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Characteristics and stability of hallucinations and delusions in patients with borderline personality disorder

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ABSTRACT

Background: Psychotic features have been part of the description of the borderline personality disorder (BPD) ever since the concept "borderline" was introduced. However, there is still much to learn about the presence and characteristics of delusions and about the stability of both hallucinations and delusions in patients with BPD.
Methods: A follow-up study was conducted in 326 BPD outpatients (median time between baseline and follow-up = 3.16 years). Data were collected via telephone (n = 267) and face-to-face interviews (n = 60) including the Comprehensive Assessment of Symptoms and History interview, Positive And Negative Syndrome Scale and the Psychotic Symptom Rating Scale.
Results: The point prevalence of delusions was 26%, with a median strong delusion conviction. For the group as a whole, the presence and severity of both hallucinations and delusions was found to be stable at follow-up. Participants with persistent hallucinations experienced more comorbid psychiatric disorders, and they differed from those with intermittent or sporadic hallucinations with their hallucinations being characterized by a higher frequency, causing a higher intensity of distress and more disruption in daytime or social activities.
Conclusions: Delusions in patients with BPD occur frequently and cause distress. Contrary to tenacious beliefs, hallucinations and delusions in participants with BPD are often present in an intermittent or persistent pattern. Persistent hallucinations can be severe, causing disruption of life. Overall, we advise to refrain from terms such as "pseudo", or assume transience when encountering psychotic phenomena in patients with BPD, but rather to carefully assess these experiences and initiate a tailor-made treatment plan.

1. Introduction

Over half a century ago, the first systematic assessment of patients with "the borderline syndrome" was conducted [1], in which psychotic disintegration was included. Since this first assessment, a slowly increasing number of studies have focused on the occurrence of psychotic symptoms - delusions and hallucinations - in patients with borderline personality disorder (BPD).

The point prevalence of *hallucinations* was found to be high (43% [2] and characteristics of auditory verbal hallucinations (AVH) did not differ between patients with schizophrenia and patients with BPD [3–5]. Also, hallucinations in patients with BPD were found to correlate with other psychotic symptoms, a diagnosis of posttraumatic stress disorder and a history of emotional abuse in childhood [2]. Furthermore, both suicidality and number of hospitalizations were associated with the presence and severity of AVH in patients with BPD [6,7].

Delusions in patients with BPD have a vague connotation, with examples such as "psychotic features" [8] and "quasi psychotic thought" [9]. These descriptions may reflect the persistent assumption that psychotic symptoms are less severe in patients with BPD than in patients with a schizophrenia spectrum disorder [10]. Reported prevalence rates show a broad range between 0 and 100% [3,5,9–15], which may be the result of using questionnaires designed for investigating BPD criteria, such as the Diagnostic Interview for Borderlines (DIB) [16], instead of

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questionnaires assessing specific psychotic symptoms.

In addition, there is limited knowledge on the *persistence* of both hallucinations and delusions in patients with BPD. In the DSM-5 [17] paranoid ideations are described as transient (criterion 9), although in a number of studies the onset of these AVH was found to be 15 to 18 years before study entry *[2,4,5]*. A limitation of these studies however, is the retrospective setting. The only study that has explored the persistence of positive psychotic symptoms prospectively was an observational study of five patients with BPD [18], who found that these symptoms often lasted more than seven days and tended to recur several times.

Summarizing, *hallucinations* in patients with BPD are prevalent and associated with severe comorbidity. A clear description of the prevalence and characteristics of *delusions* is not yet available. Furthermore, there is a lack of information on the persistence of hallucinations and delusions in patients with BPD. To draw on these findings, the aims of this study of patients with BPD are to (i) establish the point prevalence and explore the characteristics of delusions using questionnaires specifically designed to assess psychotic symptomatology; (ii) investigate the persistence of hallucinations and delusions in a prospective design; (iii) compare hallucinatory groups that differ in stability.

