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Could schizotypy protect against the negative outcomes of borderline traits on alcohol  
consumption? A cluster analytic study

Jonathan Bronchain\*, Henri Chabrol, Patrick Raynal

Centre d'Etudes et de Recherches en Psychopathologie et Psychologie de la Santé,

Université de Toulouse, UT2J, France

\*Corresponding author :

J. Bronchain, UFR de Psychologie, Université de Toulouse-Jean Jaurès, 5 allées Antonio  
Machado, 31058 Toulouse cedex 9

phone number : 33 781 53 31 09

fax number : 33 561 25 70 93

e-mail address: [jonathan.bronchain@etu.univ-tlse2.fr](mailto:jonathan.bronchain@etu.univ-tlse2.fr)

### **Abstract**

Schizotypal and borderline personality traits seem to be differently associated to alcohol use in young adult. However no study has explored co-occurring schizotypal and borderline traits in their link with alcohol consumption. Participants were 1572 students from different French universities who completed self-report questionnaires assessing these three dimensions. A cluster analysis based on the borderline and schizotypal traits scores yielded four distinct groups characterized by low schizotypal and borderline traits (LT), high borderline traits (HB), high schizotypal and borderline traits (HT) and high schizotypal traits (HS). The HS cluster had significantly lower alcohol use than the other three groups. LT and HT clusters did not differ significantly in their alcohol use. Comparison between clusters suggests that schizotypal traits may be protective against the negative impact of borderline traits on alcohol consumption. In the context of a co-occurrence between borderline and schizotypal traits, this study provides important information about their link with alcohol consumption.

**Keywords:** schizotypal traits; alcohol use; students

## Could schizotypy protect against the negative outcomes of borderline traits on alcohol consumption? A cluster analytic study

### **1. Introduction**

The high rates of alcohol use, binge drinking, and alcohol dependence in adolescents and young adults are significant public health concerns (Center for Behavioral Health Statistics and Quality, 2016). Data showed that college students drink more alcohol than non-college individuals of similar age during periods when the peak of consumption is the highest (Slutske et al., 2004). Comprehensive understanding and early prevention of these phenomena are therefore major issues.

Personality characteristics seem to be closely associated to alcohol use and misuse during young adulthood (e.g., Trull et al., 2004). However, co-occurring traits of two different disorders are not always associated with a double dose of deficit (Gillespie and Abu-Akel, 2017). For example, among patients with diagnosed schizophrenia and among non-clinical individuals with positive psychotic experiences, increased psychopathic traits are associated with improved metacognitive abilities and fewer cognitive theory of mind errors (Gillespie et al., 2017; Abu-Akel et al., 2015).

Thus, borderline and schizotypal traits have shown different associations with alcohol use (Long et al., 2017). If borderline traits have been found to be predictive of alcohol use and misuse in adolescents (Lane et al., 2016; Stepp et al., 2005; Trull et al., 2000), other researches have shown conflicting results on the relationships between schizotypal traits and alcohol consumption, with negative to non-significant associations (Esterberg et al., 2009; Larrison et al., 1999; Nunn et al., 2013), while Hasin et al. (2011) found that schizotypal personality disorder (SPD) predicted three-year persistence of alcohol use disorders.

Symptoms of schizotypy could be grouped in three dimensions: positive (unusual experiences, odd beliefs, and magical thinking), negative (anhedonia, apathy, social anxiety

and social withdrawal) and disorganized (eccentricity, odd behavior and speech). So, schizotypal personality is a heterogeneous and a multifaceted construct that could be assessed by self-reported questionnaires. Among these tools, the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) showed adequate psychometric properties, and studies support the validity and utility of SPQ in cross-cultural research (Fonseca-Pedrero et al., 2018; Fonseca-Pedrero et al., 2017). Given the multidimensional aspect of schizotypy and its co-occurrence with borderline personality traits (Fonseca-Pedrero et al., 2012), these associations need to be studied in a more global perspective.

