist mental health service for western metropolitan Melbourne, Australia between March 1998 and July 1999 ($n = 101$), and between November 2000 and September 2002 ($n = 76$). Participants were aged between 15 and 18 years at baseline assessment. They were excluded if they met DSM-IV criteria for mental retardation, psychotic disorder other than psychosis NOS. A further six participants were excluded because they had missing values for the Youth Self Report/Young Adult Self Report, reducing the sample to $N = 171$. Participants were categorised into three groups, based on the number of DSM-IV BPD criteria: 48 with no BPD (0 criteria), 80 with sub-threshold BPD (1–4 criteria), and 43 with full-threshold BPD (≥ 5 criteria).

Procedure

This study was approved by the North-Western Mental Health Behavioural and Psychiatric Research and Ethics Committee (E/98/003), and Melbourne Health (HREC1999.008). Participants, and their parent/guardian (if under 18 years) provided written informed consent. Eligible participants underwent a comprehensive psychopathology interview that included the collection of demographic data, administration of the Structured Clinical Interview for DSM-IV (SCID) Axis I and Axis II disorders, the Social and Occupational Functioning Assessment Scale (SOFAS), the Symptom Checklist-90-Revised (SCL-90-R), and depending on the participant's age, either the Youth Self Report questionnaire (YSR; < 18 years), or the Young Adult Self Report Questionnaire (YASR; ≥ 18 years).

The DSM-IV SCID II is a reliable and valid measure of BPD in adolescents and young people [20, 21]. A personality disorder feature was scored positive if it had been present for 2 years and did not occur exclusively during a DSM-IV Axis I disorder. This is 1 year longer than what is normally required for adolescents in the DSM-IV. Criterion A of antisocial personality disorder (age ≥ 18 years) was ignored in making a diagnosis. Personality disorder not otherwise specified was defined as nine positive personality disorder features across any personality disorder domain, or if a participant lacked only one feature to meet a specific personality disorder diagnosis but had two additional features from any other personality disorder domain. These criteria are more stringent than what is specified in the DSM-IV.

At 2 years, participants were followed up using the SCID I and SCID II to reassess for a diagnosis for psychotic disorder and for the number of BPD criteria, to explore the transition rates to psychosis over time.

Measures

Residential postcode was used to determine socioeconomic status according to a social disadvantage scale ranking every postcode in the state of Victoria, Australia. The tertiles of

the ranks (i.e. low, middle, and high socioeconomic status) were used for analyses.

The DSM-IV SCID I and SCID II were administered to determine diagnosis. General psychosocial functioning was assessed using the SOFAS [22]. The YSR [23] is a self-report questionnaire that measures a wide range of child and adolescent psychopathology, including psychotic symptoms, among 11–18-year olds. It includes 112 items addressing emotional and behavioural problems in the past 6 months, rated on a 3-point Likert scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). The YASR [24] was constructed to assess psychopathology for young adults between 18 and 28 years, and has comparable items to the YSR. In accordance with recent studies [25–27], the *thought problems* subscale of the YSR/YASR was used to measure psychotic symptoms. This subscale reflects the mean score of the following nine items: 'I can't get my mind off certain thoughts' (item 9), 'I deliberately try to hurt or kill myself' (item 18), 'I hear sounds or voices that other people think aren't there' (item 40), 'Parts of my body twitch or make nervous movements' (item 46), 'I repeat certain acts over and over' (item 66), 'I see things that other people think aren't there' (item 70), 'I do things other people think are strange' (item 84), 'I have thoughts that other people would think are strange' (item 85), and 'I have trouble sleeping' (item 100).

In addition, single items were selected for analysis that had face validity for psychosis [27, 28] (5, 21), like 'I feel confused or in a fog' (item 13), 'I feel that others are out to get me' (item 34), 'I hear sounds or voices that other people think aren't there' (item 40), 'I see things that other people think aren't there' (item 70), 'I do things other people think are strange' (item 84), 'I have thoughts that other people would think are strange' (item 85), and 'I am suspicious' (item 89).