2. Methods

2.1. Participants

We aimed to include all participants from the baseline measurement

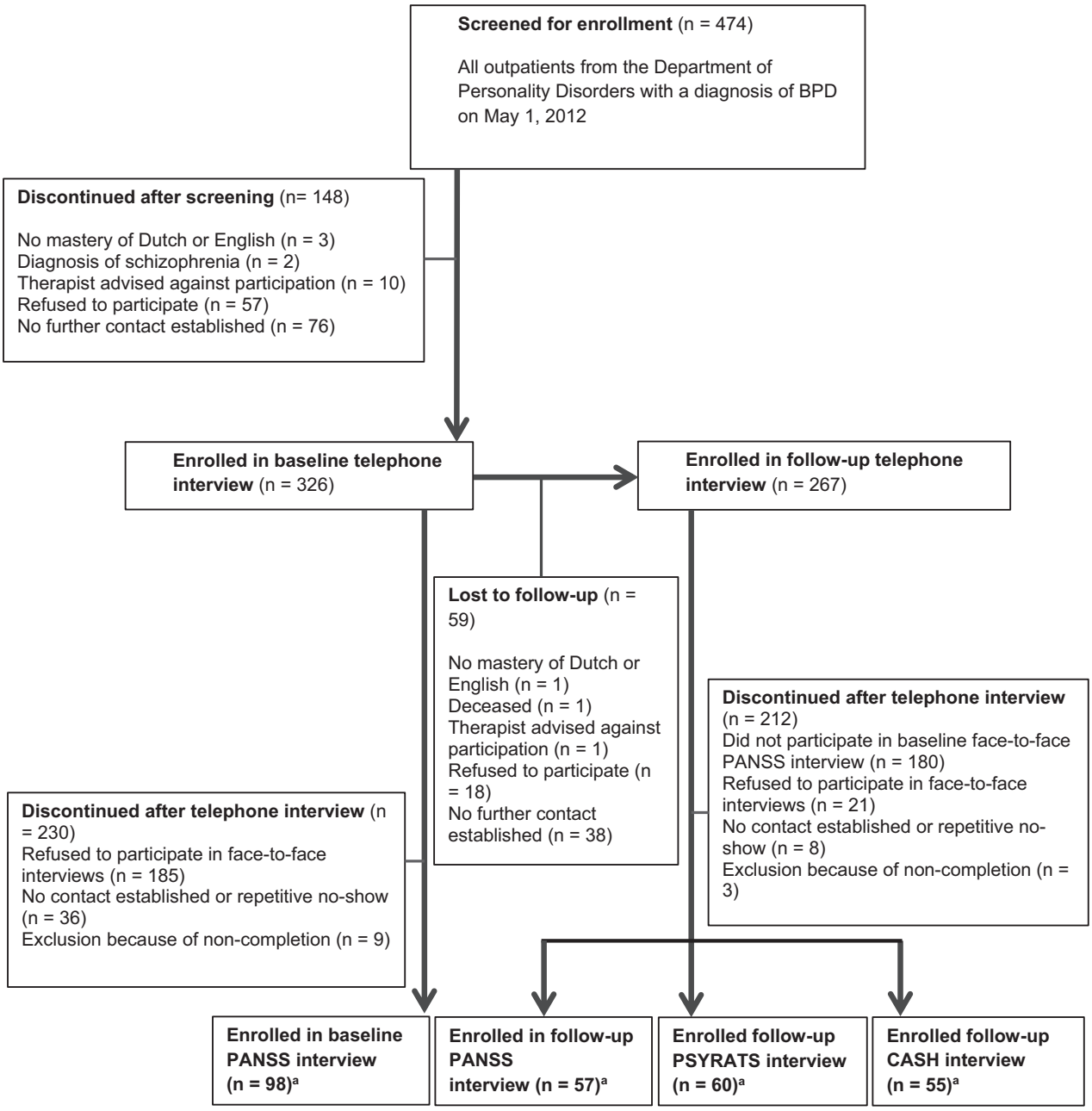

Fig. 1. [a] Two participants were enrolled in the face-to-face interviews without participating in the telephone interview. [b] From the participants who completed the PSYRATS interviews, three did not complete the PANSS and five did not complete the CASH interview.
Abbreviations: BPD, borderline personality disorder; PANSS, Positive and Negative Syndrome Scale; PSYRATS, the Psychotic Symptom Rating Scale; CASH, Comprehensive Assessment of Symptoms and History *questionnaire*.