To our knowledge, no study has evaluated the interaction effects of co-occurring schizotypal and borderline personality traits in young adult. Therefore, the main objective of this study was to define homogeneous groups of participants using cluster analysis and evaluate the association between schizotypal and borderline traits on alcohol consumption. We expected the schizotypal traits to moderate the negative impact of borderline traits on alcohol use.

## **2. Methods**

### **2.1. Participants and procedure**

The data were collected through an online survey that was distributed to students from different French universities. The link was shared on social networks in groups specifically dedicated to students. The final sample consisted of 1572 young adults (488 males, 31%; 1084 females, 69%) of which 8.75% of the data were previously excluded. Less than 4% of the data for PDQ-4, 1% for SPQ-B and 1% for alcohol use frequency were missing. Little's missing completely at random (MCAR) test was non-significant for the SPQ-BF ( $\chi^2 = 559.46$  (507),  $p = 0.053$ ) as for the alcohol use frequency ( $\chi^2 = 1.58$  (1),  $p = 0.21$ ), suggesting that the data were missing at random. Therefore, multiple imputation was used to generate 20 datasets for data missing at random (Graham, 2009). However, MCAR was significant for PDQ-4 ( $\chi^2$

= 153.08 (99),  $p < 0.001$ ). A sensitivity analysis (Resseguier et al., 2011) was conducted for non-ignorable data and did not bring any significant changes to our results. So, we should note that the results were maintained using the original unimputed dataset for all variables. Participants ranged in age from 18 to 28 years old; mean age of males = 20.41 (SD = 2.06) and mean age of females = 20.25 (SD = 1.99). Regarding the education domain of the participants, 31% were students in science, engineering, 16% in economics, commerce, management and communication, 14% in human sciences, 13% in medical and paramedical courses, 8% in letters, 4% in education and pedagogy, 4% in history, geography, political science, 3% in law, 2% in art and design, 1% in philosophy, 1% in art history and archeology, 2% were students in another field. The objectives of the study were presented to all participants at the beginning of the online questionnaire, specifying that this was a study on personality and behaviors. The participants were assured of the anonymity of their answers. The study followed the guidelines of the Helsinki declaration and the APA ethical standards. Ethical issues of the current research were explored at a research meeting.

## 2.2. Measures

Schizotypal traits were assessed using the French version of the Schizotypal Personality Questionnaire-Brief (SPQ-B; Raine and Benishay, 1995; Raynal et al., 2016), a self-administered scale including 22 items on a 5-point Likert type scale ranging from 0 (strongly disagree) to 4 (strongly agree), e.g., "People sometimes find me aloof and distant". The three following dimensions of schizotypal personality are assessed: cognitive-perceptual deficits ("Positive"; 5 items), interpersonal deficits ("Negative"; 9 items) and disorganisation (8 items). In this sample,  $\alpha$  was 0.89.

Borderline personality disorder traits were assessed using the borderline personality disorder scale of the Personality Diagnostic Questionnaire, Fourth Edition (PDQ-4, Hyler 1994; Bouvard 2002). This subscale is composed of 10 items on a 5-point scale,

corresponding to the DSM-IV criteria for borderline personality disorder (e.g., "I have to hurt or kill myself"). In this sample,  $\alpha$  was 0.79.

Alcohol use in the past 3 months was assessed using the Simons (1998) 9-point Likert type scale (Chauchard et al. 2014). This scale is composed of 1 item assessing the frequency of alcohol consumption with nine possibilities: 0. No consumption, 1. Less than once a month but at least once during the last three months, 2. Once a month, 3. Two to three times a month, 4. Once to twice a week, 5. Three to four times a week, 6. Almost every day, 7. Once a day, 8. More than once a day.

### 2.3. Statistical analysis

A cluster analysis was performed to identify distinct profiles of participants based on their standardized scores for schizotypal and borderline traits. A hierarchical cluster analysis was then conducted (Ward's method with Euclidean distance).

