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Hallucinations in patients with borderline personality disorder: characteristics, severity, and relationship with schizotypy and loneliness

Slotema CW, Bayrak H, Linszen MMJ, Deen M, Sommer IEC.
Hallucinations in patients with borderline personality disorder:
characteristics, severity, and relationship with schizotypy and loneliness.

Objective: In patients with borderline personality disorder (BPD), data are lacking on characteristics and severity of hallucinations in modalities other than the auditory (verbal) type. The same applies to relationships between hallucinations and the severity of depression, anxiety, schizotypy, and loneliness.

Methods: In 60 female patients with BPD (37 also with hallucinations), this cross-sectional study explored characteristics and severity of (i) hallucinations and (ii) schizotypal features, (iii) severity of depression and anxiety, and (iv) loneliness, and the relationships between hallucinations and the other characteristics.

Results: In patients with hallucinations, 80% experienced hallucinations in more than one modality; in the different modalities, the characteristics of the hallucinations were similar. The criteria for loneliness were fulfilled in 81% and 48% of patients with and without hallucinations. Compared to patients with BPD without hallucinations, the presence of hallucinations was associated with higher scores for depression, anxiety, loneliness, and schizotypy. Furthermore, the severity of hallucinations showed a positive correlation with the severity of loneliness and schizotypy.

Conclusion: Patients with BPD experienced hallucinations with characteristics similar to the more frequently studied auditory (verbal) hallucinations. Higher scores for schizotypy and loneliness indicate that patients with hallucinations had more characteristics of cluster A personality disorders.

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Key words: psychoses; depression; anxiety

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Significant outcomes

- In patients with hallucinations, 80% experienced hallucinations in more than one modality and the characteristics of these hallucinations were similar across the different modalities.
- The criteria for loneliness were fulfilled in 81% of patients with hallucinations and in 48% of patients without hallucinations.
- Compared to patients without hallucinations, the presence of hallucinations was associated with higher scores for the three clusters of schizotypy.

Limitations

- Since this study has a cross-sectional design, no assumptions can be made regarding causality.
- Also, the study population was of only moderate size.
- In most patients, the presence of a schizotypal personality disorder was explored by means of the DSM-5 criteria, without the use of a structured clinical interview.

Introduction

Borderline personality disorder (BPD) is characterized by chronic instability of emotions and self-image resulting in self-destructive behavior and difficulties with relationships (1). One of the BPD criteria is that '*transient, stress-related paranoid ideation may be present*' (2). In addition, the concept of BPD includes cognitive perceptual symptoms such as suspiciousness, ideas of reference, paranoid ideation, illusions, derealization, depersonalization, and hallucination-like symptoms (2).

However, studies during the last decade indicate that hallucinations proper are far from rare in patients with BPD, with reported prevalence rates ranging from 26% to 54% (3–5). In patients with BPD, auditory verbal hallucinations (AVH) have been investigated most extensively, whereas other modalities have rarely been studied. In patients with BPD, in terms of phenomenology and distress, AVH are similar to those experienced by individuals with schizophrenia (6–10). Kingdon et al. (8) even reported that patients with BPD have more negative content and greater emotional impact of AVH compared to those in schizophrenia. Furthermore, Slotema et al. found that the presence of AVH increased the risk of suicide attempts and hospitalizations in patients with BPD (11).

Despite these findings, it remains unknown whether patients with BPD *and* hallucinations experience more symptoms of depression and anxiety than those without hallucinations. However, these findings emphasize the need to improve understanding about hallucinations in patients with BPD.

Hallucinations in BPD are probably not restricted to the auditory verbal type, but may also occur in other modalities. Indeed, a recent study investigating 324 patients with BPD reported that the prevalence of different types of hallucinations was 27% for auditory hallucinations (including auditory verbal and nonverbal hallucinations), 11% for visual hallucinations, 17% for olfactory hallucinations, 15% for tactile hallucinations, and 8% for gustatory hallucinations (5).