[2]. For this baseline measurement, all patients from the Outpatient Department for Personality Disorders at Parnassia Psychiatric Institute, The Hague who met the inclusion criteria, were recruited between 2012 and 2015 (see Niemantsverdriet et al., 2017 for detailed inclusion procedure). Inclusion criteria were 1) age ≥ 18 years; 2) a diagnosis of BPD, in accordance with the operational criteria of the *Diagnostic and Statistical Manual of Mental Disorders* [19] 3) no comorbid DSM-IV-TR diagnosis of schizophrenia or schizoaffective disorder; and 4) sufficient mastery of Dutch and/or English. The study was approved by the National Medical Ethical Committee (METiGG; NL1371209706). Written informed consent was obtained from all participants at baseline.

2.2. Instruments and procedure

Between January 2014 and August 2017, all of the 326 participants who participated in the baseline study were contacted via telephone and asked to participate in this follow-up study. Fig. 1 displays the participants' disposition. Assessors who carried out the telephone and face-to-face interviews were psychologists and residents of psychology and psychiatry who had been trained in conducting the interviews. They were supervised during the interviews, and participated in monthly meetings during the data collection phase to safeguard the interrater reliability.

2.2.1. Point prevalence and characteristics of delusions

The section "Psychotic syndrome, current condition, delusions" of the Comprehensive Assessment of Symptoms and History (CASH) interview [20] and the Psychotic Symptom Rating Scale, delusion rating scale (PSYRATS) [21] were used at follow-up to investigate the point prevalence per delusion type, the phenomenological characteristics and ensuing distress of delusions.

2.2.2. Persistence of hallucinations and delusions

The persistence of hallucinations and delusions was assessed with both a tailor-made telephone interview and the Positive and Negative Syndrome Scale (PANSS) [22]. In the telephone interview data were collected on the presence, content, and frequency of each hallucination modality separately. Participants were asked if they ever heard / saw / tasted / smelled or felt something that other people did not perceive, or for which they did not have an explanation, how frequent this occurred and the content of their experiences.

2.2.3. Comparison of hallucinatory groups

The PSYRATS, MINI-International Neuropsychiatric Interview (MINI PLUS 2000) [23], the PANSS and the Childhood Trauma Questionnaire Short-Form, (CTQ-SF) [24] were administered at baseline to compare the hallucinatory groups on characteristics of auditory verbal hallucinations, the number of comorbid psychiatric disorders, the severity of other psychotic symptoms and the severity of childhood trauma, respectively. Other psychotic symptoms were assessed by organizing PANSS-data in positive, negative, and disorganized symptoms, in conformity with the van der Gaag Five-Factor Model [25].

2.3. Statistics

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (Armonk, NY: IBM Corp). Demographics of the participants who were enrolled in the face-to-face interviews and the participants who dropped out after being enrolled in the telephone interviews were compared with chi-square analyses (sex) and Mann-Whitney *U* test (age, Global Assessment of Functioning-score).

2.3.1. Point prevalence and characteristics of delusions

The point prevalence of delusions was calculated by dividing the number of participants who experienced at least one type of delusion in the past month by the total number of participants, who completed the CASH at follow-up.

2.3.2. Persistence of hallucinations and delusions

In the telephone interview, hallucinations were defined as present when at least one of the sensory occurred at least once per week. This cut-off point was based on the frequency-item of the PSYRATS [21]. If the frequency to any of the modalities could not be inquired, this participant was excluded from the analyses regarding the persistence of hallucinations in general, as measured by telephone interview. Therefore, the number of participants for this analysis was 233.

The persistence of hallucinations was further assessed by PANSS item P3 (Hallucinations), the persistence of delusions in general with PANSS item P1 (Delusions) and paranoid delusions by PANSS item P6 (Suspiciousness/Persecution). Following the operational criteria for the definition of remission formulated by the Remission in Schizophrenia Working Group (RSWG) [26], they were defined as present with a score of at least moderate (item score ≥ 4 on a 7-point scale), corresponding with the symptoms causing a moderate to extremely severe intrusion on daily life [22].

Hallucinations and delusions were categorized into three groups, based on their stability according to the PANSS items. The symptom was termed *sporadic* when the participant had a PANSS item score of ≤3 at both baseline and follow-up, termed *intermittent* when the participant had a PANSS item score of ≤3 at baseline and ≥ 4 at follow-up, and vice versa, and termed *persistent* when the participant had a PANSS item score of ≥4 at both baseline and follow-up.

