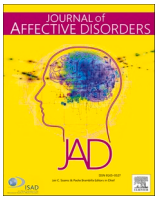
Journal of Affective Disorders 414 (2026) 122382

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad



Research paper

Latent profiles of dissociation, pain vigilance, interoception, and mentalization in university students: Associations with suicide-related outcomes

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ARTICLE INFO

Keywords:
Suicide
Dissociation
Pain sensitivity
Interoception
Mentalization

ABSTRACT

Introduction: Suicide is a leading cause of death among young people. Altered pain processing, dissociation, and interoceptive dysfunction have all been implicated in suicide risk, with evidence suggesting both pain hypo- and hypersensitivity pathways. Mentalization, as an embodied capacity integrating internal states, may further modulate these processes. This study aimed to identify distinct profiles of dissociation, pain, interoception, and mentalization in young adults and examine their associations with suicide-related outcomes.

Methods: University students aged 18–29 completed an online survey assessing suicide-related outcomes, dissociation, interoceptive awareness, subjective pain-related experiences, and mentalization. A latent profile analysis was conducted on these dimensions and the resulting profiles entered into logistic regressions to examine associations with lifetime and current suicidal ideation, lifetime suicidal planning, non-suicidal self-injury, and suicide attempts.

Results: Latent profile analysis identified four meaningful profiles: 1) low-risk, 2) hypervigilant, 3) dissociative-hypovigilant, and 4) dissociative-hypervigilant. Logistic regressions showed that dissociative profiles, particularly the dissociative-hypervigilant group, had substantially higher odds of current suicidal ideation and lifetime suicidal planning, non-suicidal self-injury, and suicide attempts compared to the low-risk profile. All associations for both dissociative profiles remained significant after adjusting for age, gender, current psychopharmacological medication, current medical condition, and lifetime psychiatric/neuropsychiatric diagnosis.

Conclusion: Suicide risk in our sample reflected distinct profiles rather than uniform distress. Two dissociative subtypes emerged: a hypovigilant profile marked by detachment and disengagement, and a hypervigilant profile combining detachment with heightened pain monitoring, the latter conferring greatest risk. These findings highlight dissociation–interoception interactions as key targets for assessment and prevention.

1. Introduction

Globally suicide is the third cause of death among young people between 15 and 29 years (World Health Organization, 2025). In Italy, the latest report showed that around 14% of suicides in the year 2022 were among 15–34-year-olds (ISTAT, 2025). Increased pain tolerance is considered a key risk factor for suicide attempt (SA) in most recent models of suicide (Klonsky et al., 2021; O'Connor and Kirtley, 2018; Van Orden et al., 2010). In earlier theories, blunted pain perception was thought to facilitate self-aggression and suicide, and it was viewed as part of an overall indifference toward bodily sensations, derived from a disposition to dissociation (Orbach, 1994). Consistently, meta-analyses have shown positive associations between general dissociation and both suicidal ideation (SI) and SA as well as higher dissociative traits in psychiatric patients with histories of non-suicidal self-injury (NSSI) and SA (Calati et al., 2017; Bruno et al., 2025a).

In contrast, neuroinflammatory processes and stress-related alterations in interoceptive signaling have been proposed to increase pain

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https://doi.org/10.1016/j.jad.2026.122382
Received 27 April 2026; Received in revised form 23 July 2026; Accepted 13 August 2026
Available online 14 August 2026

sensitivity and emotional distress, thereby facilitating SI and SA (Courtet and Guillaume, 2020). Integrating these perspectives, we previously hypothesized the existence of two distinct suicide-risk profiles characterized by either dissociation-related pain hyposensitivity or pain hypersensitivity linked to heightened bodily vigilance (Bianco et al., 2025).

Interoception, the sensing and interpretation of internal bodily states, plays a central role in these processes. Interoception comprises multiple dimensions, including attentional styles toward bodily sensations that may be either maladaptive (e.g., worry-driven hypervigilance) or adaptive (e.g., mindful, regulated attention) (Mehling, 2016). Disturbances in interoceptive processing have been associated with increased SI and SA, with specific interoceptive patterns differentially linked to ideation, planning, and attempts (Smith et al., 2021; Hielscher and Zopf, 2021).

Altered interoception is also a core feature of dissociative detachment, encompassing depersonalization and derealization experiences characterized by a sense of disconnection from the body, self, or external world (World Health Organization, 2022; Holmes et al., 2005). Theoretical models grounded in predictive processing conceptualize detachment as resulting from excessive suppression or misweighting of interoceptive signals, often in response to overwhelming or inescapable arousal (Seth et al., 2012; Gatus et al., 2022; Ciaunica et al., 2022). Empirical studies indicated that dissociative traits are associated with altered pain perception, including both reduced pain sensitivity and abnormal attentional modulation of pain (Defrin et al., 2015; Defrin et al., 2020; Ludäscher et al., 2007; Ludäscher et al., 2010).