Nevertheless, despite their frequent occurrence in BPD, little is known about the phenomenological characteristics and severity of hallucinations in domains other than the auditory (verbal) type (12, 13). The same applies to the etiology of hallucinations in patients with BPD. The presence of hallucinations in BPD was found to be associated with posttraumatic stress disorder and childhood trauma and (in particular) childhood emotional abuse (5). These findings are in line with other

patient and non-patient groups who experience hallucinations (14–16). Moreover, a strong link has been suggested between BPD and schizotypy (17, 18), which might also explain the high prevalence of hallucinations in patients with BPD.

Although it seems feasible that schizotypal features, especially cognitive-perceptual symptoms, are prevalent in this subgroup, this has not yet been investigated.

In addition to trauma and schizotypy, loneliness may be associated with the onset and persistence of hallucinations in patients with BPD. Loneliness is defined as a subjective experience of an unpleasant or inadmissible lack of (quality of) certain social relationships (19). Loneliness can lead to a variety of both psychiatric and physical disorders (20) and has been hypothesized to contribute to the emergence of psychotic symptoms by means of 'social deafferentation' (21, 22). This latter hypothesis assumes that high levels of social withdrawal/isolation in vulnerable individuals prompt social cognition programs to produce spurious social meaning in the form of complex, emotionally compelling hallucinations and delusions representing other persons or agents. Indeed, a positive association was found between the presence of loneliness and psychotic disorders (23, 24). In an Australian national survey of psychosis ($n = 1825$), up to 80% of individuals with a psychotic disorder reported loneliness (25). Two criteria for BPD are 'chronic feelings of emptiness' and 'a pattern of unstable and intense interpersonal relationships characterized by alternating between extremes of idealization and devaluation'. Emptiness is closely related to feeling hopeless, lonely, and isolated (26). Thus, as expected, patients with BPD have reported more and stronger feelings of loneliness compared to healthy participants (27) and chronic loneliness is part of the more enduring aspects of this disorder (28). Although patients with BPD and hallucinations are likely to experience more feelings of loneliness than those without hallucinations, this relationship has not yet been examined.

In summary, despite the high prevalence of hallucinations in patients with BPD, knowledge on the characteristics and severity of hallucinations in modalities other than the auditory (verbal) type is limited. The same applies to the relationship between hallucinations and depression, anxiety, schizotypy, and loneliness.

Therefore, this study aimed to address the following questions:

- i) In patients with BPD, what are the characteristics and severity of auditory, visual, olfactory, and tactile hallucinations?

- ii) Is there a correlation between severity of depression and anxiety in patients with BPD with and without hallucinations?
- iii) In patients with BPD with and without hallucinations, what are the presence and severity of schizotypal features?
- iv) In patients with BPD, is there an association between loneliness and hallucinations?

Material and methods

Study population

Between 2014 and 2017, female patients were recruited from an outpatient clinic specialized in the treatment of personality disorders (Parnassia Psychiatric Institute, The Hague, the Netherlands); since the number of available men with BPD was small, it was decided not to include any men in this study. Data collection was part of a larger multicenter study (Understanding Hallucinations part I: Phenomenology and Cognition) that was approved by the Medical Ethical committee of the University Medical Center Utrecht (No. NL42959.041.13). The study was conducted in accordance with the Declaration of Helsinki.

The criteria for study inclusion were: i) primary diagnosis of BPD in accordance with the DSM-5, made by a psychiatrist or clinical psychologist experienced in the field of personality disorders, ii) aged 18 years or over, iii) patient has sufficient mastery of the Dutch language, and iv) patient is sufficiently mentally competent to provide written informed consent.

Patients were excluded when they fulfilled the criteria of a schizotypal personality disorder or schizophrenia spectrum disorder, as established with the aid of the DSM-5.

The study had a cross-sectional, case-control design. All participants had BPD; of these, the hallucinating and non-hallucinating participants were matched groupwise for age, education, handedness, medication use, and disease severity (based on Global Assessment of Functioning scores).

Measures

The following outcome measures were included.

