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Original Article

Covariance and specificity in adolescent schizotypal and borderline trait expression

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Abstract

Aims: The first aim of the present study is to assess the overlap between borderline and schizotypal traits during adolescence. The second objective is to examine whether some psychological factors (i.e. cognitive coping mechanisms, impulsivity and encoding style) are differentially related to borderline and schizotypal traits and may therefore improve the efficiency of clinical assessments.

Methods: One hundred nineteen community adolescents (57 male) aged from 12 to 19 years completed a set of questionnaires evaluating the expression of borderline and schizotypal traits as well as cognitive emotion regulation (CER), impulsivity and encoding style.

Results: Our data first yielded a strong correlation between borderline and schizotypal scores ($r = 0.70$, $P < 0.001$). Secondly, linear regression models indicated that the 'catastrophizing' CER strategy and the 'lack of premeditation' impulsivity facet accounted for the level of borderline traits, whereas an internal encoding style predominantly explained schizotypal traits.

Conclusions: Our results support the abundant literature showing that borderline and schizotypal traits frequently co-occur. Moreover, we provide original data indicating that borderline and schizotypal traits during adolescence are linked to different specific psychological mechanisms. Thus, we underline the importance of considering these mechanisms in clinical assessments, in particular to help disentangle personality disorder traits in youths.

Key words: assessment, cognitive coping, co-morbidity, encoding style, impulsivity.

INTRODUCTION

Adolescence is a key period for the emergence of borderline and schizotypal personality disorders (BPD and SPD, respectively).[1–5] Historically, BPD described patients at the boundary between neurosis and psychosis,[6] and both BPD and SPD were conceptualized as two types of 'borderline states'.[7] Nowadays, BPD and SPD are separated into two independent entities: BPD refers to a general pattern of instability in personal relationships, identity disturbance and impulsivity, and SPD is delineated by a diminished capacity for close relationships, odd behaviours and cognitive/perceptual distortions.[8] It is now widely recognized that maladaptive personality traits are expressed in the general population, and that in the absence of a full-blown disorder, they may nevertheless signal a predisposition for a forthcoming disorder.[9] From this standpoint, personality disorders are extreme manifestations of underlying continuous dimensions.[9] Adolescence is a critical period in which *subclinical manifestations*, such as *borderline and schizotypal personality traits* (*BPT/SPT*), may become clinically significant,[1,10–18] and indicate a risk for long-term dysfunction.[19] Co-morbidity is common[9] in personality disorders, and BPD and SPD are no exception. Indeed, both the categorical (i.e. BPD/SPD) and the dimensional (i.e. BPT/SPT) approach to personality pathologies emphasize that borderline and

schizotypal symptoms frequently co-occur.[12,20–29] However, although the close link between borderline and schizotypal features is commonly acknowledged,[30] their phenomenological overlap still challenges even the most experienced clinicians. Moreover, the distinction between them may be further blurred by *common adolescent manifestations* (e.g. *increased risky behaviours*), which may often be mistaken as pathological markers. Thus, examining some of the psychological mechanisms sustaining BPT and SPT expression during adolescence may further the development of integrative clinical assessments.

Recent evidence suggests that low-level information processing, particularly encoding style, is critical for SPT expression.[31] Encoding style refers to early implicit filters that restrain what a person encodes of external ambiguous information. Encoding processes impose on external stimuli pre-existing categories (interpretive schema), even if the stimuli do not perfectly fit those categories. It has been shown that the degree of information necessary to initiate an interpretive schema varies among people, from those prone to rashly interpret environmental cues in terms of pre-existing encoding categories (internal) to those who are more conservative and more based on accumulated evidence from the outside world (external).[32] A polarized encoding style may sustain faulty attribution in everyday life,[33] which is consistent with cognitive models of psychosis that emphasize the processes involved in internal versus external information discrimination.[34,35] In particular, evidence shows that the attribution of internal content to an external source in memory tasks is associated with increased schizotypal expression, in non-clinical adolescents,[36] healthy[37] and schizophrenic adults.[38,39] Encoding style may represent a specific and easily identifiable developmental factor of schizotypal expression in adolescence.