The SCL-90-R [29] is a self-report questionnaire, which assesses for severity of psychopathology during the previous 7 days in individuals aged at least 13 years. It contains 90 items, which are rated on a 5-point Likert scale (0 = not at all to 4 = extremely). In this study, the paranoid ideation and psychoticism subscales were used as measures of psychotic symptoms, and the Global Severity Index (GSI) was used as a measure of overall psychopathology.

Data analysis

Based on $N = 171$, all variables showed less than 5% missing values. Missing values in the SOFAS, the SCL-90-R GSI, the SCL-90-R paranoid ideation and the SCL-90-R psychoticism were replaced using the expectation–maximisation method. The YSR/YASR *thought problems* subscale and items, as well as the SCL-90-R paranoid ideation and psychoticism subscales, were tested for univariate outliers. Outliers defined as a z score of ≥ 3.29 were identified and excluded for the YSR/YASR *thought problems* subscale (one outlier), item 40 (one outlier), and item 70 (six outliers), as well as for the SCL-90-R psychoticism (three outliers).

Group comparisons were conducted for descriptive demographic and clinical variables. The Pearson's χ^2 test was applied for categorical variables and the Kruskal–Wallis H test for continuous variables. A non-parametric test was chosen for continuous variables, because they were not normally distributed, as indicated by a significant Shapiro–Wilk test. Group analyses of single YSR/YASR items were collapsed from, 0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true, into 0 = not true and 1 = true. Group differences in response proportions (not true/true) were tested using Pearson's χ^2 test. Post hoc cell-wise comparisons were performed, using adjusted residuals to calculate exact p values and a Bonferroni-adjusted alpha level of .0083 to control for inflated Type-I error.

A sequential multinomial logistic regression was performed to predict group membership (no BPD, subthreshold BPD, full-threshold BPD), first on the basis of overall psychopathology (SCL-90-R GSI) and functional impairments (SOFAS), and then after the addition of psychotic symptoms (YSR/YASR *thought problems*). No multicollinearity was evident, as determined by tolerance values above the usual cut-off of .20. Using the Box–Tidwell approach, a violation of the assumption of linearity of the logit was detected for the YSR/YASR *thought problems*. Thus, the square root transformed variable was used for the regression analyses.

Results

The three groups did not differ in sex, age, or socioeconomic status (see Table 1). In contrast, a significant group effect was found for occupation, the number of current DSM-IV Axis I diagnoses, the number of current DSM-IV Axis II diagnoses, the number of BPD criteria, the SCL-90-R GSI, and the SOFAS score. Post hoc pairwise comparisons revealed that the full-threshold BPD group was less likely to be studying or working than the sub-threshold BPD group or the group with no BPD criteria ($p = .004$); whereas, no significant difference was found between the sub-threshold BPD group and the group with no BPD criteria. The two BPD groups presented with significantly more current Axis I diagnoses ($p \leq .05$) and current Axis II diagnoses ($p < .05$), and significantly higher levels of overall psychopathology ($p < .05$), than the group with no BPD criteria. The full-threshold BPD group had significantly more current Axis I diagnoses and current Axis II diagnoses, as well as significantly higher levels of overall psychopathology ($p < .01$) than the sub-threshold BPD group ($p < .001$). The sub-threshold and full-threshold BPD groups showed

Table 1 Sample characteristics for participants with no BPD ($n=48$), sub-threshold BPD ($n=80$) and full-threshold BPD ($n=43$)

	No BPD (Mdn, *n*/%)	Sub-threshold BPD (Mdn, *n*/%)	Full-threshold BPD (Mdn, *n*/%)	χ^2	*Df*	*P*
Gender, % female	29 (60.4)	54 (67.5)	33 (76.7)	2.78	2	.249
Age	16.0	16.0	16.0	4.26	2	.119
Occupation % Yes (employment, studies)	46 (95.8)	73 (91.3)	31 (73.8)	11.79	2	.003**
Socioeconomic status						
Low	25 (52.1)	51 (63.7)	23 (53.5)	8.18	4	.085
Middle	18 (37.5)	13 (16.3)	12 (27.9)			
High	5 (10.4)	16 (20.0)	8 (18.6)			
Number DSM-IV Axis I diagnoses	1	2	3	45.91	2	< .001***
Number DSM-IV Axis II diagnoses	0	1	2	63.99	2	< .001***
Number BPD criteria	0	3	6	150.94	2	< .001***
SOFAS	73.5	65	60	220.87	2	< .001***
SCL-90-R GSI	.56	.85	1.39	27.09	2	< .001***
SCL-90-R paranoid ideation	3	4	8	18.71	2	< .001***
SCL-90-R psychoticism	3	4.5	9	24.20	2	< .001***
YSR/YASR thought problems	.22	.56	.78	43.15	2	< .001***

