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BORDERLINE PERSONALITY DISORDER WITH VERSUS WITHOUT ALCOHOL USE DISORDER: COMPARING IMPULSIVITY AND SCHEMA MODES

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Substance use disorders (SUDs) and borderline personality disorder (BPD) are highly comorbid. In the present study, an attempt was made to understand the differences between BPD and BPD with comorbid SUD (BPD + alcohol use disorder [AUD]), by studying impulsivity and schema modes (i.e., maladaptive moment-to-moment emotional states and coping responses). BPD patients, BPD+AUD patients, and nonpatients (NP) were compared regarding behavioral impulsivity (motor impulsivity, risk taking, delay discounting), and schema modes. The two patient groups displayed greater delay discounting than the NP group. Further, BPD and BPD+AUD groups were different from the NP group regarding all schema modes investigated. However, no differences were found on any of the dependent variables between the two patient groups. It is suggested that although BPD patients are in general more impulsive and have more maladaptive moment-to-moment emotional states and coping responses, BPD patients with and without AUD seem not to be different in this respect.

Keywords: substance use disorder, alcohol, borderline personality disorder, impulsivity, schema modes

Substance use disorder (SUD) and borderline personality disorder (BPD) co-occur frequently, with percentages of BPD in SUD patients (in samples of patients with alcohol use disorders [AUDs] and drug use disorders [DUDs]) ranging from 7% to 27% (Trull, Sher, Minks-Brown, Durbin, & Burr, 2000; Verheul, Brink, & Hartgers, 1995) while 64–78% of BPD patients are believed to suffer from SUDs (AUDs and DUDs; Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004; Tomko, Trull, Wood, & Sher, 2014; Zanarini et al., 1998). These high comorbidity rates warrant research into the (dis)similarities between these two disorders.

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An explanation of the strong relationship between BPD and SUD might be found in the role that impulsivity plays in both disorders (Trull et al., 2000). Research on the relationship between impulsivity and SUD shows that there is a strong association: DUD patients (e.g. De Wit, 2009; Perry & Carroll, 2008) and AUD patients (Dick et al., 2010; Coskunpinar, Dir, & Cyders, 2013) are more impulsive, and impulsivity is a predictor of treatment outcome in DUD treatment (Boog et al., 2014; Patkar et al., 2004) and AUD treatment (Rupp et al., 2016). Further, impulsivity is a symptom of BPD according to the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revision (*DSM-IV-TR*; American Psychiatric Association [APA], 2000), and is considered a core aspect of BPD (Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011). Attempts to identify the dimensions that underlie the nine BPD symptoms resulted in four-factor solutions (Lieb et al., 2004) and three-factor solutions (Sanislow, Grilo, & McGlashan, 2000); in both models impulsivity was one of the factors. Because of the shared role of impulsivity, Zanarini (1993) even suggests that BPD and SUD may be placed in the same domain of psychopathology: impulse control disorders. Hypothetically, the comorbidity of two disorders characterized by impulsivity (BPD and SUD) would be related to increased levels of impulsivity, making BPD patients with comorbid SUD even more impulsive than BPD patients without SUD. This notion is supported by some studies (Coffey et al., 2011; Wilson, Fertuck, Kwitel, Stanley, & Stanley, 2006).

There are several studies addressing the differences between BPD patients and BPD+SUD patients regarding impulsivity. Impulsivity is seen as a multifaceted concept (Coffey et al., 2011; Franken & Muris, 2006; Stevens et al., 2014) that can be measured at the self-reported and behavioral level (Goudriaan, Oosterlaan, De Beurs, & Brink, 2008; Stevens et al., 2014). Although the term *impulsivity* suggests a unified construct, there is little to no overlap between these self-reported and behavioral measures (Bernoster, De Groot, Wieser, Thurik, & Franken, 2019; Cyders & Coskunpinar, 2011; Sharma, Markon, & Clark, 2014). There is some evidence for preferring the use of behavioral over self-reported measures, due to predictive validity (Boog et al., 2014; Goudriaan et al., 2008; Marhe, Luijten, & Franken, 2014; see Sharma et al., 2014 for contradicting results). At the behavioral level, impulsivity can be operationalized in at least three ways (Coffey et al., 2011; Franken & Muris, 2006): as rash, motor disinhibition (Logan, Cowan, & Davis, 1984); as a preference for smaller immediate rewards over delayed, bigger rewards (delay discounting; Petry, 2001); and as a tendency toward possible immediate rewards, when reward and punishment contingencies are unclear (Franken & Muris, 2005), also seen as risk taking (Stevens et al., 2014). Various studies in samples with AUD patients and DUD patients (Bosch, Verheul, & Brink, 2001; Lee, Bagge, Schumacher, & Coffey, 2010) found no differences in self-reported impulsivity between BPD patients versus BPD+SUD patients. These findings were replicated and extended by Maraz et al. (2016): They found no differences among BPD, BPD+DUD, and BPD+AUD on self-reported and behavioral (delay discounting) impulsivity. In other studies BPD+SUD patients (Coffey et al., 2011; Links, Heslegrave, Mitton, Reekum, & Patrick, 1995) and BPD+AUD patients (Wilson et al., 2006) obtained higher (self-reported)