Concerning BPT, current theories converge in attributing a pivotal role to emotion dysregulation.[40] However, cognitive emotion regulation (CER) remains a psychological factor less documented. CER refers to cognitions through which individuals manage and control their emotions during or after stressful events and/or events that generate negative emotions.[41] Based on their self-regulatory effect, these cognitions can be separated into 'more' or 'less' adaptive strategies (CERS). Less adaptive CERS play a significant role in adults and adolescents reporting psychopathological manifestations[42,43] and in adults suffering from a personality disorder.[44]

Impulsivity represents another core aspect of borderline condition.[45,46] Impulsivity has been conceptualized as a multi-faceted construct comprising four distinct components (i.e. urgency, lack of perseverance, lack of premeditation and sensation seeking)[47] that may differentially contribute to the development and maintenance of various mental disorders or psychopathological symptoms.[48] The urgency facet (i.e. the tendency to behave hurriedly when experiencing intense emotions) best accounts for the presence of impulsivity symptoms[48,49] in BPD, and individuals with a BPD diagnosis generally display a higher mean level of urgency than control participants.[50] Moreover, urgency is involved in core features of BPD: substance abuse,[47,51,52] non-suicidal self-injury,[49,53] suicidal[49] and risky sexual[48,54,55] behaviours. Other impulsivity facets have also been associated with clinical features of the borderline condition. For instance, lack of premeditation is linked with excessive alcohol and drug consumption,[48,56,57] suicidality[58] and aggressiveness.[48] Investigations on the association between sensation seeking and addictive behaviours have led to mixed results.[48,56,59–62]

Within this framework, the first aim of the present study is to assess the degree of overlap between BPT and SPT in youth. As established in adult samples, we postulate that the general level of schizotypal and borderline personality traits are strongly correlated in a community sample of adolescents. At a dimensional level, we expect the level of BT to be specifically associated with positive and disorganized ST. The second objective is to investigate the extent to which key psychological factors differentially contribute to BPT and SPT, demonstrating the usefulness of parsing these constructs into distinct dimensions to increase clinical assessment specificity. We hypothesize that negative CERS and high impulsivity, especially urgency, will best account for the total level of BT, whereas a predominantly internal encoding style will specifically contribute to the total level of ST.

METHODS

Participants

Participants were recruited through written advertisement and word of mouth in the Geneva area. Inclusion criteria were age interval (12–19 years), French-native speaker and parental consent. After a phone call for presenting research objectives, potential participants and their parents decided whether to volunteer for the study. Participants consulting mental health professionals were excluded ($n = 38$). Our final sample encompassed

119 community adolescents (57 male; M_{age} = 16.18, SD_{age} = 1.91), including 94.1% white Caucasian, 3.0% African, 2.0% mixed and 0.9% Asian, and were primarily from middle (n = 60) and superior (n = 46) socio-economic status. Written informed consent was received from participants and their parents under protocols approved by the Institutional Review Board of the Department of Psychiatry of the University of Geneva Medical School. Adolescents were offered a small financial compensation for their participation (20 CHF/hour).

Procedure

Clinical psychologists supervised the individual administration of self-report questionnaires, ensuring that all subjects understood the items.

Measures

The *Schizotypal Personality Questionnaire*[63] (SPQ) was used to assess schizotypal trait expression. It included 74 dichotomous items, yielding a total score and three dimension scores: 'Cognitive-Perceptual', 'Interpersonal' and 'Disorganisation'. The SPQ was validated with French-speaking adolescents,[64] replicating the original three-factor structure.[63]

The *Borderline Personality Inventory*[65] (BPI) comprised 53 7-point scale items, yielding a total score and the six following subscores: 'affectivity/identity disturbance', 'dissociative/psychotic aspects', 'narcissism', 'instable relationships', 'impulsivity' and 'substance use'. The BPI has been validated in a French-speaking adolescent sample (α from 0.56 to 0.90).[66]