Mdn Median, *SCL-90-R GSI* Symptom Checklist-90 General Severity Index, *SOFAS* Social and Occupational Functioning Assessment Scale
*$p=.05$,**$p=.01$, ***$p<.000$

significantly lower SOFAS scores than the group with no BPD criteria ($p \leq .005$). No significant differences in SOFAS score were found between the sub-threshold BPD group and the full-threshold BPD group ($p=.145$).

Group differences in psychotic symptoms

There was a significant group effect for the YSR/YASR *thought problems* subscale as a general index for psychotic symptoms, as well as for the SCL-90-R Paranoid Ideation and Psychoticism subscales (see Table 1). Post hoc pairwise comparisons revealed that the two BPD groups reported significantly more psychotic symptoms than the group with no BPD criteria ($p \leq .001$). The full-threshold BPD group reported more psychotic symptoms than the subthreshold BPD group ($p<.001$). In addition, the full-threshold BPD group experienced significantly more paranoid ideation and psychoticism than both the sub-threshold BPD group ($p=.001$) and the no BPD group ($p<.001$). No significant group differences in paranoid ideation and psychoticism were found between the sub-threshold BPD group and the no BPD group ($p=.822$ and $p=.218$, respectively). The full-threshold BPD group presented with higher psychoticism scores than the no BPD group ($p=.001$). No significant group differences were found for psychoticism when comparing the sub-threshold BPD group with the no BPD group ($p=.131$), or the full-threshold BPD group with the sub-threshold BPD group ($p=.143$).

When the single YSR/YASR psychosis items were analysed, there was a significant group effect for items 13, 34, 40, 70, 84, 85, and 89 (Table 2). Post hoc cell-wise comparisons revealed that the full-threshold BPD group responded significantly more frequently with *true* to feeling confused (item 13, $p=.003$), feeling others are out to get them (item 34, $p<.001$), having visual hallucinations (item 70, $p=.001$), and strange thoughts (item 85, $p=.003$), than the two other groups. In addition, the groups with sub-threshold or full-threshold BPD endorsed the auditory hallucination item significantly more frequently (item 40, $p=.004$), than the group with no BPD criteria. No significant post hoc cell-wise differences were found regarding strange behaviour (item 84) and suspiciousness (item 89, $p>.0083$).

The regression analysis based on overall psychopathology and functional impairments only showed an adequate model fit, $\chi^2(330)=322.75$, $p=.602$, using the Pearson criterion. After the addition of psychotic symptoms, the model fit was $\chi^2(334)=322.28$, $p=.516$, Nagelkerke $R^2=.36$. Comparison of log-likelihood ratios for the models, with and without psychotic symptoms, showed statistically significant improvement with the addition of psychotic symptoms, $\chi^2(2)=35.00$, $p<.05$. Correct classification rates were 54.2% for the no BPD group, 66.3% for the sub-threshold BPD group, and 37.2% for full-threshold BPD; the overall correct classification rate was 55.6%. Table 3 shows that the full-threshold BPD group was significantly more likely to have higher levels of functional impairment, overall psychopathology, and psychotic symptoms than the no BPD group, and was significantly more likely to have higher levels of psychotic symptoms than the sub-threshold BPD group.