The agglomeration schedule and dendrogram were used to identify the number of clusters. Then, K-means clustering was used to assign each individual to the identified clusters. Statistical analyses were performed using Statistica 10.

## 3. Results

### 3.1. Descriptive statistics

Means and standard deviations for all variables are reported in Table 1.

### 3.2. Cluster analysis

Based both on the dendrogram and on the aggregation curve, a four-cluster solution was identified. The dendrogram is presented in Figure 1. The agglomeration schedule showed a sudden increase in linkage distance which more than doubled when four clusters merged to three clusters (from 123.05 to 259.92). This indicated that the passage from four to three clusters would have more impact on the heterogeneity of the clusters than previous stages of

the analysis. Therefore, the four cluster solution was the most appropriate. A discriminant analysis showed clear differences between the four clusters (Wilks'  $\lambda = 0.10$ ,  $p < 0.001$ ) with 97.6% of original cases correctly classified. The first cluster ( $n = 473$ ) was called "Low Traits Cluster" (LT; mean age = 20.53) as it is characterized by students with a low score on both schizotypal ( $M = 19.85 \pm 8.72$ ) and borderline traits ( $M = 18.63 \pm 3.45$ ) (Figure 2 and Table 1). The second cluster ( $n = 307$ ) includes participants with low schizotypal traits ( $M = 28.74 \pm 8.25$ ) and high borderline traits ( $M = 30.12 \pm 3.83$ ) and was therefore named "High Borderline Traits Cluster" (HB; mean age = 20.47). The third cluster ( $n = 459$ ) named "High Schizotypal Traits Cluster" (HS; mean age = 20.07), is composed with individuals displaying high score on schizotypal traits ( $M = 44.45 \pm 7.81$ ) and low score borderline traits ( $M = 23.90 \pm 3.47$ ). Finally, the fourth cluster ( $n = 333$ ) was called "High Traits Cluster" (HT; mean age = 20.11) as it is characterized by participants with a high score on both schizotypal ( $M = 57.08 \pm 10.21$ ) and borderline traits ( $M = 36.60 \pm 4.62$ ).

We then compared these clusters on the frequency of alcohol consumption using ANOVA and Tukey HSD post-hoc test. The HS cluster had significantly lower alcohol use than the other three groups (Table 1). LT and HT clusters did not differ significantly in their alcohol use. Finally, HB cluster had significantly higher alcohol consumption than the other groups.

We then conducted hierarchical regression analysis in order to examine the interactive effect of borderline and schizotypal traits on the frequency of alcohol use in the HT cluster. Since our sample included a wide age range with a majority of women, gender and age were introduced as covariates. Borderline traits, gender and age were entered into the regression first, and schizotypal dimensions were entered in the second step. Interpersonal schizotypy was the only significant predictor ( $\beta = -0.22$ ,  $p < 0.001$ ;  $R^2 = 0.73$ ,  $F = 4.28$ ).

#### **4. Discussion**

Based on the evaluation of schizotypal and borderline personality traits profiles and on cluster analysis, we identified four distinct groups of participants. These clusters were similar in size but displayed significant differences. Most interestingly, the comparison of alcohol consumption scores suggests a protective effect of schizotypal personality traits and a negative effect of borderline personality traits, confirming literature data regarding personality characteristics and alcohol use and misuse (e.g., Long et al., 2017). Indeed, the HS cluster which was characterized by high schizotypal traits and weak borderline traits, showed a significantly lower alcohol consumption score than the other three groups. Conversely, the HB cluster, which was characterized by high borderline traits and low schizotypal traits, showed a significantly higher alcohol consumption score than the other three groups. The LT and HT clusters did not differ in their alcohol consumption, suggesting that schizotypal traits might protect against the negative impact of borderline traits on alcohol consumption. Moreover, hierarchical regression analysis showed a significant negative effect of interpersonal schizotypy on alcohol consumption in the HT group.