Mentalization, defined as the capacity to understand oneself and others in terms of mental states, is increasingly recognized as an embodied process rooted in the integration of interoceptive and emotional signals (Fotopoulou and Tsakiris, 2017). Impairments in mentalization have been linked to dissociative symptoms and SA, while mentalization-based interventions have supported efficacy in reducing NSSI and SA (Calati and Courtet, 2016; Bateman et al., 2024).

Taken together, these findings suggest that distinct profiles characterized by specific configurations of dissociative detachment, pain vigilance, interoceptive regulation, and mentalization may exist within the general population and may be differentially associated with suicide-related outcomes (SROs). The present study aimed to identify latent profiles of these dimensions among young adult university students and to examine their associations with SROs, including lifetime and current SI, suicidal planning (SP), NSSI, and SAs.

2. Methods

2.1. Participants

University students across different Italian universities were invited to participate in the study, between December 6th, 2024, and June 30th, 2025, through an online survey, composed of a battery of questionnaires. The survey was developed and administered via Qualtrics Survey Software (Qualtrics, 2025). The Qualtrics link to the survey was shared on students' groups on social networks (mainly Whatsapp and Telegram groups), accompanied by a brief description of the study stating that it aimed to investigate personal experiences of university students, and the names of the researchers involved. To be included in the study, students had to be aged between 18 and 29 years and to declare to be enrolled in a university faculty. All students had to sign an electronic informed consent in order to participate in the study. A total of 3696 students opened the survey, while only 1525 students completed at least 97% of the survey. Only 1423 students satisfied the predefined age requirements for inclusion. Finally, we had to exclude an additional 3 participants, due to blatantly absurd responses in more than one open-ended question. The final sample comprised 1420 students. The protocol of the study was approved by the Ethics Committee of the University of Milano-Bicocca (protocol n° 0473412, 05/12/2024).

2.2. Measures

The screening version of the *Columbia-Suicide Severity Rating Scale* (C-SSRS) (Posner et al., 2011) was adapted for self-report administration. Items 1–2 assessed lifetime and current death wish (DW) and SI, supplemented by visual analogue scales (1−10) for intensity and 5-point Likert scales for frequency. SP was assessed with a single ad hoc item grouping items 3–5. NSSI and SA history were each assessed with ad hoc items, with NSSI frequency rated on a 3-point Likert scale over the past year. The full modified scale is available in supplementary materials.

The *Dissociative Experiences Scale* (DES-II) (Carlson and Putnam, 1993) assesses dissociative experiences across 28 items (0–100%). The Italian version shows good psychometric properties (Schimmenti, 2016a; Schimmenti, 2016b). A three-factor structure (Stockdale et al., 2002; Mazzotti et al., 2016; Wülfing et al., 2025) yielded subscores of Absorption, Amnesia, and Depersonalization/derealization (total score: $\alpha = 0.93$, $\omega = 0.94$). Main analyses used the Depersonalization/derealization subscale (DES-depersonalization; $\alpha = 0.82$, $\omega = 0.86$), scored according to Wülfing and colleagues (Wülfing et al., 2025).

The *Multidimensional Assessment of Interoceptive Awareness* (MAIA-2) (Mehling et al., 2018) assesses interoceptive awareness across 37 items and 8 subscales (5-point Likert scale), with acceptable reliability and dimensionality in Italian university students (Calì et al., 2015). Main analyses focused on the not-distracting (i.e., a tendency not to ignore or distract oneself from pain or discomfort; $\alpha = 0.71$, $\omega = 0.80$) and not-worrying (i.e., a tendency not to worry excessively about pain or discomfort; $\alpha = 0.80$, $\omega = 0.85$) subscales, both subdomains of emotional and attentional responses to bodily sensations (Mehling et al., 2012).

The *Psychological and Physical Pain Visual Analog Scale* (PPP-VAS) (Olié et al., 2010) measures maximum, habitual, and current psychological and physical pain over the last 15 days (0–10), with satisfactory convergent and discriminant validity in psychiatric populations (Alacreu-Crespo et al., 2024). Habitual physical and psychological pain levels (VAS physical pain and VAS mental pain) were used in main analyses.