With McNemar's test the *proportion* of participants who experienced hallucinations (as measured by telephone interview and PANSS item P3), delusions in general (PANSS item P1) and paranoid delusions (PANSS item P6) was compared between baseline and follow-up. To determine if there was a change in hallucination and/or delusion *severity* between baseline and follow-up, raw (ordinal) PANSS scores of items P1, P3 and P6 were analyzed with a Wilcoxon signed-rank test as a normal distribution was lacking.

2.3.3. Comparison of hallucinatory groups

The PSYRATS, auditory hallucination rating scale, was only conducted from participants who experienced AVH at least once per week. Therefore, the number of descriptions of AVH characteristics was $n = 5$, $n = 4$ and $n = 10$ for the sporadic, intermittent and persistent hallucinatory group, respectively. The characteristics of AVH, the number of comorbid psychiatric disorders and the severity of other psychotic symptoms were compared between the groups via Kruskall-Wallis testing and Mann-Whitney post hoc analyses, because of non-normal distributions. The total scores of the CTQ-SF were compared with one-way ANOVA. Post hoc analyses were only conducted if the main analyses were statistically significant. PANSS item P3 was excluded from the analyses of other psychotic symptoms, since the categorization of the three hallucinatory groups was based on this PANSS item. *P*-values below 0.05 were considered statistically significant, with Benjamini & Hochberg False Discovery Rate testing for multiple comparisons [27].

3. Results

The participants who were enrolled in the face-to-face interviews did not differ from the participants who dropped out after inclusion in the telephone interviews at follow-up, with regards to sex ($\chi^2 = 0.11$, $p = 0.76$), age ($Z = -0.35$, $p = 0.72$) and GAF-score ($Z = -0.40$, $p = 0.69$). Median time between baseline and follow-up measurement was 3.16 years (range 0.60–5.24) for the telephone interviews and 2.45 years (range 1.54–4.99) for the face-to-face interviews.

3.1. Demographics

In the telephone interviews 251 participants (94%) were female. The mean (*SD*) age was 40.72 (10.95), and mean (*SD*) GAF-score was 54.70

(6.30).

3.2. Point prevalence and characteristics of delusions

The point prevalence of delusions was 26% ($n = 14$). Of the participants who experienced delusions, eight participants experienced one delusion, and 6 experienced more than one delusion. Table 1 displays frequencies and point prevalence per delusion type. Delusions of reference were most frequently reported, followed by persecutory delusions and delusions of being controlled. Table 2 displays the median PSYRATS delusions rating scale scores, describing delusion characteristics. There was a strong conviction in the delusional beliefs, and they caused a moderate amount of distress. Disruption of life caused by the experience of delusions was found to be minimal, on average.

3.3. Persistence of hallucinations and delusions

Table 3 shows the results of the telephone and PANSS interview. There were no significant differences in the *proportion* of hallucinations and delusions experienced at baseline or at follow-up.

The *severity* of hallucinations measured via the raw item-scores of PANSS P3, did not differ between baseline and follow-up ($Z = -1.33$, $p = 0.18$, $r = -0.13$). Indeed, median hallucination severity score was 3 (mild) at both baseline and follow-up. The severity of delusions in general (PANSS P1), differed significantly between baseline and follow-up ($Z = -3.03$, $p = 0.002$, $r = -0.29$), with the median score decreasing from 2 (minimal; range 1–5) to 1 (absent; range 1–7). The severity of paranoid delusions (PANSS P6) did not change significantly ($Z = -1.80$, $p = 0.07$, $r = -0.17$), with a median of 3 (mild) at both baseline (range 1–5) and follow-up (range 1–7).

Of the hallucinations measured via telephone interview, 147 (63%) were sporadic, 51 (22%) were intermittent, and 35 (15%) were stable. This was 34 (60%), 12 (21%) and 11 (19%) respectively, for hallucinations measured by PANSS item P3. Of delusions in general (PANSS P1) 43 (77%) were sporadic, 10 (18%) intermittent and 3 (5%) stable. This was 38 (67%), 18 (32%) and 1 (2%) respectively, for paranoid delusions (PANSS P6).