The *Youth and Adult Self-Reports* (YSR[67]/ASR[68]) encompassed a series of 119 3-point scale statements from which standardized level of internalizing and externalizing can be calculated. YSR and ASR have been validated in francophone samples (α > 0.80).[69]

The *Encoding Style Questionnaire*[32] (ESQ) included six critical 6-point scale items assessing the frequency of 'split-second illusion' (e.g. When I'm on a walk, I sometimes see a rock or piece of wood and for a split second mistake it for something else) and 15 disguising items. High scores on ESQ reflect an internal encoding style. ESQ showed good psychometric properties in francophone youths (α = 0.67).[70]

The *Cognitive Emotion Regulation Questionnaire*[42] (CERQ) encompassed 36 5-point scale items that measured nine more or less adaptive CERS: 'Acceptance', 'Positive refocusing', 'Refocus on planning', 'Positive reappraisal', 'Putting into perspective', 'Self-blame', 'Rumination', 'Catastrophizing' and 'Blaming others'. The CERQ has been validated for French-speaking adolescents (α > 0.70, except for acceptance α > 0.60).[71]

The French *UPPS impulsive behaviour scale*[72] (UPPS) comprised 45 4-point scale items evaluating the following impulsivity facets: 'Urgency', 'Lack of premeditation', 'Lack of perseverance' and 'Sensation seeking'. As our standard assessment protocol has been slightly modified (notably for time concerns), part of the sample (n = 60) was given the short version of the UPPS (UPPS-P),[73] created by selecting for each facet the four UPPS items with stronger loadings. UPPS and UPPS-P showed good reliability in French samples (α = 0.70–0.84).[73,74]

Data analyses

To determine the amount of shared variance between BPI and SPQ *total scores*, normally distributed in our sample, Pearson's product moment correlations (r) were assessed. Because each of BPI and SPQ *subscales* scores violated the assumption of normality (Kolmogorov–Smirnov test below $P < 0.05$), Spearman's rho coefficients (rs) were calculated to estimate their relationships. To obtain confidence intervals (5 and 95% points of the distribution of bootstrap estimates), bootstrapping procedure (for 1000 bootstrap trials)[75,76] was used. Then, partial correlations ($r_{partial}$), accounting for YSR/ASR scores, were carried out between UPPS, CERQ, ESQ and, respectively, SPQ and BPI total scores, all normally distributed in our sample. To make sure the results are not the by-product of common phenomenological characteristics in assessment instruments, items assessing positive psychotic features and impulsivity in our BPT measure were subtracted from the original BPI total score. This did not significantly affect the reliability of our measure. Cronbach's α of BPI total without psychotic and impulsivity features remained above 0.90. Lastly, two stepwise multiple regression models were run to assess the contribution of the UPPS, CERQ and ESQ scales (independent variables) to the SPQ (accounting for BPI scores) and the BPI (accounting for SPQ scores) total scores. Both models also controlled for the level of YSR/ASR scores. Thus, control variables (BPI/SPQ total scores; YSR internalizing and externalizing scores) were entered in step 1, whereas all independent variables (UPPS, CERQ and ESQ scores) were inserted together in step 2. Multicollinearity and influential cases were tested with variance inflation factors, standardized residual and cook distance coefficients.

TABLE 1. Means, standard deviations, range expected mean and standard deviations for each variable in the total sample

	Mean (SD)	Range	Expected mean (SD)
SPQ total score	19.91 (12.98)	0–57	15.63 (11.31)
BPI total score	106.44 (34.53)	51–201	125.1 (44)
YSR/ASR internalizing per.	54.02 (29.50)	2–98	50 (34)
YSR/ASR externalizing per.	65.23 (26.16)	2–98	50 (34)
ESQ total score	18.50 (6.00)	6–32	18.93 (5.76)
CERQ acceptance	13.66 (3.31)	6–20	12.79 (3.14)
CERQ blaming others	7.85 (2.75)	4–20	7.98 (2.80)
CERQ self-blame	9.46 (3.03)	4–17	9.58 (3.02)
CERQ refocus on planning	14.16 (3.38)	5–20	13.65 (3.34)
CERQ positive refocusing	11.47 (3.77)	4–20	11.70 (3.99)
CERQ catastrophizing	8.25 (3.33)	4–19	7.92 (3.32)
CERQ putting into perspective	13.95 (3.64)	5–20	13.06 (3.78)
CERQ positive reappraisal	13.58 (3.63)	4–20	12.05 (3.74)
CERQ rumination	11.33 (3.31)	5–20	11.58 (3.60)
UPPS Lack of premeditation	8.88 (2.08)	1–16	7.98 (2.15)
UPPS Lack of perseverance	8.56 (2.48)	1–16	7.46 (2.41)
UPPS Urgency	9.64 (2.23)	1–14	9.38 (2.73)
UPPS Sensation seeking	11.44 (2.61)	1–16	10.55 (2.72)