The *Pain Vigilance and Awareness Questionnaire* (PVAQ) (McCracken, 1997) assesses pain-related attention across 13 items and two subscales: awareness (passive detection) and vigilance (active attentional focus) (McCracken, 2007). The Italian validation confirmed adequate factor structure, reliability, and construct validity (Monticone et al., 2016). Internal consistency was acceptable to good (awareness: $\alpha = 0.79$, $\omega = 0.84$; vigilance: $\alpha = 0.77$, $\omega = 0.84$).

The *Reflective Functioning Questionnaire-8* (RFQ-8) (Fonagy et al., 2016), validated in Italian by Morandotti and colleagues (Morandotti et al., 2018), assesses mentalization on a 7-point Likert scale. We used the revised 7-item version (Horváth et al., 2023), scored unidimensionally to reflect mentalizing deficits (Müller et al., 2022), with good internal consistency ($\alpha = 0.78$, $\omega = 0.85$).

The *Toronto Alexithymia Scale-20* (TAS-20) (Bagby et al., 2020; Bagby et al., 1993) assesses alexithymia across 20 items (5-point Likert scale). The Italian version (Bressi et al., 1996) showed adequate reliability. Internal consistency in the present sample was $\alpha = 0.85$, $\omega = 0.87$.

The *Psychache Scale* (PAS) (Holden et al., 2001) assesses psychological pain intensity across 13 items (5-point Likert scale), grounded in Shneidman's psychache theory of suicide (Shneidman, 1993), with satisfactory reliability and validity (Holden et al., 2001; Mills et al., 2005; Troister and Holden, 2013). The Italian version was developed via back-translation across multiple clinical settings (Pompili et al., 2022; Blandizzi et al., 2025) and showed excellent reliability ($\alpha = 0.94$, $\omega = 0.95$).

The *Acquired Capability for Suicide Scale – Fearlessness About Death* (ACSS-FAD) (Ribeiro et al., 2014) assesses fearlessness about lethal self-harm within Joiner's Interpersonal Theory of Suicide, across 7 items (4-point Likert scale). The Italian version (Magliocca et al., 2024) demonstrated satisfactory reliability and convergent/discriminant validity. Internal consistency was good to excellent ($\alpha = 0.86$, $\omega = 0.91$).

2.3. Procedures

The study was preregistered prior to data collection (AsPredicted; https://aspredicted.org/xm6t-6k4k.pdf) with a plan to conduct machine-learning–based confirmatory clustering analyses in a subsample of participants reporting current SI. The original aim was that of testing our hypothesis of two subtypes of people at suicide risk: a dissociative vs. a pain hypersensitive subtype (Bianco et al., 2025). The preregistered analyses were conducted as planned, and they can be accessed in supplementary materials. However, as they did not yield stable or interpretable solutions with acceptable fit, the analytic strategy was revised. Because the analyses here presented deviated substantially from the preregistered confirmatory plan, they should be considered exploratory in nature. We conducted Latent Profile Analyses (LPA) using a revised set of indicators in the full sample. Current SI, alongside other SROs, was subsequently examined in logistic regression models as a function of profile membership.

2.4. Statistical analyses

Descriptive statistics were used to summarize the characteristics of the sample, in terms of sociodemographic and clinical dimensions, SROs, and scores obtained across the measures of interest.

A LPA was conducted, using tidyLPA R Package (Rosenberg et al., 2018), to determine if unobserved profiles existed within the sample. Consistent with recommendations, DES-depersonalization, MAIA not-distracting, MAIA not-worrying, and PPP-VAS-habitual physical pain were selected as primary variables of interest, while other candidate indicators were evaluated iteratively based on theoretical relevance and empirical contribution to latent profile differentiation (Masyn, 2013; Sinha et al., 2021). SROs were not evaluated as potential indicators, as they were identified as outcome measures. All other measures were tested for indicator selection.

Prior to the LPA, correlations among candidate indicators were examined to reduce redundancy and support the assumption of local independence. Indicators showing substantial overlap were excluded to preserve parsimony and avoid overrepresentation of single constructs. PAS score was excluded due to strong overlap with PPP-VAS-habitual mental pain ($r = 0.71$) and moderate correlation with DES-depersonalization ($r = 0.53$); PPP-VAS-habitual mental pain was retained as the indicator of psychological pain. TAS score was excluded in favor of RFQ score ($r = 0.54$), as models including TAS consistently yielded insufficient classification quality. Although PVAQ-awareness and PVAQ-vigilance were moderately correlated ($r = 0.67$), both were retained as they reflect theoretically distinct attentional processes (i.e. passive bodily awareness versus active pain hypervigilant monitoring) without compromising model interpretability or classification quality. Only the MAIA not-distracting and not-worrying subscales were selected, based on theoretical considerations, as they capture maladaptive versus adaptive interoceptive regulation strategies central to depersonalization, pain processing, and suicide-related vulnerability. ACSS-FAD was excluded as it was considered as a downstream outcome of repeated exposure to painful experiences, reducing its conceptual separation from the outcome variables. All indicator correlations are provided in Supplementary Fig. S1; LPA models with alternative indicators are reported in Supplementary Tables S6–S7.