impulsivity scores than BPD patients. Especially, the findings of Coffey et al. (2011) are notable in respect to the present study: BPD+SUD patients (it is not entirely clear whether the sample under consideration consisted of AUD or SUD patients; probably the sample was mixed) obtained higher scores on self-reported impulsivity than BPD patients, who, in turn, had higher scores than controls. BPD+SUD patients and BPD patients performed worse than controls on a task measuring behavioral inhibition, but did not differ from each other in this respect. No differences in risk taking were found between the three groups. Lastly, Coffey et al. (2011) found BPD+SUD patients to prefer smaller, immediate rewards over delayed, bigger rewards compared to controls. No differences in delay discounting were found between BPD+SUD patients versus BPD patients and BPD patients versus controls. Briefly worded: Coffey et al. (2011) found differences between BPD patients versus BPD+SUD patients in self-reported impulsivity, but not in behavioral measures of impulsivity.

An interesting, less documented perspective in studying (impulsive) personality and the differences between SUD and BPD is formed by schemas and schema modes, as defined by Young, Klosko, and Weishaar (2003). Schemas and schema modes might give a supplementary, less fundamental, and more clinically oriented perspective on the unpredictable, impulsive, and erratic behavior of BPD patients and SUD patients. Schemas are dysfunctional themes or patterns, consisting of cognitions, emotions, bodily sensations, and memories, and are often closely tied to early childhood adverse events (Young et al., 2003). Schemas serve as “templates” (Nysæter & Nordahl, 2008) for perception of everyday experiences. For example: A childhood that lacks emotional reliability might lead to the development of a “mistrust schema.” This schema causes a tendency to interpret social situations as hostile and to distrust others. Schema modes are the combination of a schema (or more than one schema) that is active at a given moment, and a specific coping reaction to this schema activation (Lobbestael, van Vreeswijk, & Arntz, 2007; Sempértegui, Karreman, Arntz, & Bekker, 2013); a schema mode therefore is similar to a state. Both schemas and schema modes play an important role in schema therapy, an evidence-based form of psychotherapy for BPD (Giesen-Bloo et al., 2006; Nadort et al., 2009). Including schemas and schema modes, next to impulsivity, in the investigation of BPD and SUD, might in the long run help to improve the treatment of patients with SUD and BPD. Studying impulsivity provides insight into the nature and development of SUD and BPD and the fundamental (dis)similarities between both disorders; schema therapy might eventually offer an holistic treatment approach and therapeutic tools. So, possibly, by investigating a more fundamental concept (impulsivity) and a concept that has more applied, therapeutical value (schema mode) in one study, insight might be gained in potential (dis)similarities regarding fundamentals and therapeutic approach of patients with BPD and BPD+SUD.

A preference for applying schema modes (over schemas) in BPD and SUD is suggested because of three reasons. First, BPD patients often display high scores on many schemas, and schema modes make therapy models more parsimonious (Lobbestael et al., 2007). Further, “mode flipping” in BPD patients is highly frequent (Sempértegui et al., 2013; mode flipping might hypothetically be seen as the psychotherapeutic labeling of impulsivity). Third,

schema modes appear to be relevant for AUD and DUD, because they clearly discriminate between nonpatients versus AUD patients and DUD patients (Boog, Van Hest, Drescher, Verschuur, & Franken, 2018). Therefore, we will focus on schema modes in the present study. In schema therapy, 14 different schema modes are defined. Of these 14 schema modes, the vulnerable child, angry child, impulsive child, punitive parent, and detached protector modes (see Table 1 for definitions of specific schema modes) are identified as being highly active in BPD, whereas lower scores on the healthy adult mode have also been linked to BPD (Arntz, Klokman, & Sieswerda, 2005; Lobbestael, Arntz, & Sieswerda, 2005; Lobbestael, van Vreeswijk, & Arntz, 2008; Sempértegui et al., 2013). Each of the schema modes has a specific (therapeutic) meaning, and demands specific therapeutic techniques. For example, in schema therapy, the child schema modes are targeted by fulfilling unmet childhood needs; the punitive parent schema mode is addressed in order to protect the patient from destructive thoughts.

Only one study (Boog et al., 2018) has examined the relevance of schema modes for AUD and DUD. Boog and colleagues found higher levels of dysfunctional scores on the schema modes detached self-soother, vulnerable child, angry child, impulsive child, and punitive parent in SUD patients compared to nonpatients. This study did not include comparisons of schema modes for BPD.