The Questionnaire for Psychotic Experiences (QPE, 29) was used to explore the phenomenology of hallucinations. This questionnaire is applicable to all individuals who have psychotic experiences, regardless of diagnosis. It consists of a 50-item structured interview to assess the presence, severity, and phenomenology of psychotic-like experiences and has good response rates and validity

(30). For auditory (i.e., auditory verbal and non-verbal hallucinations) and visual hallucinations, the items for 'frequency', 'duration', 'relationship with traumatic events', 'emotional value of content', 'experienced distress', 'impact on functioning', 'repetition', 'complexity', 'location', 'time of the day', 'insight', 'interaction', 'commands', and 'illusions' were used. The item for musical hallucinations was included for auditory hallucinations. For tactile and olfactory hallucinations, solely the items for frequency and relationship with traumatic events were available in the QPE. Furthermore, an open question was included on the content of the four types of hallucinations.

The severity of hallucinations was calculated by adding the items 'frequency', 'duration', 'emotional value of content', 'experienced distress', 'impact on functioning' for auditory and visual hallucinations, and the item 'frequency' of the tactile and olfactory hallucinations.

The total score of the Beck's Depression Inventory-II (BDI-II) and the Beck's Anxiety Inventory (BAI) was used to measure the severity of depression and anxiety, respectively. These are self-report questionnaires; both consist of 21 items with good psychometric properties (31, 32).

The Schizotypal Personality Questionnaire (SPQ) was used to measure symptoms of schizotypy. This is a self-report measure, consisting of 74 items with subscales for all nine schizotypal traits within three clusters, that is the cognitive-perceptual cluster with subgroups 'ideas of reference', 'odd beliefs/magical thinking', 'unusual perceptual experiences', and 'suspiciousness', the interpersonal cluster with subgroups 'social anxiety', 'no close friends', 'constricted affect' and 'suspiciousness/paranoid ideation', and the cluster for disorganization, with subgroups 'eccentric/odd behavior', and 'odd speech'. The SPQ has high sampling validity and high internal reliability (33).

The De Jong Gierveld Loneliness Scale (DJGL) was used to measure social and emotional loneliness. The DJGL has sufficient to good reliability and validity (19). A calculated total score of at least three is an indication for the presence of loneliness (34).

Statistical analysis

Data analysis was performed with the SPSS 23. Patients were allocated to i) the group with hallucinations if they experienced hallucinations in the last 30 days prior to inclusion in this study or to ii) the group without hallucinations if they had never experienced hallucinations, *or* if hallucinations were present longer than 2 years ago *and* perceived

during one episode that lasted no longer than one week.

Demographic differences between the two groups were explored with chi-square tests and *t*-tests for independent samples. Since age was not normally distributed, a Mann–Whitney *U*-test for independent samples was used.

Data on the characteristics of hallucinations were investigated by means of descriptive analyses for the findings of the QPE.

Mann–Whitney *U*-tests for independent samples were used to compare scores for depression and anxiety, schizotypy, and loneliness between the groups with and without hallucinations, as scores for these outcome measures were not normally distributed. Sensitivity analyses were performed to explore whether the subgroup ‘unusual experiences’ for schizotypy explained the difference between the groups with and without hallucinations, by subtracting this subgroup from the summed score for schizotypy. Then, the correlation with severity of hallucinations and the difference between the two groups was explored.

Association between the severity of hallucinations and loneliness was analyzed with Spearman’s rho. With the aid of Benjamini–Hochberg correction, multiple testing was corrected for the SPQ and DJGL (35).

Results

This study included 60 female patients with BPD (37 in the hallucination group and 23 in the group without hallucinations). Table 1 presents the demographic data; there were no significant differences between the two groups. In the hallucination group, 28% used antipsychotics vs. 19% in the group without hallucinations.