3.4. Comparison of hallucinatory groups

The results of the comparison of the three hallucinatory groups are displayed in Table 4. The median number of years that participants had experienced AVH did not differ between the groups. Participants with persistent hallucinations had higher scores on the frequency of AVH and on the intensity of distress and disruption of life caused by these hallucinations, compared to participants with intermittent or sporadic hallucinations. The duration of AVH was longer for participants with persistent hallucinations compared to those with sporadic hallucinations. The number of comorbid psychiatric disorders was also significantly greater for the persistent group, compared to the sporadic group. Both the persistent and the intermittent group reported significantly higher positive psychotic symptom scores compared to the sporadic group. The severity of childhood trauma did not differ between the groups; total CTQ-SF scores (mean, SD) were 66.13 (21.29), 62.92 (14.03) and 75.70 (26.36), ($F = 1.11$, $p = 0.45$).

Table 1
Frequency and point prevalence of delusions, per type of delusion.

Type	n	%
Persecutory delusions	4	7
Delusions of jealousy	1	2
Delusions of sin or guilt	3	5
Grandiose delusions	2	4
Religious delusions	2	4
Somatic delusions	0	–
Delusions of reference	7	13
Delusions of being controlled	4	7
Delusions of mind reading	3	5
Delusions of thought broadcasting	2	4
Delusions of thought insertion	0	–
Delusions of thought withdrawal	2	4

Table 2
Phenomenological characteristics of delusions (PSYRATS-DRS).

Characteristic of delusion	PSYRATS-DRS score, median (range)	Description of score
Amount of preoccupation with delusions	1 (0–4)	Thinks about beliefs at least once a week
Duration of preoccupation with delusions	2 (0–4)	Thoughts about delusions last for several minutes
Conviction	3 (1–4)	Conviction in belief is very strong, between 50 and 99%
Amount of distress	2 (0–4)	Beliefs cause distress on 50% of occasions
Intensity of distress	2 (0–4)	Beliefs cause moderate distress
Disruption to life caused by beliefs	1 (0–3)	Beliefs cause minimal amount of disruption to life

Abbreviations: PSYRATS-DRS = Psychotic Symptom Rating Scales, delusion rating scale.

Table 3
Alterations in proportion of hallucinations and delusions between baseline and follow-up, results of telephone and PANSS interview.

Baseline	n (%)	Follow-up	n (%)	p[d]
Telephone interview				
Hallucinations absent	169 (73%)	Hallucinations absent	147 (63%)	0.56
		Hallucinations present	22 (9%)	
Hallucinations present[a]	64 (27%)	Hallucinations absent	29 (12%)	
		Hallucinations present	35 (15%)	
PANSS P3				
Hallucinations absent[b]	40 (70%)	Hallucinations absent	34 (60%)	1.00
		Hallucinations present	6 (11%)	
Hallucinations present[c]	17 (30%)	Hallucinations absent	6 (11%)	
		Hallucinations present	11 (19%)	
PANSS P1				
Delusions absent[b]	45 (80%)	Delusions absent	43 (77%)	0.22
		Delusions present	2 (4%)	
Delusions present[c]	11 (20%)	Delusions absent	8 (14%)	
		Delusions present	3 (5%)	
PANSS P6				
Paranoid delusions absent[b]	42 (74%)	Paranoid delusions absent	38 (67%)	0.12
		Paranoid delusions present	4 (7%)	
Paranoid delusions present[c]	15 (26%)	Paranoid delusions absent	14 (25%)	
		Paranoid delusions present	1 (2%)	

Abbreviation: PANSS = Positive and Negative Syndrome Scale.
[a] Occurring at least once per week.
[b] PANSS item score ≤ 3.
[c] PANSS item score ≥ 4.
[d] Benjamini-Hochberg corrected p-values.

Table 4
Comparison of characteristics of AVH, comorbid psychiatric disorders and severity of comorbid psychotic symptoms and childhood trauma between the hallucinatory groups.