The LPA model was finally fitted on the following features after scaling: DES-depersonalization subscale, PPP-VAS-habitual physical pain, PPP-VAS-habitual mental pain, PVAQ-awareness, PVAQ-vigilance, MAIA-not-distracting, MAIA-not-worrying, and RFQ score. Different clustering solutions were compared by the following model fit indices: Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Sample-size-Adjusted BIC (SABIC), Entropy, and Bootstrap Likelihood Ratio Test (BLRT). Model estimation was performed using the mclust algorithm via tidyLPA, with equal variances and zero covariances constrained across profiles. To ensure estimation stability, the deterministic EM algorithm implemented in mclust was used, which employs multiple initializations to avoid local maxima. Classification quality of the retained solution was evaluated using entropy and the average posterior probability of class membership (AvePP), with values $\geq$0.80 considered indicative of adequate classification accuracy. Descriptive statistics of sociodemographic and clinical characteristics of the clusters were then summarized. The profiles resulting from the best fitting solution were then used to conduct logistic regressions with SROs (i.e. lifetime SI, current SI, lifetime SP history, lifetime NSSI history and lifetime SA history) as dependent variables. All analyses were conducted using R version 4.4.2. (R Core Team, 2024).

The following R packages have been used: broom (Robinson et al., 2025), dplyr (Wickham et al., 2023), ggplot2 (Wickham, 2016), gtsummary (Sjoberg et al., 2021), kableExtra (Zhu, 2024), psych (Revelle, 2025), TidyLPA (Rosenberg et al., 2018).

3. Results

3.1. Description of the sample

The sample was composed of 1420 university students with a mean age of 21.22 ± 2.39 years. Most of them were undergraduate students (79%, $N = 1127$), identified as female (73%, $N = 1039$), heterosexual (78%, $N = 1110$), and currently lived in the North of Italy (64%, $N = 911$).

Around 16% ($N = 228$) were living with a medical condition, which implied some form of chronic pain for 1/3 of them. Nearly 1/2 ($N = 643$) undertook some kind of psychotherapy in their life, around 15% ($N = 211$) received a psychiatric/neuropsychiatric diagnosis in the lifetime and 7% ($N = 100$) were currently taking some form of psychopharmacological medication.

The lifetime prevalence was 57% ($N = 808$) for DW and 32% ($N = 461$) for SI. When experienced, the reported intensity of such thoughts on a scale of 1 to 10 was of 6.50 ± 2.55 for DW and of 6.97 ± 2.39 for SI. Around 21% ($N = 304$) reported DW in the past month, with an average intensity of 5.98 ± 2.17; 55% ($N = 169$) of them had DW at least once a week. Around 5% ($N = 72$) reported SI in the past month with an average intensity of 6.93 ± 1.98, and among them 65% ($N = 47$) experienced SI at least once a week.

Around 20% ($N = 286$) experienced SP in their life. Lifetime NSSI was reported by 36% ($N = 510$) of students, 35% ($N = 211$) of which during the last year. Additionally, around 9% ($N = 132$) of students reported a history of SA, 26% ($N = 34$) of which had their most recent SA during the last two years (Table 1).

3.2. Latent profile analysis

The LPA was based on the individual scores of DES-depersonalization subscale, VAS-habitual-physical-pain, VAS-habitual-mental-pain, PVAQ awareness and PVAQ vigilance subscales, MAIA-not-distracting and MAIA-not-worrying subscales, and RFQ-total score. Using a stepwise approach, latent profile models ranging from 2 to 7 classes were estimated and compared; fit indices for each LPA model are shown in Table 2. The information criteria (AIC, BIC, SABIC) decreased consistently as additional profiles were added, indicating improved fit for more complex models. The largest incremental improvements were observable for models with up to 3 classes ($\Delta AIC = -606.94$, $\Delta BIC = -559.61$; $\Delta SABIC = -588.20$), as observable by the elbow plot of information criteria (see Fig. 1). Notably, the 4-profile solution still showed a meaningful improvement compared to the 3-profile model ($\Delta AIC = -234.07$, $\Delta BIC = -186.75$; $\Delta SABIC = -215.33$; BLRT(p) < 0.05). Additionally, it possessed the strongest classification accuracy (entropy = 0.80), suggesting that the additional profile captured meaningful heterogeneity rather than statistical noise. Consistent with the information criteria, the loglikelihood also markedly increased from the 3- to the 4-class model ($\Delta LL = +126.03$), reflecting a better

Table 1
Description of the sample.