These results could be explained by the negative dimension of schizotypy that can lead to significant social withdrawal. Cross-sectional studies have found that individuals with elevated schizotypal traits demonstrate elevated social anhedonia score (Horan et al., 2007). Indeed, individuals with high levels of negative schizotypal symptoms displayed lower self-reported social quality of life and social behavior and poorer social relationships and skills for non-clinical (Cohen & Davis, 2009; Henry et al., 2008) and SPD samples (Dickey et al., 2005). Individuals with such characteristics would engage less frequently in social activities that could lead to alcohol use and misuse (Esterberg et al., 2009). These less frequent interpersonal relationships may protect borderline individuals from problematic alcohol use.

This study has several limitations. Although internet data collection methods, using online completion of self-report questionnaires from self-selected samples, are consistent with

findings from traditional methods (Gosling et al., 2004), the possibility that participant self-selection may have biased the results cannot be excluded. Moreover, whether the results of the current study are applicable to a clinical sample is unknown, since all participants were university students. For the same reason, results may not be generalized to older age-ranges and other groups of young adults. Thus, future research could lead to better identification and early prevention of at-risk populations and should include clinical and high borderline and schizotypal traits participants. Finally, our findings underscore the importance of the assessment of co-occurring personality traits before drawing conclusions about their influence on substance use.

### **Declarations of interest**

The authors declare that they have no conflict of interest.

### **Role of funding sources**

This study received no funding.

### **Author contributions**

JB, HC, and PR participated in the design of the study. JB conducted the statistical analysis and wrote the first draft of the manuscript. JB, HC, and PR contributed to manuscript writing and approved the final manuscript.

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**Table 1** Cluster analysis based on schizotypal and borderline traits scores. Cluster comparison using ANOVA and post-hoc tests.

	Sample <i>N</i> = 1572 <i>M</i> ( <i>SD</i> )	Range	Cluster <i>M</i> ( <i>SD</i> )				<i>F</i>	Eta <sup>2</sup>	Significant comparisons
			LT <i>n</i> = 473 30%	HB <i>n</i> = 307 20%	HS <i>n</i> = 459 29%	HT <i>n</i> = 333 21%			
Total schizotypy	36.65 (16.71)	0-86	19.85 (8.72)	28.74 (8.25)	44.45 (7.81)	57.08 (10.21)	1400.39*	0.73**	HT>HS>HB>LT
Cog.-percept. schizotypy	6.56 (4.58)	0-15	3.44 (3.06)	4.63 (3.26)	8.05 (3.87)	10.71 (4.23)	318.31*	0.38**	HT>HS>HB>LT
Interpersonal schizotypy	15.96 (7.84)	0-36	9.02 (5.13)	12.68 (5.03)	19.33 (5.09)	24.20 (5.69)	658.09*	0.55**	HT>HS>HB>LT
Disorganized schizotypy	14.13 (7.21)	0-32	7.38 (4.38)	11.41 (4.83)	17.06 (4.28)	22.18 (4.83)	798.13*	0.60**	HT>HS>HB>LT
Borderline traits	26.22 (7.68)	10-50	18.63 (3.45)	30.12 (3.83)	23.9 (3.47)	36.6 (4.52)	1637.56*	0.76**	HT>HB>HS>LT
Alcohol consumption	2.55 (1.6)	0-8	2.54 (1.54)	2.95 (1.58)	2.26 (1.57)	2.59 (1.66)	11.67*	0.02**	HB>HT,LT>HS

LT: Low Traits cluster; HB: High Borderline traits cluster; HS: High Schizotypal traits cluster; HT: High Traits cluster.