Hallucinations	Sporadic or absent (S)[a]	Intermittent (I)[a]	Persistent (P)[a]	H(2)	p[b]	post hoc[a,c]	p[b, c]
Prevalence, n (%)	34 (60)	12 (21)	11 (19)	–		–	
No of years AVH, median (range)[d]	13.02 (1–54)	15.45 (0–45)	18.14 (3–37)	0.22	0.90	–	
Characteristics of AVH, PSYRATS-AHRS score, median (range)[d]							
Frequency	1 (0–2)	1.5 (1–4)	4 (2–4)	11.59	0.03	P > S	0.003
						P > I	0.04
Duration	1 (0–2)	2 (1–4)	3.5 (2–4)	9.50	0.03	P > S	0.006
Perceived location	1 (0–4)	3 (1–4)	2 (1–2)	1.89	0.48	–	
Loudness	2 (1–2)	1.5 (1–2)	3 (1–4)	4.57	0.22	–	
Beliefs about origin	4 (1–4)	1.5 (1–4)	3 (1–4)	0.76	0.72	–	
Amount of negative content	0 (0–4)	2.5 (0–4)	3 (3–4)	4.44	0.22	–	
Degree of negative content	2 (0–3)	2.5 (0–4)	4 (2–4)	7.81	0.055	–	
Amount of distress	1 (0–4)	3 (0–4)	3.5 (2–4)	1.70	0.50	–	
Intensity of distress	1 (0–3)	1 (0–2)	3 (2–4)	10.66	0.03	P > S	0.01
						P > I	0.009
Disruption of life	1 (1–2)	1 (0–2)	2 (2–3)	9.44	0.03	P > S	0.01
						P > I	0.009
Controllability	2 (0–4)	2 (1–4)	4 (0–4)	2.17	0.45	–	
No of comorbid psychiatric disorders, median (range)	2 (0−11)	3.5 (0–7)	6 (1−12)	10.03	0.03	P > S	0.006
Comorbid psychotic symptoms, PANSS score, median (range)							
Positive symptoms	6 (4–12)	9 (6–13)	10 (8–11)	26.47	0.000	I > S	0.003
						P > S	0.000
Negative symptoms	11 (8–22)	11 (8–15)	14 (9–36)	8.17	0.053	–	–
Disorganization	10 (8–20)	9.5 (8–13)	13 (8–19)	5.89	0.13	–	
Childhood trauma, CTQ-SF score, mean (SD)							
Sexual abuse	9.5 (5–25)	9.5 (5–25)	19.5 (5–25)	3.17	0.38	–	
Physical abuse	8 (5–25)	7.5 (5–16)	14 (5–23)	2.69	0.44	–	
Physical neglect	10 (5–24)	8.5 (5–17)	11.5 (5–21)	1.12	0.63	–	
Emotional abuse	16.5 (5–25)	17 (10–25)	20 (8–25)	2.13	0.45	–	
Emotional neglect	18 (8–25)	16.5 (8–24)	15.5 (6–24)	2.10	0.45	–	

Abbreviations: AVH = auditory verbal hallucinations, CTQ-SF = Childhood Trauma Questionnaire Short-Form, PANSS = Positive and Negative Syndrome Scale, PSYRATS-AHRS = Psychotic Symptom Rating Scale auditory hallucinations rating scale.
[a] The letters in the parentheses in the group names refer to the numbers used in illustrating statistically significant differences in post hoc analyses
[b] Benjamini-Hochberg corrected p-values.
[c] Posthoc analysis was only conducted if the main analysis was statistically significant.
[d] Sporadic, n = 5; intermittent, n = 4; persistent, *n* = 10.

4. Discussion

The aim of this study was to explore the point prevalence and characteristics of delusions, the persistence of both hallucinations and delusions, and to compare hallucinatory groups that differed in stability, all in patients with a borderline personality disorder.