Table 2 Proportion of participants who responded positively to psychotic symptoms on the YSR/YASR

YSR/YASR items	Item number	No BPD (*N*, % yrs)	Sub-threshold BPD (*N*, % yrs)	Full-threshold BPD (*N*, % yrs)	χ^2	*p*
I feel confused or in a fog	13	28 (58.3)	57 (71.3)	40 (93.0)	14.14	.001***
I feel that others are out to get me	34	14 (29.29)	33 (41.3)	31 (72.1)	18.00	< .001***
I hear sounds or voices that other people think are not there	40	2 (4.3)	18 (22.5)	16 (37.2)	14.77	.001***
I see things that other people think are not there	70	1 (2.2)	2 (2.7)	8 (18.6)	13.06	.001***
I do things other people think are strange	84	10 (20.8)	24 (30.0)	22 (51.2)	9.99	.007**
I have thoughts that other people would think are strange	85	10 (21.7)	26 (32.9)	24 (58.5)	13.40	.001***
I am suspicious	89	22 (45.8)	55 (68.8)	28 (65.1)	6.98	.03*

YSR Youth self-report, *YASR* young adult self-report

*$p = .05$,**$p = .01$, ***$p < .000$

Table 3 Multinomial logistic regression analysis of group membership as a function of functional impairments, overall psychopathology, and psychotic symptoms

	B	SE	Wald	*Df*	Sig.	Exp (B)	95% CI
No BPD							
Intercept	− .97	1.60	.37	1	.546		
SOFAS	.08	.02	13.08	1	.000***	1.08	1.04–1.13
SCL-90-R GSI	− 1.03	.49	4.49	1	.034*	.36	.14–.93
YSR/YASR *thought problems*	− 4.14	1.08	14.78	1	.000***	.02	.01–.13
Sub-threshold BPD							
Intercept	1.18	1.33	.79	1	.375		
SOFAS	.03	.02	3.38	1	.066	1.03	1.0–1.07
SCL-90-R GSI	− .48	.33	2.06	1	.151	.62	.32–1.19
YSR/YASR *thought problems*	− 2.42	.89	7.46	1	.006**	.09	.02–.51

The reference category is full-threshold BPD

SOFAS Social and Occupational Functioning Assessment Scale, *SCL-90-R GSI* Symptom Checklist-90 General Severity Index, *YSR* youth self-report, *YASR* young adult self-report

*$p = .05$,**$p = .01$, ***$p < .000$

2-year follow-up

At baseline, one participant met criteria for both full-threshold BPD and psychotic disorder not otherwise specified (NOS). At 2-year follow-up, this participant still met criteria for psychotic disorder NOS, but had only sub-threshold BPD. A total of 7/171 (4.1%) made the transition to a diagnosis of psychotic disorder NOS at 2 years. Two of these had full-threshold BPD at baseline, one of whom still met BPD criteria at 2 years, with the other becoming sub-threshold over time. Three of these participants had sub-threshold BPD at baseline, two of these continued to have sub-threshold BPD at 2 years, and the other developed full-threshold BPD.

Discussion

This study is the first to examine psychotic symptoms among adolescents with sub- or full-threshold BPD, providing important information about the early stages of BPD, proximal to its clinical onset. The study hypotheses were supported by the major findings: (1) a high proportion of 15–18-year olds with BPD either sub- or full-threshold BPD experienced psychotic symptoms; (2) that psychotic symptoms predicted group membership, defined by BPD severity; (3) that greater BPD severity (i.e. number of BPD criteria) was associated with more severe psychotic symptoms. These results validate the experience of adolescents with BPD who experience psychotic

symptoms, and highlight the need for these symptoms to be clinically recognised and treated.

As hypothesised, the full-threshold BPD group had higher scores on the thought problems subscale, compared with the sub-threshold BPD group, and both these groups had higher thought problems scores than the no BPD group. The full-threshold BPD group also reported higher scores on the paranoid ideation and psychoticism subscales, along with more confusion, paranoia, visual hallucinations and strange thoughts, than either the sub-threshold or no BPD groups. Both BPD groups had significantly more auditory hallucinations than the no BPD group.