Characteristics and severity of hallucinations

Tables 2 and 3 present the characteristics and severity of the hallucinations. In hallucinating participants, auditory, visual, tactile, and olfactory hallucinations were present at least once per month in 65%, 51%, 31%, and 47%, respectively. In 80%, these hallucinations were present in more than one modality. Hallucinations were reported with a mean frequency ranging from at least once a week to once a day and a mean duration ranging from one to several minutes. In 50% of the hallucinations, the content was negative; also, 23–47% of the patients related their hallucinations to traumatic events they had earlier experienced. In most patients, the auditory and/or visual hallucinations were experienced as repetitions, and more

Table 1. Characteristics of the 60 females with borderline personality disorder

	Hallucinations <i>n</i> = 37	No hallucinations <i>n</i> = 23	Test and <i>P</i> -value
Age in years, median (range)	39 (19–71)	33 (23–60)	MWUT 0.62
Education, <i>n</i> (%)			PCS 4.3, <i>P</i> 0.69
Primary school	4 (11)	4 (18)	
High school	3 (9)	1 (5)	
Vocational education	22 (63)	12 (54)	
University and higher vocational education	6 (17)	5 (23)	
GAF, mean (sd)	50.6 (8.4)	52.7 (5.5)	<i>t</i> -test 1.053, <i>P</i> 0.30
Medication, <i>n</i> (%)			
Antidepressive agents	13 (36)	13 (62)	FET, <i>P</i> 0.10
Benzodiazepines	12 (33)	9 (43)	FET, <i>P</i> 0.57
Antipsychotics	10 (28)	4 (19)	FET, <i>P</i> 0.54
Classical antipsychotics	1 (3)	0	
Atypical antipsychotics	7 (19)	4 (19)	
Classical and atypical antipsychotic	2 (6)	0	
Mood stabilizers	2 (6)	1 (5)	FET, <i>P</i> 1.0
Psychostimulants	2 (6)	5 (24)	FET, <i>P</i> 0.09

GAF, Global Assessment of Functioning; MWUT, Mann–Whitney *U*-test for independent samples; PCS, Pearson’s chi-square; FET, Fisher’s exact test.

complete phrases or complex images, but without a specific pattern of appearance during the day. Furthermore, for most patients, the belief that their experiences were real ranged from probably to completely convinced; in addition, they sometimes interacted with their experiences. Both benign and dangerous commands of auditory hallucinations were sometimes obeyed; almost none of the patients reported visual commands.

The ensuing distress of hallucinations ranged from moderate to substantial, and the extent of interference ranged from one specific activity to several activities of functioning.

Scores for depression and anxiety were higher in patients with hallucinations (Table 3). There was no difference in the scores for Global Assessment of Functioning between the two groups (Table 1).

Association between hallucinations and schizotypy

Table 3 presents data on schizotypy and loneliness. Summed scores of the SPQ and the three SPQ clusters were significantly higher for patients with hallucinations. For the schizotypal subgroups, all scores for the cognitive–perceptual cluster (‘ideas of reference’, ‘odd beliefs/magical thinking’, ‘unusual perceptual experiences’, and ‘suspiciousness/paranoid ideation’) and the subgroup ‘odd speech’ of the cluster for disorganization were significantly higher in the group with hallucinations. Examining the scores for the interpersonal cluster (‘social anxiety’, ‘no close friends’, ‘constricted affect’, and ‘suspiciousness/paranoid

Table 2. Characteristics and severity of hallucinations in borderline personality disorder