First, the point prevalence of delusions was 26%. Delusions were accompanied by a strong conviction and a moderate amount of distress. Disruption of life due to the experience of delusions was found to be minimal. Our findings contrast with previous studies that reported mainly "quasi-psychotic thought" in patients with BPD when compared to patients with a schizophrenia spectrum disorder [9,14]. In these studies psychotic symptoms were assessed using the Cognitive section of the Revised Diagnostic Interview for Borderlines (DIB-R) [28] a semi-structured interview originally designed to distinguish BPD patients from patients with other personality disorders. In this current study, delusions were assessed with the PSYRATS [21]. This questionnaire focusses much more on the characteristics of the psychotic symptoms (hallucinations and delusions), which allows for more specific statements about the dimensions and impact of these symptoms. Delusion characteristics have also been studied with the aim of the PSYRATS in patients with a schizophrenia spectrum and a schizoaffective disorder [21,29]. The reported scores on the amount of preoccupation and associated distress were higher for these patients, but other characteristics such as delusion conviction, seem to be equal for both patients with a schizophrenia spectrum / schizoaffective disorder and patients with BPD. However, a study that directly compares the characteristics of delusions in patients with BPD and a schizophrenia spectrum disorder is needed to confirm this observation. Lincoln [30] compared delusions in patients with schizophrenia to those experienced by healthy controls. There was a difference in the level of distress (higher in patients with schizophrenia) and the content of delusions; patients with schizophrenia experienced beliefs of being persecuted or losing control more often. Peters & Garety found that associated distress, preoccupation, and delusion conviction was higher for psychotic inpatients with delusional ideas than for participants recruited from the normal population [31]. The experience of delusions in patients with BPD then seems to lie in between the experience of healthy controls and patients with a schizophrenia spectrum disorder. This is in line with the view of a "psychosis-continuum", which advocates to assess psychotic symptoms trans-diagnostically and regard them on a continuum from healthy individuals on the one end, to patients with severe dysfunction, reduced global functioning and in need of clinical care, on the other end of the spectrum [32–36].

Second, we found that patients with BPD often have had a long history of experiencing psychotic symptoms (13 to 18 years at study entry). And that the presence and severity of both hallucinations and paranoid delusions for the group as a whole were found to be stable during the study period. Within the groups, a large percentage of participants had either intermittent or persistent hallucinations and delusions. Similar findings were reported in a study of BPD inpatients, where the authors found that the majority of patients who experienced psychotic symptoms, experienced these for periods ranging from 1 to 12 weeks [37]. For some the symptoms lasted for more than 12 weeks.

Miller, Abrams, Dulit, & Fyer consequently state that they "could not confirm the view that patients with BPD characteristically experience brief or transient psychotic episodes". O'Connell, Cooper, Perry & Hoke assessed psychotic symptoms in (among others) a group of patients with BPD and found that, from a total of 16 BPD patients, six patients experienced intermittent psychotic symptoms and four patients experienced chronic psychotic symptoms [38]. They conclude that hallucinations and delusions in patients with BPD were moderately stable. The general view about delusions in patients with a *schizophrenia spectrum disorder* is that these symptoms are deeply held and resistant to change [39], although long-term follow-up showed that only 57% of schizophrenia patients had recurrent and persistent delusions [40]. The opposite appears to happen for psychotic symptoms in patients with *BPD*, which are often being assumed to be transient [41] when we find that these symptoms can be present intermittently or even persistently for many years.

The only psychotic symptom that did decrease in severity between baseline and follow-up, were delusions in general. The severity of delusions are known to be associated with negative emotional states (i.e. increased anxiety and sadness) [42] and with negative self-esteem [43]. We think that the decrease of the severity of delusions in general may be explained by the treatment our participants received for symptoms of BPD during the study period.

Third, we found differences in AVH characteristics, number of comorbid psychiatric disorders and the severity of other psychotic symptoms when we compared participants with sporadic, intermittent and persistent hallucinations. AVH in participants with persistent hallucinations were more frequent, associated with higher intensity of distress and caused disruption in daytime or social activities. Furthermore, the duration of AVH was longer for participants with persistent hallucinations and they had more comorbid psychiatric disorders than participants with sporadic hallucinations. Other positive psychotic symptoms were more severe in participants with persistent and intermittent hallucinations than in participants with sporadic hallucinations. In the beforementioned study by O'Connell et al. [38], the authors report that the level of associated impairment varied from absent to severe in the BPD participants who experienced psychotic symptoms. Out of 10 patients, three patients experienced intermittent psychotic symptoms without impairment, three patients experienced intermittent symptoms *with* impairment and four patients experienced chronic, impairing, psychotic symptoms [38]. The presence of psychotic experiences has been described as being a marker for greater illness severity in patients with a mental illness rather than to use as a criterium for specific diagnoses [36,44]. This may also apply to our BPD participants with persistent hallucinations, who experience more severe AVH, more associated disruption of life and more comorbid psychiatric disorders.