Note: YSR/ASR externalizing per., YSR/ASR externalizing percentile; YSR/ASR internalizing per., YSR/ASR internalizing percentile.

TABLE 2. Correlations between total schizotypal and borderline scores and their respective dimensions

	SPQtot.	SPQcogn-perc.	SPQint.	SPQdis.
BPItot.	0.70* (0.52–0.80)	0.68* (0.56–0.77)	0.51* (0.35–0.65)	0.60* (0.46–0.73)
BPItot. modified	0.69* (0.56–0.79)	0.66* (0.54–0.75)	0.50* (0.34–0.64)	0.59* (0.45–0.71)
BPI aff/id dist.	0.68* (0.56–0.79)	0.62* (0.48–0.72)	0.60* (0.46–0.71)	0.52* (0.37–0.66)
BPI diss/psych.	0.55* (0.38–0.69)	0.56* (0.40–0.68)	0.39* (0.20–0.55)	0.46* (0.30–0.61)
BPI inst.rel.	0.42* (0.26–0.56)	0.39* (0.24–0.53)	0.32* (0.15–0.47)	0.42* (0.24–0.56)
BPI narcissism	0.32* (0.15–0.50)	0.32* (0.14–0.48)	0.19 (0.00–0.37)	0.28* (0.10–0.44)
BPI subst.use	0.31* (0.12–0.47)	0.27* (0.10–0.43)	0.11 (−0.07–0.30)	0.42* (0.28–0.55)

Note: *indicate significant correlations.
BPI aff/id dist., BPI affectivity and identity disturbances; BPI inst.rel., BPI instable relationships; BPI subst.use, BPI substance use; BPIdiss/psycho., BPI dissociation and psychotic symptoms; BPIimp., BPI impulsivity; BPItot. modified, BPI total score removed from psychotic and impulsivity features; BPItot., BPI total score; SPQcogn-perc., SPQ cognitive-perceptual; SPQdis, SPQ disorganization; SPQint, SPQ interpersonal; SPQtot, SPQ total score.

RESULTS

Descriptive results

Table 1 presents the descriptive results for the variables included in our analyses.

Borderline and schizotypal trait associations during adolescence

Table 2 presents the *Pearson and Spearman* correlations between the BPI total and subscale scores and the SPQ total and dimension scores.

Regarding *Dancey and Reidys' categorization for the strength of correlation*, a strong *Pearson* correlation (r) was observed between SPQ and BPI total scores $r(119) = 0.70(0.52–0.80)$, $P = 0.000$ even after excluding questions related to positive symptoms (hallucinations and delusions) in the BPI total score $r(119) = 0.69(0.56–0.79)$, $P = 0.000$.

With respect to each individual subscale, *rho Spearman coefficients* (rs) were calculated. Cognitive-perceptual SPQ traits were associated with the following BPI subscales: affectivity/identity disturbance $r\text{s}(119) = 0.62(0.48–0.72)$, $P = 0.000$, dissociation/psychotic symptoms $r\text{s}(119) = 0.56(0.40–0.68)$, $P = 0.000$, relationships instability $r\text{s}(119) = 0.39(0.24–0.53)$, $P = 0.000$ and narcissism $r\text{s}(119) = 0.32\ (0.14–0.48)$, $P = 0.001$.