Hallucinations <i>n</i> = 37	Auditory	Visual	Tactile	Olfactory
Hallucinations at least in the last month, <i>n</i> (%)	24 (65%)	19 (51%)	11 (31%)	17 (47%)
Description of hallucinations	Voices with negative content, buzzing, banging on the door	Shadows and ghosts	Hand on shoulder and itching	Gas, smoke, and putridity
Frequency, mean (SD)	2.6 (1.3)	2.6 (1.2)	2.4 (1.4)	2.1 (1.2)
	At least once per day	At least once per day	At least once per week	At least once per week
Duration, mean (SD)	2.4 (1.7)	2.2 (1.9)	NA	NA
	One to several minutes	One to several minutes		
Related to trauma, no. (%)	10/22 (46%)	8/17 (47%)	4/12 (33%)	3/13 (23%)
Emotional value of content, mean (SD)	3 (2.1)	2.4 (1.8)	NA	NA
	Negative content in 50%	Negative content in 50%		
Distress, mean (SD)	2.5 (1.7)	2.6 (1.8)	NA	NA
	Substantial distress	Moderate distress		
Impact on functioning, mean (SD)	1.5 (1.6)	1.2 (1.7)	NA	NA
	Interfere with several activities	Interfere with some specific activities		
Repetition, majority	Same themes up to always the same words/phrases/noises	Often to constant repetition of the same images	NA	NA
Complexity, majority	More complete phrases	People and/or animals	NA	NA
Location, majority	Outside the head	No specific location	NA	NA
Time of the day, majority	No specific pattern in time	No specific pattern	NA	NA
Insight, majority	Probably real up to completely convinced that the voices/noises are real	Probably real up to completely convinced that images are real	NA	NA
Interaction, majority	Sometimes up to most of the time	Sometimes	NA	NA
Commands, majority	I sometimes obey benign up to dangerous commands	No commands	NA	NA
Illusions, majority	At least once per week	No illusions	NA	NA
Musical hallucinations, <i>n</i> (%)	12/24 (50)	NA	NA	NA

NA, not applicable.

ideation'), only the latter showed a significant difference between the two groups. The severity of schizotypy (i.e., the summed score of the SPQ) was positively correlated with the severity of hallucinations (Spearman's rho 0.605, $P < 0.001$). The subgroup 'unusual perceptions' of the SPQ could not solely explain the association between schizotypy and hallucinations; the total sum of the SPQ without the score for unusual perceptions remained higher in the group with hallucinations (Mann-Whitney U -test $P = 0.001$). Similarly, the significant correlation between schizotypy and severity of hallucinations persisted after omitting the 'unusual perceptions' subgroup from the total schizotypy score (Spearman's rho = 0.575, $P < 0.001$).

Association between hallucinations and loneliness

The criteria for loneliness were fulfilled in 81% of patients with hallucinations and in 48% of patients without hallucinations. Median scores for social loneliness and the summed score of loneliness were higher in patients with hallucinations compared to controls; the difference in emotional loneliness score lost significance after the Benjamini-Hochberg correction. Furthermore, the severity of hallucinations was significantly associated with the severity of the emotional, social, and total score

for loneliness (Spearman's rho and P -values of 0.381, $P = 0.003$, 0.376, $P = 0.003$ and 0.409, $P = 0.001$, respectively).

Discussion

The aim of this study was to explore the characteristics and severity of hallucinations in four sensory modalities and the association between hallucinations and severity of depression and anxiety, schizotypy, and loneliness in 60 female patients with BPD. Patients were divided into those with ($n = 37$) and without hallucinations ($n = 23$).

In the hallucinating patients, 31–65% reported hallucinations in different modalities; in 80%, the hallucinations were present in more than one modality. In the four modalities, frequency of hallucinations ranged from at least once per week to at least once per day; up to 47% related their hallucinations to previous traumatic events. The content of auditory and visual hallucinations was negative in 50%; most patients thought these perceptions were real. Scores for distress and impact on functioning ranged from moderate to substantial. Symptoms of anxiety and depression were higher in patients with hallucinations. Scores for the three clusters of schizotypy were higher in patients with hallucinations, as were scores for all

Table 3. Results for severity of depression and anxiety, schizotypy, and loneliness in patients with borderline personality disorder

	Hallucinations	No hallucinations	MWUT, <i>P</i> -value
Severity of hallucinations, median	9.5	0	(<0.001)
BDI-II, sum, median	37	20	0.002
BAI, sum, median	29.5	11.5	0.001
SPQ, median			
SPQ, sum	51	30.5	<0.001
SPQ cognitive-perceptual cluster	16	9	<0.001
SPQ ideas of reference	5	3	0.008
SPQ Odd beliefs/magical thinking	3	0	<0.001
SPQ unusual perceptual experiences	4	0	<0.001
SPQ suspiciousness/paranoid ideation	7	3	0.007
SPQ interpersonal cluster	23	14	0.001
SPQ social anxiety	7	5	0.013
SPQ no close friends	6	4	0.011
SPQ constricted affect	4	2	0.013
SPQ suspiciousness/paranoid ideation	7	3	0.007
SPQ disorganization	11	6.5	0.009
SPQ eccentric/odd behavior and appearance	4	2	0.076
SPQ odd speech	8	5	0.001
DJGL emotional loneliness, median	3	1	0.04
DJGL social loneliness, median	3	1	0.013
DJGL sum, median	5	2	0.015
DJGL loneliness number (%)	30 (81)	11 (48)	FET 0.010

The numbers in bold are significant after Benjamini-Hochberg correction.