These findings are consistent with growing evidence that many adult patients with BPD report psychotic symptoms, even though these symptoms are not core diagnostic features of this disorder. In the current study, the reported rate of auditory hallucinations among adolescents with full-threshold BPD was 37.2%, and 18.6% of these young people reported visual hallucinations. This rate is comparable with the rates reported among adults with BPD for auditory (22–50%) and visual (30%) hallucinations [8, 9]. Similarly, 72.1% of young people with full-threshold BPD reported paranoid ideation and 65.1% reported suspiciousness, which is comparable with rates reported among adults with BPD of 29–87% [8, 13] and 71% [13], respectively. There was also a high rate of general thought problems, including confusion (93%) and strange thoughts (58.5%) among those with full-threshold BPD, which is consistent with the rates reported among adults with BPD for odd thinking (86%) [13]. These findings demonstrate that psychotic symptoms are common among young people with BPD, early in the course of the disorder.

The current findings highlight and extend previous findings that young people with sub-threshold BPD features have more severe mental illness and poorer social and occupational functioning than individuals with no BPD features [30] by also demonstrating the higher likelihood of psychotic symptoms among young people with sub-threshold BPD features. Psychotic symptoms predicted group membership, defined by BPD severity (i.e. number of BPD criteria), after adjusting for overall psychopathology and functional impairment and greater severity of BPD was associated with greater overall psychopathology, including greater number of DSM-IV Axis I and Axis II disorders and poorer psychosocial functioning. These findings are consistent with those from population studies indicating that psychotic symptoms are important risk markers for a wide range of non-psychotic psychopathological disorders, in particular for severe psychopathology characterised by multiple co-occurring diagnoses [15], and that young people with psychotic experiences are known to have worse global functioning than those without, even when compared with young people with psychopathology who do not report psychotic experiences [31]. Importantly, persistent psychotic experiences have been associated with increased risk of non-suicidal self-injury and suicide attempts among school-based adolescents [32], poor functioning and coping in adolescents with mental illness [33]. More specifically, AVHs have been associated with greater suicidal ideation and more suicide attempts and hospitalisations among adults with BPD [10], together with a self-reported history of childhood abuse and neglect [8].

The 2-year follow-up data did not reveal any relationship between the number of BPD criteria and emerging psychotic disorder. This is consistent with the findings from a study of young people meeting 'Ultra-High Risk' criteria for psychosis (i.e. attenuated psychotic symptoms), in which co-occurring BPD or BPD features did not influence the risk of short-term transition to psychosis or the risk of developing a non-affective psychotic disorder [18].

The current study has several limitations. This study was not primarily designed to assess for psychotic symptoms and was limited to the YSR/YASR and SCL-90-R at baseline, and it did not include a measure of symptom severity. The DSM-IV SCID I was the only measure used to assess for these symptoms at 2-year follow-up. Furthermore, participants were initially excluded if they had a schizophrenia spectrum or other psychotic disorder, which prevented the investigation of co-occurring BPD and psychotic disorder in this patient group. However, a strength of this approach was that clinical controls were similarly excluded and no participant met diagnostic criteria for a DSM-IV psychotic disorder. Future studies in this age group would benefit from more comprehensive measurement of psychotic symptoms, along with longitudinal assessment given the bidirectional associations between psychotic experiences and DSM-IV mental disorders [34].

The primary clinical implication of these findings is the need for further studies using more appropriate instruments for the assessment of psychotic symptoms and also for treatment studies in young people. A previous pilot study of combined specialist BPD and first-episode psychosis early intervention treatment in this age group demonstrated that this was feasible [35]. As yet, no study has explored the effectiveness of antipsychotic medication for these symptoms, even though it is regularly prescribed [36], or conducted a randomised controlled trial of cognitive behaviour therapy for the treatment of auditory verbal hallucinations. This is a much needed area of investigation.

Overall, these findings indicate that psychotic symptoms, such as hallucinations, paranoia, and thought problems are present early in the course of BPD, are common, and occur at comparable rates to those reported among adults with BPD. Moreover, psychotic symptoms are clinically important among young people with BPD features, as these symptoms appear to be an indicator of more severe psychopathology and greater functional impairment. Future studies need

to investigate appropriate treatments for these symptoms and whether reducing these symptoms might lead to improved psychopathological and functional outcomes for young people with BPD.

Acknowledgements Dr. Marialuisa Cavelti is supported by the Swiss National Science Foundation, and the Gottfried and Julia Bangerter-Rhyner-Foundation.

Funding Funding was received for Dr Marialuisa Cavelti as stated in the acknowledgements.