To our knowledge, regarding schema modes, studies on comparisons between BPD patients and BPD+SUD patients have not yet been performed. Therefore, in the present study, we investigated the differences between three groups of individuals: patients with BPD, patients with BPD+AUD (according to the *DSM-IV*), and nonpatients (NP). Only patients whose main SUD diagnosis was an alcohol dependency were included in the BPD+AUD group, in order to prevent confounding due to dependencies on different substances. AUD is believed to be the most prevalent SUD in BPD (Kienast, Stoffers, Berm-pohl, & Lieb, 2014; Trull, Jahng, Tomko, Wood, & Sher, 2010; Zanarini et al., 1998). The three groups were compared regarding impulsivity and schema modes, in order to gain more insight into the differences between BPD and BPD+AUD. Possibly, this might help improve treatment interventions of especially patients suffering from both disorders, who have been suggested to have more severe pathology than patients with BPD only or AUD only (Gianoli, Jane, O'Brien, & Ralevski, 2012; Heath, Laporte, Paris, Hamdullahpur, & Gill, 2018; Links et al., 1995), or than BPD patients with other comorbidities (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2004). Moreover, specific treatment interventions for BPD+SUD patients are scarce (Lee, Cameron, & Jenner, 2015; Pennay et al., 2011), and prognosis for patients with BPD+SUD is worse than for patients with only BPD (Kienast et al., 2014; Skodol et al., 2002). Arntz, Stupar-Rutenfrans, Bloo, van Dyck, and Spinhoven (2015), however, found that substance abuse was not predictive of discontinuation of nor recovery in psychotherapy for BPD. We hypothesized that BPD patients (with and without AUD) would obtain higher scores on measures of behavioral impulsivity than NP. As suggested above, behavioral measures of impulsivity might have better predictive validity, as compared to self-reported impulsivity. Therefore, we focused on behavioral measures of impulsivity. Based on prior research, it was expected that no differences would be found between BPD

TABLE 1. Schema Modes Investigated in the Present Study

<i>Child modes</i>	
Vulnerable child	The patient believes that nobody will fulfill his needs and that everyone eventually abandons him. He mistrusts others and believes that they will abuse him. He feels worthless and expects rejection. He is ashamed of himself and he often feels excluded. He behaves like a small, vulnerable child that clings to the therapist for help, because he feels lonely and believes there is danger everywhere.
Angry child	The patient feels intensely angry, enraged, and impatient because his core needs are not being met. He can also feel abandoned, humiliated, or betrayed. He expresses his anger in extreme manifestations, both verbal and nonverbal, just like a small child who has an outburst of anger.
Impulsive child	The patient wants to satisfy his (non-core) desires in a selfish and uncontrolled manner. He cannot control his feelings and impulses and he becomes enraged and infuriated when his (non-core) desires or impulses are not met. He often behaves like a spoiled child.
Undisciplined child	The patient has no tolerance for frustration and cannot force himself to finish routine or boring tasks. He cannot bear dissatisfaction or discomfort (pain, conflict, or overexertion) and he behaves like a spoiled child.
<i>Maladaptive coping modes</i>	
Detached protector	The patient cuts off strong feelings because he believes that such feelings are dangerous and can get out of hand. He withdraws from social contacts and tries to cut off his feelings (sometimes this leads to dissociation). The patient feels empty, bored, and depersonalized. He may adopt a cynical or pessimistic attitude to keep others at arm's length.
Detached self-soother	The patient seeks distraction in order not to feel negative emotions. He achieves this by soothing behavior (e.g., sleeping or substance abuse) or by self-stimulating activities (being fanatical or occupied with work, the internet, sport or sex).
<i>Maladaptive parent modes</i>	
Punitive parent	The patient is aggressive, intolerant, impatient, and unforgiving toward himself. He is always self-critical and feels guilty. He is ashamed of his mistakes and believes he had to be punished severely for them. This mode is a reflection of what (one of) the parents or other educators used to say to the patient in order to belittle or punish him.
<i>Healthy mode</i>	
Healthy adult	The patient has positive and neutralized thoughts and feelings about himself. He does things that are good for him and this leads to healthy relationships and activities. The healthy adult mode isn't maladaptive.

From *The Wiley-Blackwell handbook of schema therapy: Theory, research, and practice* (pp. 33–34), by M. F. van Vreeswijk, J. Broersen, and M. Nadort, 2012, Chichester: John Wiley & Sons. Copyright 2012 by John Wiley & Sons. Reprinted with permission.

patients and BPD+AUD patients regarding behavioral indices of impulsivity. Further, we limited our scope to eight schema modes. The vulnerable child, angry child, impulsive child, punitive parent, detached protector, and healthy adult schema modes were studied because of their relevance for BPD (Arntz et al., 2005), as described above. In addition to these six schema modes, we investigated the detached self-soother and undisciplined child schema modes because of their face validity for AUD (detached self-soother is about seeking distraction in order not to feel negative emotions; undisciplined child is related to lack of tolerance for frustration [see Table 1].) Regarding differences in schema modes, we expected that patients (both groups) would be rated as

more dysfunctional than NP. Furthermore, we expected BPD+AUD patients to obtain higher scores than BPD patients on the impulsive child, undisciplined child, and detached self-soother schema modes, because of the possible relationship of these schema modes to AUD. Regarding the other schema modes, no differences between the two patient groups were expected.