BDI-II, Beck's Depression Inventory II; BAI, Beck's Anxiety Inventory; SPQ, Schizotypal Personality Questionnaire; DJGL, De Jong Gierveld Loneliness Scale; MWUT, Mann-Whitney *U*-test; FET, Fisher's exact test.

subgroups of the cognitive-perceptual cluster of schizotypy and the trait 'odd speech' of the cluster for disorganization. The scores for loneliness were higher in patients in the hallucination group (81%) compared to the controls (48%). The severity of both schizotypy and loneliness was associated with the severity of hallucinations.

The results for auditory hallucinations (i.e., auditory and auditory *verbal* hallucinations) were similar to earlier studies on AVH in patients with BPD (5–9).

Despite one study investigating prevalence rates and phenomenology of psychotic-like symptoms in patients with BPD, reporting alterations of perception in 36% of the patients (36), the characteristics and distress of other hallucinations in patients with BPD have not yet been explored in a structural manner; neither has the relationship with severity of anxiety and depression. However, studies on the association between comorbid affective disorders and the presence of psychotic symptoms in BPD have yielded inconclusive results. For example, in three studies, hallucinations and other psychotic symptoms were associated with affective disorders

(4, 37, 38). However, in another two studies, the presence of affective disorders failed to predict any subsequent psychotic symptoms (5, 39). Moreover, Benvenuti et al. (40) were unable to establish a difference between psychotic symptoms experienced by patients with BPD with and without a comorbid mood disorder on a lifetime basis.

Studies are lacking on the association between the presence of hallucinations in patients with BPD and schizotypy. High scores on the Schizotypal Personality Questionnaire (SPQ) have been related to increased vulnerability to psychosis (41). In patients with BPD, comorbid schizotypal personality disorder can be classified in 7% (42). In 23 patients with BPD (with no distinction between presence/absence of hallucinations) and 12 patients with schizotypal personality disorder, no differences were found between scores for the three clusters of schizotypy (43). This association with schizotypy was also found in patients with other personality disorders, except for cognitive-perceptual schizotypal personality disorder criteria that were significantly associated with BPD (44). Although no patients in our study fulfilled the criteria for schizotypal personality disorder, scores for the cognitive-perceptual, interpersonal, and disorganization cluster were higher for patients with BPD and hallucinations. A close link has been reported between BPD and schizotypy (17, 43), even for patients with BPD who did not fulfill the criteria for schizotypal personality disorder. In addition, our results for schizotypy are in line with those of Sommer et al. investigating a population with AVH without psychiatric diagnoses (45). The most prominent finding was the difference between voice hearers and non-voice hearers for the cognitive-perceptual subgroups, as also found in our study. Our scores for both hallucination and non-hallucination groups were higher in patients with BPD compared to individuals without psychiatric disorders (45).

Patients with BPD are reported to have more and stronger feelings of loneliness compared to healthy participants (27); these findings applied to both social and emotional loneliness. A correlation between loneliness and the presence of hallucinations has not yet been investigated in patients with BPD. However, in patients with psychotic disorders, a positive relationship between loneliness and the presence of hallucinations has not yet been established (24). In a review of Lim et al. (46), factors that may influence loneliness in individuals with psychosis were: mental health symptoms, social support, wellbeing, societal perceptions, and self-constructs. Several mechanisms that might link loneliness to psychotic symptoms (such as