Interpersonal SPQ traits were related to affectivity/identity disturbance $r\text{s}(119) = 0.60\ (0.46–0.71)$, $P = 0.000$; dissociation/psychotic symptoms $r\text{s}(119) = 0.39\ \ (0.20–0.55)$, $P = 0.000$; relationship instability $r\text{s}(119) = 0.32\ (0.15–0.47)$, $P = 0.001$.

Lastly, disorganization SPQ traits displayed associations with affectivity/identity disturbance

TABLE 3. Stepwise multiple regression model of variables that accounted for borderline traits expression while controlling for schizotypal, internalizing and externalizing symptoms

Dependent variables	Model	*F*	Coefficients				
Control and independent variables	R^2		*A*	SE *A*	β	*t*	*P*
Borderline total traits	0.70	(5,101)					
SPQ total traits			1.45	0.19	0.58	7.34	<0.001
YSR/ASR int.			0.08	0.08	0.07	0.92	0.36
YSR/ASR ext.			0.35	0.09	0.28	3.97	<0.001
CERQ catastroph.			1.18	0.57	0.12	2.08	<0.05
UPPS Lprem			7.57	3.74	0.12	2.02	<0.05

Note: Only the final model is reported here (control variables entered in step 1, all independent variables entered in step 2). CERQ catastroph., CERQ catastrophizing; UPPS Lprem, UPPS Lack of premeditation; YSR/ASR ext., YSR/ASR externalizing symptoms; YSR/ASR int., YSR/ASR internalizing symptoms.

*r*s(119) = 0.52(0.37–0.66), $P = 0.000$; dissociation/psychotic symptoms *r*s(119) = 0.46 (0.30–0.61), $P = 0.000$; instable relationships *rs*(119) = 0.42(0.24–0.56), $P = 0.000$; and narcissism *r*s(119) = 0.28(0.10–0.44), $P = 0.002$, BPI subscales.

Associations between encoding style, impulsivity, cognitive emotion regulation, and borderline and schizotypal traits during adolescence

Seven participants were excluded from these analyses because of missing data on the UPPS scale. Partial correlations ($r_{partial}$) revealed that the level of BPT was positively associated with the 'catastrophizing' CERS $r_{partial}(103) = 0.22(0.02–0.43)$, $P = 0.023$, and the 'lack of premeditation' impulsivity facet $r_{partial}(103) = 0.30(0.11–0.48)$, $P = 0.038$. On the contrary, the level of schizotypal traits displayed negative associations with 'lack of premeditation' $r_{partial}(103) = -0.27$(from −0.44 to −0.06), $P = 0.006$, and 'lack of perseverance' $r_{partial}(103) = -0.26$(from −0.44 to −0.08), $P = 0.007$ impulsivity facets but a positive link with encoding style $r_{partial}(103) = 0.27(0.10–0.44)$, $P = 0.005$.

Psychological factors specifically contributing either to borderline or to schizotypal trait expression in adolescence

There were no concerns about possible multicollinearity or influential cases.

The final stepwise regression model indicated that catastrophizing CERQ (β = 0.12, $t(102) = 2.08$, $P = 0.040$) and the lack of premeditation UPPS (β = 0.12, $t(102) = 2.02$, $P = 0.046$) specifically contributed to the level of BPI total traits when controlling for SPQ total traits and level of internalizing and externalizing symptoms (Table 3). ESQ total score (β = 0.22, $t(102) = 3.53$, $P = 0.001$), positive re-focusing CERQ (β = −0.12, $t(102) = -2.00$, $P = 0.049$) and the lack of perseverance UPPS (β = −0.17, $t(102) = -2.83$, $P = 0.006$) significantly influenced SPQ total traits when controlling for BPI total traits and level of internalizing and externalizing symptoms (Table 4). Variables included at each step of both linear regression models and variance accounted for are summed up in Table 5.

DISCUSSION

This article provides the first analysis using trait-relevant psychological *factors* to differentiate schizotypal and borderline expression at a *normative adolescent trait level*. This is crucial as it focuses on non-clinical trait expression during a key developmental window while avoiding many possible confounds (e.g. illness duration or medication side effects).