METHOD

PARTICIPANTS

A sample of 71 individuals volunteered to participate: 25 individuals diagnosed with BPD according to *DSM-IV-TR* (APA, 2000), 22 individuals with BPD and alcohol dependence according to *DSM-IV* criteria, and 24 individuals without a mental disorder (see Table 2 for characteristics of participants). For all participants, inclusion criteria were Dutch literacy and IQ above 80. Regarding the BPD group, exclusion reasons were ADHD (because of ADHD being characterized by impulsivity and therefore potentially obscuring the associations investigated in this study), psychotic disorders (except short, reactive psychotic episodes, as seen in BPD), bipolar disorder, and SUD. For the BPD+AUD group the same exclusions were used, with one additional criterion: a nonalcohol SUD that was the principal SUD. A power analysis indicated that with $N = 71$, 80% power was achieved to detect a large effect ($f = 0.34$) between the three groups at $\alpha = .05$, and a (large) effect of $f = 0.44$ at Bonferroni corrected alpha level of .00625 (f is “the standard deviation of the standardized means”; Cohen, 1992, p. 275). For the comparisons between the patient groups power was 80% to detect large effect sizes of $f = 0.42$ ($\alpha = .05$) respectively $f = 0.54$ ($\alpha = .00625$).

The administration of behavioral tests suffered from some challenges (regarding the functioning of the laptops used, but also with regard to the understanding of the instructions by the participants) and therefore not all participants completed all behavioral tests. Of the 25 BPD participants, 2 did not complete the Stop Signal Task (SST), for 1 other participant the Card Playing Task (CPT) was missing, and 1 individual did not complete any (SST, CPT, Delay Discounting Task [DDT]) behavioral test. The DDT outcomes of two individuals (1 of the BPD group and 1 of the BPD+AUD group) were excluded because of nonsystematic responding as defined by Johnson and Bickel (2008). No data were missing for the NP group. In case of missing data regarding any variables, participants were retained for other analyses.

PROCEDURE

Patients were recruited at two outpatient facilities of Antes, a mental health care institute in Rotterdam, the Netherlands. The study protocol was approved by the authorized Ethical Committee. Patients were solicited through internal announcements (using flyers and intranet announcements). Once a potential participant had given permission to be contacted, he/she was approached by a member of the research team. Information was given to the patient and a preliminary inclusion screening was performed. Subsequently, patients were

TABLE 2. Characteristics of Subjects

	BPD	BPD+AUD	NP
Gender	22 females (88%), 3 males (12%)	17 females (77%), 5 males (23%)	14 females (58%), 10 males (42%)
Age, years	$M = 35.88$ $SD = 9.51$	$M = 34.82$ $SD = 6.37$	$M = 33.67$ $SD = 7.37$
Level of education ^a	1 = 24% 2 = 56% 3 = 20%	1 = 36.4% 2 = 45.5% 3 = 18.2%	1 = 16.7% 2 = 54.2% 3 = 29.2%
BPDSI score	$M = 30.16$ $SD = 6.91$	$M = 31.28$ $SD = 6.72$	$M = 1.62$ $SD = 1.48$

^a Level of education: 1 = low (elementary to middle school), 2 = intermediate (high school), 3 = high (college or university); BPD = borderline personality disorder; AUD = alcohol use disorder; NP = nonpatients; BPDSI = Borderline Personality Disorder Severity Index.

asked to participate; informed consent concluded the inclusion. Nonpatients were recruited through convenience sampling. From controls informed consent was obtained as well. Finally, tests, questionnaires, and interviews were administered, usually in two sessions.

The participants in the BPD+AUD groups were recruited in the context of a broader (therapy) study. They were recruited at the SUD departments of Antes over 2.5 years. All BPD+AUD patients were participating in a psychotherapy research study. This psychotherapy research study lasted for a year.

The patients in the BPD group were not recruited in the context of a therapy study. They were recruited in departments of Antes that specialize in the treatment of personality disorders. These patients were referred for a treatment for an (alleged) personality disorder, most of them even for a specialized BPD program.

Nonpatients were recruited through the networks of the first two authors. The first two authors asked their friends and colleagues whether the social networks of these friends and colleagues could be approached to participate in the present study. If friends and colleagues agreed, the researchers contacted potential participants. Demographics of the two patient groups were taken into account (groups were matched regarding sex, age, and level of education).