hallucinations) have been reported. For example, Hoffman (21) assumed a relationship between social isolation and hallucinations based on his social deafferentation hypothesis; that is, high levels of social withdrawal or isolation among susceptible individuals can induce certain parts of the brain to produce social meaning, like auditory and visual hallucinations. This hypothesis is based, in part, on the fact that schizophrenia is strongly associated with previous social isolation (47) and that in 40% of cases, voices are labeled as familiar or recognizable (48). Although the social deafferentation hypothesis was initially formulated as a framework to explain positive psychotic symptoms in patients with schizophrenia (21), it may well apply to other diagnoses (49), as also illustrated by the present study. The social deafferentation hypothesis is similar to the pathway involving ‘anthropomorphism’ as described by Epley et al. (50). This latter pathway indicates that people are motivated to maintain a social connection with other people in their environment and, in case of social isolation and feelings of loneliness, they may try to compensate by perceiving human agency in non-human agents or an increasing likelihood of hearing voices (50).

Implications for clinical practice and future research

The results of this study have several implications. First, patients with BPD commonly experience auditory, olfactory, and visual hallucinations; in our patients, 50% of the content of the auditory/visual hallucinations was negative. The ensuing distress was moderate, and hallucinations were associated with higher scores for depression and anxiety. Thus, the term ‘hallucination-like experiences’ as provided in the DSM definition (2) might possibly be replaced by ‘hallucinations proper’, given the sense of reality and the high prevalence of acting upon these hallucinations in our patients with BPD. Findings for visual, tactile, and olfactory hallucinations were comparable to those for auditory hallucinations. Therefore, for clinicians, it is important to inquire whether patients with BPD experience hallucinations in all these modalities and to consider appropriate treatment for hallucinations when associated distress is high, rather than disregarding this phenomenon as being pseudo-hallucinations. Antipsychotics have been studied in patients with BPD for cognitive-perceptual symptoms, that is, suspiciousness, referential thinking, paranoid ideation, illusions, derealization, depersonalization, and hallucination-like symptoms (51) or ‘psychotic symptoms’. In three meta-analyses, small-to-moderate effect sizes were

found (51–53). In a systematic review of studies reporting on treatment of psychotic symptoms, both typical and atypical antipsychotics tend to have positive effects on psychotic features experienced in the context of BPD (13). These findings indicate that antipsychotics can be used in clinical practice of patients with BPD and hallucinations.

Second, SPQ scores for the cognitive-perceptual, interpersonal, and disorganization cluster were higher in patients with BPD and hallucinations. The results for the cognitive-perceptual subgroups were particularly prominent. This implies that BPD and schizotypal personality disorders (although considered to be part of different clusters) may in fact be more akin than previously thought. Therefore, in this patient group, treatment of the tendency for schizotypy should start with studying interventions related to psychotic disorders, such as antipsychotics, cognitive behavioral therapy, and non-invasive brain stimulation (54).

Finally, loneliness was associated with the presence of hallucinations in patients with BPD, with an exceptionally high prevalence among hallucinating patients with BPD. Loneliness can lead to both psychiatric and physical disorders (20); it can also follow several psychiatric disorders. Satisfying interpersonal relationships is essential for mental and physical wellbeing. Left untended, loneliness can have serious consequences for an individual’s mental and physical health. The existence of a relationship between loneliness and psychosis is well-known, but remains poorly understood (45). In clinical practice, the results for loneliness indicate the importance of these patients acquiring meaningful relationships. Therefore, involvement of the surroundings of the patient and family therapy should be part of the standard treatment of patients with BPD (and hallucinations).

In patients with BPD and hallucinations, since the underlying mechanism of loneliness is unknown, studies should focus on elucidating these mechanisms. This knowledge will allow to explore interventions for hallucinations other than those known from the treatment of psychotic disorders.

Limitations

This study has several limitations. First, as only females were included, it is unknown whether the results also apply to men. Second, since the study has a cross-sectional design, no assumptions can be made regarding causality. Third, the sample size of the population was only moderate. Fourth, the associations between psychotic symptoms in BPD and schizotypy might result from assessing the same findings in two different ways. Moreover, the

presence of a schizotypal personality disorder was explored using the DSM-5 criteria, without the use of a structured clinical interview.

Conflicts of interest

The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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