\*  $p < 0.05$

\*\*  $p < 0.001$

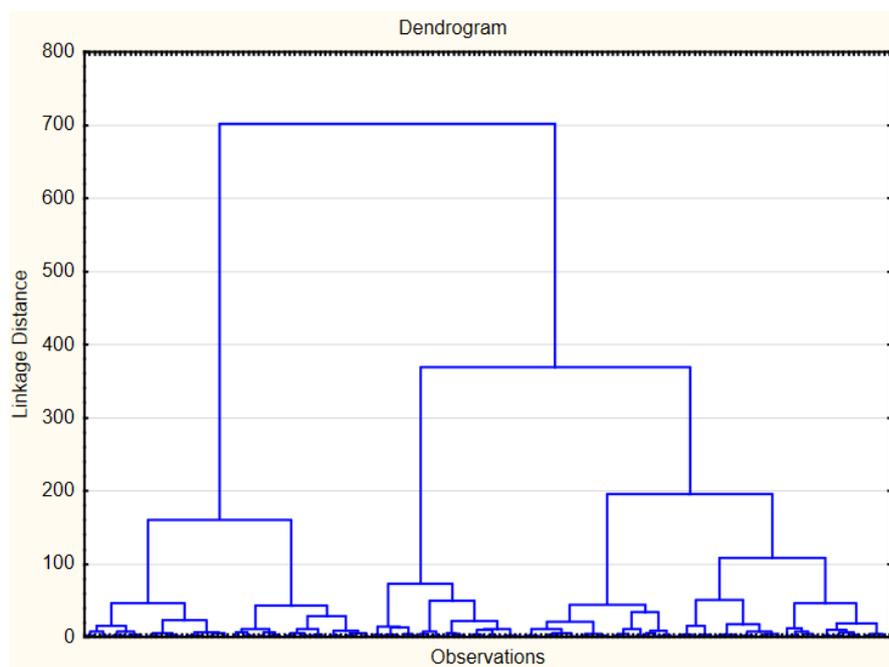


Fig.1 - Hierarchical clustering dendrogram

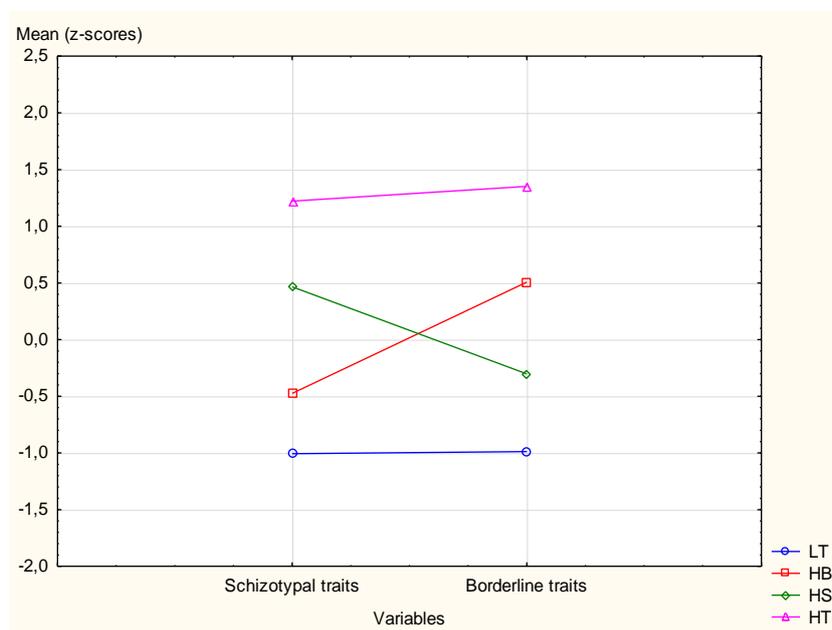


Fig. 2 - Four-cluster solution (LT, HB, HS and HT) based on scores for the SPQ-BF and PDQ-4 indicated on the  $x$ -axis. LT: Low Traits cluster; HB: High Borderline traits cluster; HS: High Schizotypal traits cluster; HT: High Traits cluster.