MEASURES

The MINI-International Neuropsychiatric Interview-PLUS (MINI; Sheehan et al., 1997, 1998) is a short, structured interview for *DSM-IV* diagnoses. Its sensitivity and specificity are generally good; concurrent validity, test-retest reliability, and interrater reliability are good as well (Lecrubier et al., 1997; Sheehan et al., 1997, 1998).

The Structured Clinical Interview for the *DSM-IV* Axis II disorders (SCID II; Gibbon, Spitzer, Williams, Benjamin, & First, 1997) is a semistructured interview for the assessment of personality disorders according to the *DSM-IV*. It has excellent interrater reliability (Lobbstaël, Leurgans, & Arntz, 2011), and good test-retest reliability (Zanarini & Frankenburg, 2001; Zanarini et al., 2000).

The Schema Mode Inventory is a questionnaire assessing schema modes. It has adequate psychometrical qualities (Lobbestael, van Vreeswijk, Spinhoven, Schouten, & Arntz, 2010). Only eight schema modes were used (see Table 1).

The Borderline Personality Disorder Severity Index (BPDSI) is a semi-structured interview (Giesen-Bloo, Wachtters, Schouten, & Arntz, 2010). It is a valid and reliable instrument (Arntz et al., 2003; Giesen-Bloo et al., 2010) that investigates the frequency and severity of BPD symptoms in a period of 3 months. The BPDSI was employed to confirm the SCID-II diagnosis of BPD. Participants needed a score of 20 or higher to be included (Giesen-Bloo et al., 2010); a score of 15 was seen as the cutoff between patients with BPD and nonpatients (Arntz et al., 2003).

The Stop Signal Task (SST) is a behavioral, neuropsychological test that measures motor disinhibition (Verbruggen & Logan, 2008; Verbruggen, Logan, & Stevens, 2008). The most important outcome variable of this task is the stop signal reaction time (SSRT). The SST examines the capacity to inhibit a reaction that has already been set (see Boog, Goudriaan, Wetering, Deuss, & Franken, 2014 for a more detailed description of the SST).

The Card Playing Task (CPT) is a neurocognitive instrument that tests reward sensitivity (Goudriaan, Oosterlaan, de Beurs, & Brink, 2005; Goudriaan et al., 2008). It is a gambling task in which high reward sensitive individuals show a preference for smaller, immediate rewards over long-term, larger rewards. The number of cards played is the dependent variable: High reward sensitive individuals will play on even when they lose substantially (Goudriaan et al., 2005). In the CPT, the decision making that is done while rewarding is unclear (Boog et al., 2013; see this reference for more details about the CPT). High scores on the CPT come with a tendency to take risks (Stevens et al., 2014).

The DDT (Stevens, Verdejo-García, Roeyers, Goudriaan, & Vanderplassen, 2015) is a behavioral impulsivity task that, like the CPT, measures the preference for smaller, immediate rewards relative to delayed, larger rewards (Stevens et al., 2014). Delay discounting is the phenomenon that the perceived value of rewards tends to diminish as a function of time (Wittmann, Leland, & Paulus, 2007), which is augmented in SUD (Amlung, Vedelago, Acker, Balodis, & MacKillop, 2017). However, contrary to the CPT, in the DDT, participants are aware of the contingencies. In six blocks of eight trials per block, participants are asked to state their preference for a smaller, immediate financial reward versus a delayed financial reward. With help of a fixed value per block of the delayed rewards and a fixed number of days per block between the immediate and delayed reward, and a computerized adaption in the value of the immediate reward (based on the responses of the subject), an indifference point is determined for each block (Stevens et al., 2015). The indifference point (determined for each of the six blocks) is the value of the immediate reward that is equally preferred to the delayed reward. The indifference points are plotted for every delay of the six blocks, which results in a curve. The dependent variable is the area under the curve (AUC; Schmaal, Goudriaan, Meer, Brink, & Veltman, 2012). A smaller AUC (and a corresponding steeper delay discounting function) represents higher impulsivity.

DATA ANALYSIS

To find out whether the BPD, BPD+AUD, and NP groups differed regarding gender and level of education, Chi-square tests for independence were applied. To compare the three groups in respect to age, a one-way analysis of variance (ANOVA) was used.

In order to examine differences regarding indices of impulsivity and schema modes multivariate analyses of variance (MANOVAs) were conducted. If considerable differences regarding demographic variables were found, multivariate analyses of covariance (MANCOVAs) were applied.

RESULTS

DEMOGRAPHIC CHARACTERISTICS

Demographics and BPDSI scores are presented in Table 2. A one-way ANOVA pointed out that the BPD group, the BPD+AUD group, and the NP group did not differ in age: $F(2, 68) = .48, p = .62$. Chi-square tests for independence showed that the three groups were not significantly different from each other regarding level of education ($\chi^2(4) = 2.79, p = .59$), nor gender ($\chi^2(2) = 5.81, p = .06$). However, because of the considerable differences regarding gender between the three groups, gender was added to the analyses (regarding impulsivity and schema modes) as a covariate.