The present findings show that BPT and SPT during adolescence share a significant amount of variance and are consistent with many studies showing that borderline and schizotypal features co-occur at trait and diagnostic levels.[12,20–29] They confirm that BPT is more specifically associated with cognitive-perceptual and disorganized schizotypal dimensions.[12,29,77] Our study is the first to provide evidence that the coexistence of these traits is also a characteristic of a non-clinical adolescent sample, and additionally underlines an association between the level of BPT expression and the interpersonal schizotypal dimension. Overall, the results demonstrate that subclinical BPT and SPT are connected constructs, which is not due to an overlap in item content.

Moreover, we assessed some of the critical psychological *factors* usually associated with emerging SPT and BPT, and tested whether they could

TABLE 4. Stepwise multiple regression model of variables that accounted for schizotypal traits expression while controlling for borderline, internalizing and externalizing symptoms

Dependent variables	Model	F	Coefficients				
Control and Independent variables	R^2		*A*	SE *A*	β	*t*	*P*
Schizotypal total traits	0.67	(6,102)					
BPI total traits			0.14	0.03	0.36	4.48	<0.001
YSR/ASR int.			0.19	0.03	0.42	5.91	<0.001
YSR/ASR ext.			0.06	0.04	0.12	1.59	0.115
ESQ total score			0.47	0.13	0.22	3.53	<0.001
CERQ pos.refoc.			−0.401	0.20	−0.12	−2.00	0.05
UPPS Lpers			−3.65	1.29	−0.17	−2.83	<0.01

Note: Only the final stepwise model is reported here. CERQ pos.refoc., CERQ positive refocusing; UPSS Lpers, UPPS Lack of perseverance; YSR/ASR ext., YSR/ASR externalizing symptoms; YSR/ASR int., YSR/ASR internalizing symptoms.

TABLE 5. Variables included at each step of both linear regression model and variance accounted for

	Step 1	Step 2	Step 3	Step 4
Dependent variable	Borderline total traits	Borderline total traits	Borderline total traits	
Control and independent variables	SPQ total score YSR/ASR int. YSR/ASR ext.	SPQ total score YSR/ASR int. YSR/ASR ext. CERQ catastroph.	SPQ total score YSR/ASR int. YSR/ASR ext. CERQ catastroph. UPPS Lprem	
R^2	0.67	0.69	0.70	
Dependent variable	Schizotypal total traits	Schizotypal total traits	Schizotypal total traits	Schizotypal total traits
Control and independent variables	BPI total score YSR/ASR int. YSR/ASR ext.	BPI total score YSR/ASR int. YSR/ASR ext. ESQ total score	BPI total score YSR/ASR int. YSR/ASR ext. ESQ total score UPPS Lpers	BPI total score YSR/ASR int. YSR/ASR ext. ESQ total score UPPS Lpers CERQ pos.refoc.
R^2	0.59	0.63	0.66	0.67

Note: CERQ catastroph., CERQ catastrophizing; CERQ pos.refoc., CERQ positive refocusing; UPPS Lprem, UPPS Lack of premeditation; UPSS Lpers, UPPS Lack of perseverance; YSR/ASR ext., YSR/ASR externalizing symptoms; YSR/ASR int., YSR/ASR internalizing symptoms.

constitute specific variables uniquely associated with either/or adolescent BPT and SPT expression.

Regarding SPT, we provide original data suggesting that an *internal* encoding style, namely a fast application of internal primary *schema*, especially in the case of less sensory evidence such as during high sensory ambiguity,[32] is fundamental to their expression. To a lesser extent, lack of perseverance impulsivity facet also contributes to this kind of personality feature. These results are consistent with recent models of schizotypal manifestations, highlighting the role played by other data-gathering biases.[78,79] Like other information processing biases, encoding style may lead to early and hasty decisions, thereby inducing false conclusions and fostering SPT expression.