Childhood trauma did not differ between the groups. It is possible that the group sizes of the three groups were too small to detect differences, since rates of childhood trauma in patients with BPD are extremely high [45].

It has been argued that AVH in patients with BPD are better explained by a comorbid disorder, and comorbidity rates in BPD are high [46]. For example, approximately 20% of patients with BPD have a comorbid diagnosis of bipolar disorder and vice versa [47]. Several studies have addressed this issue, but results are univocal [8,12,37,48,49]. In a previous study by our research group, we did not find an association between the presence and severity of hallucinations and a comorbid mood disorder, including bipolar disorder [2].

The following limitations of this study should be considered. Our sample sizes were relatively small, making it possible that some differences between participants with sporadic, intermittent or persistent hallucinations are present but have not reached statistical significance (e.g. the observation that participants with persistent hallucinations seemed to experience a higher degree of negative content from the AVH, and more negative psychotic symptoms than participants with intermittent or sporadic hallucinations).

Another limitation is that we did not carry out measurements at shorter intervals, which means we are not able to draw definite conclusions on the behavior of hallucinations and delusions were stable *in-between* baseline and follow-up. It is therefore possible that some of the participants from the persistent group, may have belonged to the intermittent group. This would correspond with findings by Appelbaum, Robbins, & Vesselinov, who assessed the presence of delusions in 400 psychiatric patients with a mood disorder, schizophrenia spectrum disorder, substance use disorder or personality disorder at 10-week intervals for a period of one year [39]. They found that only 15% of patients were delusional at every follow-up appointment.

Finally, we did not control for psychological of pharmacological treatment. The point prevalence of delusions may be higher and the presence of psychotic symptoms more persistent in patients who do not receive such treatment.

There are a several implications for clinical practice and future research that are important to address. First of all, we strongly emphasize the importance of carefully assessing psychotic phenomena in patients with BPD, instead of assuming they will be transient or disregarding them as pseudo-symptoms. Information on the characteristics, persistence, associated distress and impact on daily functioning will aid the clinician in tailoring an appropriate treatment plan in collaboration with the patient. This treatment plan can consist of psycho-education, and treatment aimed directly at diminishing psychotic symptoms and/or the associated distress. Antipsychotics should be discussed with the patient, weighing possible benefits and side-effects [15,50]. Furthermore, other treatments that are being recommended in the treatment of psychotic symptoms in other diagnoses may be considered, such as cognitive-behavioral therapy [51]. Treatment focused on traumatic experiences and associated dissociation can be discussed when posttraumatic stress disorder and/or dissociative symptoms are present, since both phenomena are thought to contribute to the experience of AVH in patients with BPD [52,53].

One could evaluate BPD patients with persistent hallucinations for fulfilling criteria for the category of severe mental illness (SMI) [54]. If this is the case, an approach developed for patients with chronic symptoms and impaired functioning may offer improvement in quality of life [55].

To date, only the use of antipsychotics has been investigated for psychotic symptoms in patients with BPD (Slotema et al., 2018). In a subgroup of patients with BPD and AVH, eye movement desensitization and reprocessing for posttraumatic stress disorder was accompanied by a reduction of the severity of AVH (Slotema et al., 2019). The results of a randomized controlled trial investigating the efficacy of aripiprazole may become available soon (Chanen et al., 2019). However, there is a definite need for more studies to find out if treatments for psychotic symptoms in schizophrenia spectrum disorders, trauma-related symptoms, BPD-symptoms or other severe mental illness will effectively diminish psychotic symptoms and associated distress in patients with BPD.

Summarizing our findings, we conclude that a significant proportion of participants with BPD experience delusions, accompanied with a strong delusion conviction and stress. Furthermore, contrary to the assumption that psychotic symptoms in patients with BPD will be transient, hallucinations and delusions in participants with BPD were found to have been experienced for many years and often being present intermittently of even persistently. BPD participants with persistent hallucinations reveal higher scores on severity of AVH, more comorbid psychiatric disorders, and more severe positive psychotic symptoms. Overall, we advise a careful assessment of psychotic experiences in patients with BPD, including their stability and associated distress, to come to a tailored treatment plan treating both the personality disorder as well as the psychotic symptoms.

Declaration of Competing Interest

None.

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