IMPULSIVITY

In order to compare the three groups concerning behavioral measures of impulsivity, a one-way MANCOVA (with gender as covariate) was used (Table 3). No significant differences were found in the SSRT (SST), nor regarding cards (CPT). A significant difference at the $p < .05$ level was found in AUC (DDT): BPD patients and BPD+AUD patients obtained lower scores than NP (large effect size). BPD patients and BPD+AUD patients did not differ from each other in AUC.

SCHEMA MODES

A MANCOVA (with gender as covariate) was used to investigate possible differences regarding schema modes (Table 4). To avoid Type 1 errors, we used a Bonferroni adjustment to the alpha level: The alpha level was set at .00625 (.05/8). The two patient groups differed significantly from NP on the schema modes vulnerable child, angry child, impulsive child, undisciplined child, punitive parent, detached protector, detached self-soother, and healthy adult (post-hoc comparisons indicated that the two patient groups obtained higher scores on vulnerable child, angry child, impulsive child, undisciplined child, punitive parent, detached protector, and detached self-soother than NP; NP obtained a higher score on the healthy adult mode than the patient groups). All effect sizes (partial eta squared) were large (according to Cohen, 1988). No significant differences in schema modes between BPD and BPD+AUD groups were found.

TABLE 3. MANCOVA Behavioral Measures of Impulsivity

	Mean (SD)	F (df)	p	Partial eta squared	Post-hoc analyses
AUC (DDT) ^a	NP ^d : .61 (.21) BPD ^e : .38 (.21) BPD ^f +AUD: .34 (.19)	11.49 (2, 64)	≤ .001	.27 (large effect size)	NP > BPD/ BPD+AUD
SSRT (SST) ^b	NP: 236 (34) BPD: 249 (45) BPD+AUD: 238 (49)	.62 (2, 64)	.54	.020	—
Cards (CPT) ^c	NP: 33.21 (17.31) BPD: 37.55 (25.93) BPD+AUD: 45.14 (31.87)	1.21 (2, 65)	.30	.038	—

^aAUC (DDT) = area under the curve in the Delay Discounting Test; ^bSSRT (SST) = stop signal reaction time in the Stop Signal Test; ^cCards (CPT) = the number of cards played in the Card Playing Test; ^dNP = nonpatients; ^eBPD = borderline personality disorder; ^fAUD = alcohol use disorder.

Pairwise contrasts (Table 5) showed, in line with the MANCOVAs described above, that the differences between BPD patients and BPD+AUD patients regarding the schema modes under investigation were nonsignificant (although the effect sizes regarding the schema modes impulsive child and undisciplined child were substantial—BPD+AUD patients had higher scores on these two schema modes than BPD patients).

Additionally, intercorrelations between schema modes and impulsivity tasks were computed (Table 6).

DISCUSSION

Are BPD patients who suffer from a comorbid AUD different from “regular” BPD patients, further than their pervasive usage of substances? In the present study, an attempt has been made to answer this question regarding impulsivity and schema modes.

On two behavioral measures of impulsivity (rash, behavioral motor disinhibition and a tendency toward possible immediate rewards), when reward and punishment contingencies were unclear (risk taking), no differences were found between the three groups. In delay discounting, the two patient groups obtained lower scores than the NP group (indicating that the patients were more impulsive), but BPD patients and BPD+AUD patients did not differ from each other. The effect size in this analysis was large, indicating that the difference in mean scores was substantial.

The findings regarding impulsivity in our study correspond partly to our hypotheses. In line with our hypotheses, behavioral indices of impulsivity did not yield differences in scores between BPD patients and BPD+AUD patients. However, two measures of impulsivity (CPT and SST) did not differ among any of the three groups, suggesting that BPD patients (with and without AUD) do not differ from controls regarding risk taking or motor impulsivity. In delay discounting, meaningful differences between BPD patients (BPD and BPD+AUD) and nonpatients were found, suggesting that patients tend to favor immediate rewards over future rewards. In other words, rewards rapidly