Compliance with ethical standards

Conflict of interest All Authors declare that they have no conflict of interest.

Ethical standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. Barnow S, Arens EA, Sieswerda S et al (2010) Borderline personality disorder and psychosis: a review. Curr Psychiatry Rep 12:186–195
2. Slotema CW, Daalman K, Blom JD et al (2012) Auditory verbal hallucinations in patients with borderline personality disorder are similar to those in schizophrenia. Psychol Med 42:1–6
3. Chanen AM, Sharp C, Hoffman P, Global Alliance for Prevention and Early Intervention for Borderline Personality Disorder (2017) Prevention and early intervention for borderline personality disorder: a novel public health priority. World Psychiatry 16:215–216. https://doi.org/10.1002/wps.20429
4. Chanen AM, McCutcheon L (2013) Prevention and early intervention for borderline personality disorder: current status and recent evidence. Br J Psychiatry Suppl 54:s24–s29
5. Sharp C, Fonagy P (2015) Practitioner review: borderline personality disorder in adolescence–recent conceptualization, intervention, and implications for clinical practice. J Child Psychol Psychiatry 56:1266–1288
6. Tschoeke S, Steinert T, Flammer E, Uhlmann C (2014) Similarities and differences in borderline personality disorder and schizophrenia with voice hearing. J Nerv Ment Dis 202:544–549. https://doi.org/10.1097/NMD.0000000000000159
7. Hepworth CR, Ashcroft K, Kingdon D (2013) Auditory hallucinations: a comparison of beliefs about voices in individuals with schizophrenia and borderline personality disorder. Clin Psychol Psychother 20:239–245
8. Kingdon DG, Ashcroft K, Bhandari B et al (2010) Schizophrenia and borderline personality disorder: similarities and differences in the experience of auditory hallucinations, paranoia, and childhood trauma. J Nerv Ment Dis 198:399–403
9. Pearse LJ, Dibben C, Ziauddeen H et al (2014) A study of psychotic symptoms in borderline personality disorder. J Nerv Ment Dis 202:368–371
10. Slotema CW, Niemantsverdriet MBA, Blom JD et al (2017) Suicidality and hospitalisation in patients with borderline personality disorder who experience auditory verbal hallucinations. Eur Psychiatry 41:47–52. https://doi.org/10.1016/j.eurpsy.2016.10.003
11. Yee L, Yee L, Korner AJ et al (2005) Persistent hallucinosis in borderline personality disorder. Compr Psychiatry 46:147–154. https://doi.org/10.1016/j.comppsych.2004.07.032
12. Niemantsverdriet MBA, Slotema CW, Blom JD et al (2017) Hallucinations in borderline personality disorder: prevalence, characteristics and associations with comorbid symptoms and disorders. Sci Rep 7:13920. https://doi.org/10.1038/s41598-017-13108-6
13. Zanarini MC, Frankenburg FR, Wedig MM, Fitzmaurice GM (2013) Cognitive experiences reported by patients with borderline personality disorder and axis II comparison subjects: a 16-year prospective follow-up study. Am J Psychiatry 170:671–679. https://doi.org/10.1176/appi.ajp.2013.13010055
14. Kelleher I, Devlin N, Wigman JTW et al (2014) Psychotic experiences in a mental health clinic sample: implications for suicidality, multimorbidity and functioning. Psychol Med 44:1615–1624. https://doi.org/10.1017/S0033291713002122
15. Kelleher I, Keeley H, Corcoran P et al (2012) Clinicopathological significance of psychotic experiences in non-psychotic young people: evidence from four population-based studies. Br J Psychiatry 201:26–32
16. Kelleher I, Connor D, Clarke MC et al (2012) Prevalence of psychotic symptoms in childhood and adolescence: a systematic review and meta-analysis of population-based studies. Psychol Med 42:1857–1863
17. Kelleher I, Lynch F, Harley M et al (2012) Psychotic symptoms in adolescence index risk for suicidal behavior: findings from two population-based case-control clinical interview studies. Arch Gen Psychiatry 69:1277–1283. https://doi.org/10.1001/archgenpsychiatry.2012.164
18. Thompson A, Nelson B, Bechdolf A et al (2012) Borderline personality features and development of psychosis in an "Ultra High Risk" (UHR) population: a case control study. Early Interv Psychiatry 6:247–255. https://doi.org/10.1111/j.1751-7893.2012.00365.x
19. Chanen AM, Jovev M, Jackson HJ (2007) Adaptive functioning and psychiatric symptoms in adolescents with borderline personality disorder. J Clin Psychiatry 68:297–306
20. Chanen AM, Jackson HJ, McGorry PD et al (2004) 2-year stability of personality disorder in older adolescent outpatients. J Pers Disord 18:526–541. https://doi.org/10.1521/pedi.18.6.526.54798
21. Chanen AM, Jovev M, Djaja D et al (2008) Screening for borderline personality disorder in outpatient youth. J Pers Disord 22:353–364. https://doi.org/10.1521/pedi.2008.22.4.353
22. Goldman HH, Skodol AE, Lave TR (1992) Revising axis V for DSM-IV: a review of measures of social functioning. Am J Psychiatry 149:1148–1156. https://doi.org/10.1176/ajp.149.9.1148
23. Achenbach TM (1991) Manual for the youth self-report and 1991 profile. VT University of Vermont Department of Psychiatry, Burlington
24. Achenbach TM (1997) Manual for the young adult self-report and young adult behavior checklist. Department of Psychiatry, University of Vermont, Burlington
25. Wigman JTW, van Winkel R, Raaijmakers QAW et al (2011) Evidence for a persistent, environment-dependent and deteriorating subtype of subclinical psychotic experiences: a 6-year longitudinal general population study. Psychol Med 41:2317–2329. https://doi.org/10.1017/S0033291711000304
26. Griffith-Lendering MFH, Wigman JTW, Prince van Leeuwen A et al (2013) Cannabis use and vulnerability for psychosis in early adolescence–a TRAILS study. Addiction 108:733–740. https://doi.org/10.1111/add.12050
27. Welham J, Scott J, Williams G et al (2009) Emotional and behavioural antecedents of young adults who screen positive for non-affective psychosis: a 21-year birth cohort study. Psychol Med 39:625–634