The association between SPT and 'lack of perseverance' impulsivity facet was less expected and may signal an improved ability to resist proactive interference.[80] Interestingly, this result shows that low level of impulsivity can also be dysfunctional. Excessive perseverance might reflect a lack of flexibility, disengagement difficulties once an activity is initiated, and dissociative experiences proneness, namely absorption (i.e. propensity to enter altered states of consciousness). We expect the level of absorption to contribute to excessive perseverance, accounting for increased schizotypal symptoms. This association should be considered in future studies.

Concerning BPT, our investigation identified that the 'catastrophizing' coping strategy and the 'lack of premeditation' impulsivity facet uniquely characterize adolescent borderline feature expression. A way of dealing with negative events that tend to explicitly emphasize the shock of an experience and

marked difficulties to consider the consequences of an act before performing it are both typical of youths with these traits. Their lack of premeditation propensity may reflect poor decision-making abilities and difficulty in delaying rewards,[56,81] which is consistent with what has been observed in BPD[82,83] and in those symptoms characterized by short-term regulation (e.g. substance misuse,[24] suicide attempt[82,84] and deliberate self-harm[85]).

Surprisingly, the often-cited relationship between urgency and BPT was not found in our investigation. A potential explanation is that we focused upon the general level of borderline symptoms, whereas urgency may be associated with specific borderline-related manifestations aiming at regulating negative affect (e.g. substance use, self-harm). Moreover, the current study included non-clinical adolescent participants. Further studies are thus required to disentangle the role of urgency in borderline symptoms at varying stages of pathological expression.

Overall, we highlighted two main uniquely discriminative assessment domains, namely an internal encoding style and the 'catastrophizing' coping strategy, which mental health professionals may use in their evaluation of adolescent borderline and schizotypal manifestations.

Future research may integrate some of this study's conclusions. Firstly, close attention to the underlying psychological factors highlighted might help to better separate psychotic experiences in BPD from those in SPD. It has been argued that psychotic manifestations related to BPD differ from those reported in psychosis-spectrum disorder in nature (broadly vs. narrowly defined[86–88]) and in duration (transient vs. persistent hallucinatory and paranoid experience[89–94]). Accurately characterized coping strategies and encoding style will help in the assessment of overlapping BDP and SPD phenomena.

Secondly, in a continued attempt to build a comprehensive and integrative understanding of BPT and SPT comorbidity, we suggest scrutinizing the less established developmental processes through which these traits and disorders become embedded across lifespan. Several levels of analyses (e.g. brain imaging, experimental cognitive tasks) or behavioural phenotypes (e.g. non-suicidal self-injury, hallucination) may be relevant to differentiating adaptive processes inherent to the negotiation of developmental tasks from those signalling a liability to maladaptive personality traits.

Our results also bear three main limitations, including its cross-sectional nature. Of particular relevance would be the collection of prospective longitudinal data to identify potential risk markers and to clarify causal and chronological relations between personality disorder traits and psychological variables. Another is that self-report questionnaires can be biased by social desirability and a lack of introspection. It has been pointed out that insight into one's own feelings, thoughts and behaviours might be disrupted in personality disorder. However, because our community adolescent sample had functional capacity of accurate self-perception, this factor should not significantly alter the observations. Further studies should nevertheless follow a multitrait-multimethod approach encompassing various methodologies and/or data from multiple informants. They should also recognize that the psychological processes involved in two methods (self-report vs. experimental task) designed to evaluate the same theoretical construct often demonstrate only relative overlap. This has been well demonstrated for the concept of impulsivity and can be extended to research psychology in general.[95] Together, these considerations might help to strengthen our understanding of psychological factors differentiating personality disorder traits in youth. Finally, the present study does not rely on a random sampling method, which might slightly decrease the representativeness of the results.

In conclusion, the present research has both clinical and conceptual implications. By connecting specific psychological mechanisms to particular personality disorder traits, our results act as preliminary guidelines for an improved assessment of BPT and SPT in adolescence. Studies on personality traits in non-clinical samples allow us to establish links between typical and maladaptive psychological mechanisms,[96] and to appreciate their underlying influences in the development of more or less adaptive ways to navigate through subjective and interpersonal experiences.

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