TABLE 4. MANCOVAs Schema Modes

	Mean (SD)	F (df)	p	Partial eta squared	Post hoc analyses
Vulnerable child	NP: 1.16 (.20) BPD ^b : 3.55 (.99) BPD+AUD ^c : 3.65 (.78)	85.48 (2, 67)	≤ .001	.72 (large effect size)	BPD/BPD+AUD > NP
Angry child	NP: 1.68 (.56) BPD: 3.49 (.87) BPD+AUD: 3.43 (.74)	45.67 (2, 67)	≤ .001	.57 (large)	BPD/BPD+AUD > NP
Impulsive child	NP: 1.70 (.56) BPD: 3.04 (.77) BPD+AUD: 3.48 (.95)	33.91 (2, 67)	≤ .001	.50 (large)	BPD/BPD+AUD > NP
Undisciplined child	NP: 1.88 (.62) BPD: 2.93 (.99) BPD+AUD: 3.41 (.77)	21.52 (2, 67)	≤ .001	.39 (large)	BPD/BPD+AUD > NP
Punitive parent	NP: 1.30 (.25) BPD: 2.97 (1.10) BPD+AUD: 3.04 (.85)	34.20 (2, 67)	≤ .001	.50 (large)	BPD/BPD+AUD > NP
Detached protector	NP: 1.27 (.23) BPD: 2.91 (.97) BPD+AUD: 2.95 (.74)	42.48 (2, 67)	≤ .001	.56 (large)	BPD/BPD+AUD > NP
Detached self-soother	NP: 1.62 (.42) BPD: 3.58 (1.12) BPD+AUD: 3.89 (.88)	48.09 (2, 67)	≤ .001	.59 (large)	BPD/BPD+AUD > NP
Healthy adult	NP: 4.92 (.43) BPD: 3.38 (.69) BPD+AUD: 3.22 (.51)	68.44 (2, 67)	≤ .001	.67 (large)	NP > BPD/BPD+AUD

^aNP = nonpatients; ^bBPD = borderline personality disorder; ^cAUD = alcohol use disorder.

lose their subjective value for BPD patients and BPD+AUD patients, when the delivery of these rewards is postponed.

Our findings regarding behavioral impulsivity are in concordance with a study comparing BPD patients with NP (Barker et al., 2015), in which no differences were found between these two groups on motor impulsivity. Further, in the Barker et al. study, BPD patients showed greater delay discounting than NP. Coffey et al. (2011) compared BPD patients, BPD+SUD patients, and nonpatients. Contrary to the present study, they found motor impulsivity to be a characteristic of BPD patients and BPD+SUD patients. In line with our findings, no differences in risk taking were found among the three groups. Coffey et al. (2011) concluded delay discounting to be a variable that distinguished BPD+SUD patients from NP (a finding that is supported by findings of Maraz et al., 2016). The results of the present study support the conclusion of Coffey et al. (2011) that BPD patients and BPD+SUD patients do not differ on behavioral indices of impulsivity. Based on the present study and prior research (Coffey et al., 2011; see also Maraz et al., 2016), although findings are mixed, delay discounting might be the impulsivity variable that most strongly differentiates BPD patients and BPD+SUD patients from NP.

As far as schema modes, the outcomes of the present study match the hypotheses based on prior research (among others Arntz et al., 2005). Significant differences, reflecting more maladaptive behavior, in the typical modes

TABLE 5. Pairwise Contrasts Between BPD^a+AUD^b Patients and BPD Patients

	Estimated means (standard error)	<i>t</i>	<i>p</i>	Estimated Cohen's <i>d</i>
Vulnerable child	BPD: 3.60 (.15) BPD+AUD: 3.67 (.16)	0.30	.76	.09
Angry child	BPD: 3.53 (.15) BPD+AUD: 3.44 (.16)	-0.45	.65	-.14
Impulsive child	BPD: 3.12 (.15) BPD+AUD: 3.50 (.16)	1.74	.087	.52 (medium effect size)
Undisciplined child	BPD: 2.98 (.16) BPD+AUD: 3.42 (.17)	1.89	.063	.57 (medium effect size)
Punitive parent	BPD: 2.96 (.17) BPD+AUD: 3.04 (.18)	0.31	.75	.09
Detached protector	BPD: 2.95 (.14) BPD+AUD: 2.96 (.15)	0.03	.97	.01
Detached self-soother	BPD: 3.64 (.17) BPD+AUD: 3.90 (.18)	1.04	.30	.31 (small effect size)
Healthy adult	BPD: 3.36 (.11) BPD+AUD: 3.22 (.12)	-0.84	.40	-.25 (small effect size)

^aBPD = borderline personality disorder; ^bAUD = alcohol use disorder.

that are related to BPD—that is, vulnerable child, angry child, impulsive child, punitive parent, detached protector, and healthy adult—were found when comparing the two patient groups on one hand and individuals without psychopathology on the other. As expected, patients scored as more dysfunctional on all the modes under investigation. Regarding schema modes that were expected to be related to AUD (impulsive child, detached self-soother, and undisciplined child), the two patients groups had higher scores than the NP group, too. But, contradicting our hypotheses, BPD+AUD patients did not obtain higher scores than BPD patients on these three schema modes. The difference, however, between BPD patients and BPD+AUD patients concerning the undisciplined child was substantial (although not significant), with BPD+AUD patients scoring higher than BPD patients. A similar phenomenon showed up regarding the impulsive child schema mode (BPD+AUD patients obtaining higher scores than BPD patients). Failure to reach significance regarding the comparison between BPD patients and BPD+AUD patients on these two schema modes might be a consequence of insufficient statistical power, and a larger sample size might have led to significant differences. However, the similarities between BPD patients and BPD+AUD patients regarding schema modes found in the present study might possibly be a reflection of the transdiagnostic quality of schema modes.