28. Dhossche D, Ferdinand R, Van der Ende J et al (2002) Diagnostic outcome of self-reported hallucinations in a community sample of adolescents. Psychol Med 32:619–627
29. Derogatis LR (1992) SCL-90-R: Administration, scoring and procedures manual for the revised version and other instruments of the psychopathology rating scale series, 2nd edn. MD Clinical Psychometric Research, Towson
30. Thompson KN, Jackson HJ, Cavelti M et al (2018) The clinical significance of subthreshold borderline personality disorder features in outpatient youth. J Pers Disord 32:1–11
31. Kelleher I, Wigman JTW, Harley M et al (2015) Psychotic experiences in the population: association with functioning and mental distress. Schizophr Res 165:9–14. https://doi.org/10.1016/j.schres.2015.03.020
32. Martin G, Thomas H, Andrews T et al (2015) Psychotic experiences and psychological distress predict contemporaneous and future non-suicidal self-injury and suicide attempts in a sample of Australian school-based adolescents. Psychol Med 45:429–437. https://doi.org/10.1017/S0033291714001615
33. Wigman JTW, Devlin N, Kelleher I et al (2014) Psychotic symptoms, functioning and coping in adolescents with mental illness. BMC Psychiatry 14:97. https://doi.org/10.1186/1471-244X-14-97
34. McGrath JJ, Saha S, Al-Hamzawi A et al (2016) The bidirectional associations between psychotic experiences and DSM-IV mental disorders. Am J Psychiatry 173:997–1006. https://doi.org/10.1176/appi.ajp.2016.15101293
35. Gleeson JFM, Chanen A, Cotton S et al (2012) Treating co-occurring first-episode psychosis and borderline personality: a pilot randomized controlled trial. Early Intervention Psychiatry 6:21–29
36. France SM, Jovev M, Phassouliotis C (2017) Does co-occurring borderline personality disorder influence acute phase treatment for first-episode psychosis? Early Intervention Psychiatry. https://doi.org/10.1111/eip12435