Regarding the differences between the two patient groups on one hand and NP on the other, effect sizes were large, which means that all eight schema modes appear to be meaningful variables for BPD patients with and without AUD. The specific profile as found in BPD patients in prior research (high scores on vulnerable child, angry child, impulsive child, punitive parent, and detached protector modes and a lowered healthy adult score; Sempértegui

TABLE 6. Correlations Between Schema Modes and Impulsivity Tasks

Scale	1	2	3	4	5	6	7	8	9	10	11
AUC (DDT)	—	-.12	-.06	-.45**	-.43**	-.29*	-.25*	-.34**	-.38**	-.40**	-.46**
SSRT (SST)		—	.03	-.13	-.03	-.07	-.16	-.04	-.03	-.17	-.12
Cards (CPT)			—	.07	.10	.12	.12	.14	.01	.12	-.22
Vulnerable child				—	.78**	.76**	.64**	.77**	.81**	.83**	-.79**
Angry child					—	.78**	.58**	.75**	.75**	.67**	-.62**
Impulsive child						—	.73**	.72**	.76**	.63**	-.58**
Undisciplined child							—	.69**	.59**	.44**	-.48**
Detached protector								—	.72**	.60**	-.68**
Detached self-soother									—	.73**	-.64**
Punitive parent										—	-.69**
Healthy adult											—

**Correlation is significant at the .01 level (2-tailed); *Correlation is significant at the .05 level (2-tailed).

et al., 2013) was found in the present study in BPD patients as well as in BPD+AUD patients.

As far as the variables that we investigated, we found evidence that the differences between the personalities of BPD+AUD patients and BPD patients are limited. For clinical practice, our findings therefore might suggest that the advancements regarding schema therapy for BPD (Giesen-Bloo et al., 2006; Nadort et al., 2009) might be valid for BPD+AUD patients as well (as suggested by Bosch et al., 2001). Indeed, comorbid SUD was not an exclusion criterion in these studies on schema therapy for BPD—only when clinical detox was deemed necessary was the patient excluded. Specialized treatment programs for personality disorders are often not accessible for patients with comorbid SUD (Bosch et al., 2001), at least in the Netherlands. Although further research is needed, the present study suggests that the underlying personalities (regarding impulsivity and schema modes) of BPD patients and BPD+SUD patients might not be very different, and perhaps the psychotherapeutic approach should not be that different either. Perhaps evidence-based psychotherapeutic approaches for BPD should be supplemented with specialized SUD interventions, and therapists should become familiar with topics specific for SUD treatment (such as urine tests, intoxication, and knowledge of addictive substances).

A shortcoming in the present study is the difference in recruitment between the groups of BPD patients and BPD+AUD patients. The BPD+AUD patients were solicited in the context of a therapy study: Their refusal in the present study was a refusal of the therapy study. The BPD group was recruited just for the present study. It is unclear whether a sampling bias occurred because of this. Further, many more AUD patients were denied participation because they met an exclusion criterion (predominantly because a BPD could not be diagnosed) than patients who were considered for inclusion in the BPD group. This was likely due to two reasons: the very specific treatment referral of the BPD group for psychotherapy for their (borderline) personality disorder and the obscurity in symptoms in AUD patients who had recently become

abstinent of alcohol. Possibly, health care professionals confused the emotional instability of patients going through withdrawal with BPD symptoms. This led them to refer patients for the present study. When subsequent formal diagnostic classification was performed, oftentimes a BPD diagnosis could not be established. Third, due to limited sample size, the present study suffers from restricted power. Only large effects (Cohen's $d = 0.83$ for uncorrected p level, respectively; $d = 1.05$ for Bonferroni corrected p level) could be detected with 80% power between the two patient groups. Although including a sample with BPD patients and especially BPD+AUD patients is challenging, this is a shortcoming of the present study. Fourth, the nonpatient group was recruited through convenience sampling, which is a potential shortcoming of the study.

Future research should address these limitations, and is also needed to further broaden the scope of these findings. Can these findings be extended to other personality disorders and other SUD? And is it really so that BPD+SUD patients can benefit from psychotherapy?

All in all, the outcomes of the present study suggest a pronounced profile of schema modes in BPD and BPD+AUD patients, but limited differences between these two patient groups regarding schema modes. Regarding behavioral impulsivity, BPD patients and BPD+AUD patients showed more delay discounting, but they did not exhibit higher levels of risk taking, and had no higher levels of motor impulsivity. BPD patients and BPD+AUD patients did not differ on any impulsivity variable. Future studies should further unravel whether fundamental differences between BPD patients and BPD+AUD patients do exist. Given the possibly limited differences between the groups, future studies should also clarify whether BPD+AUD patients need a different treatment approach than BPD patients without AUD.

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