Characteristic	$N = 1420$	N (%) / Mean (SD)
Sociodemographic and clinical features		
Age		21.22 (2.39)
Education		
Undergraduate		1127 (79%)
Bachelor's Degree		243 (17%)
Master's Degree or higher		50 (3.5%)
Gender		
Female		1039 (73%)
Male		342 (24%)
Other		39 (2.7%)
Sexual Orientation		
Heterosexual		1110 (78%)
Homosexual		72 (5.1%)
Other		238 (17%)
Italian region		
North		911 (64%)
Center		220 (16%)
South and Island		276 (19%)
Prefer not to answer		13 (1%)
Nationality		
Italian		1306 (92%)
Other or Italian + other		111 (7.8%)
Prefer not to answer		3 (0.2%)
Origin Country		
Italy		1327 (93.5%)
Other or Italy + other		92 (6.5%)
Prefer not to answer		1 (<0.1%)
Commuter		249 (18%)
Occupation		
Full-time student		1025 (72%)
Student + part-time job		327 (23%)
Student + full-time job		41 (2.9%)
Other		27 (1.9%)
Relationship status		
Single		744 (52%)
Engaged not cohabiting		596 (42%)
Engaged cohabiting		80 (5.6%)
Parent		4 (0.3%)
Medical condition		228 (16%)
Chronic pain	N = 228	66 (29%)
Current medication	N = 228	158 (69%)
Psychotherapy (lifetime)		643 (45%)
Psychiatric/neuropsychiatric diagnosis (lifetime)		211 (15%)
Psychopharmacological medication (current)		100 (7.0%)
Psychoactive substances (current)		89 (6.3%)
SROs		
DW or SI (lifetime)		843 (59%)
DW or SI (last month)		306 (22%)
DW (lifetime)		808 (57%)
DW intensity (lifetime)	N = 808	6.50 (2.55)
DW (last month)		304 (21%)
DW intensity (last month)	N = 304	5.98 (2.17)
DW frequency (last month)	N = 304	
Less than once a week		135 (44%)
Once a week		74 (24%)
2–5 times a week		50 (16%)
Daily or almost		35 (12%)
Many times each day		10 (3.3%)
SI (lifetime)		461 (32%)
SI intensity (lifetime)	N = 461	6.97 (2.39)
SI (last month)		72 (5.1%)
SI intensity (last month)	N = 72	6.93 (1.98)
SI frequency (last month)	N = 72	
Less than once a week		25 (35%)
Once a week		15 (21%)
2–5 times a week		17 (24%)
Daily or almost		12 (17%)
Many times each day		3 (4%)
SP (lifetime)		286 (20%)
NSSI (lifetime)		510 (36%)
NSSI frequency (last year)	N = 510	
Never		299 (59%)
1–4 times		146 (29%)
5 times or more		65 (13%)
SA (lifetime)		132 (9.3%)
Most recent SA	N = 132	
Last 2 years		34 (26%)
More than 2 years ago		98 (74%)
Self-report measures		
DES total score		24 (15)
DES depersonalization		18 (20)
DES amnesia		13 (14)
DES absorption		31 (20)
MAIA noticing		2.89 (1.13)
MAIA not-distracting		2.35 (0.92)
MAIA not-worrying		2.26 (1.10)
MAIA attention-regulation		2.44 (1.00)
MAIA emotional awareness		2.98 (1.25)
MAIA self-regulation		1.97 (1.16)
MAIA body listening		2.23 (1.26)
MAIA trusting		2.76 (1.37)
VAS physical pain (current)		1.76 (2.01)
VAS physical pain (habitual 15d)		2.77 (2.10)
VAS physical pain (maximal 15d)		4.70 (2.64)
VAS mental pain (current)		3.84 (2.75)
VAS mental pain (habitual 15d)		4.66 (2.65)
VAS mental pain (maximal 15d)		6.36 (2.89)
PVAQ awareness		19.8 (5.7)
PVAQ vigilance		14.4 (5.8)
RFQ total score		4.01 (1.22)
TAS total score		53 (12)
PAS total score		34 (12)
ACSS-FAD score		14 (7)

SROs: Suicide-related outcomes**, DW:** Death Wish**, SI:** Suicidal Ideation, **SP:** Suicidal Planning, **NSSI:** Non-suicidal Self-injury, **SA:** Suicide Attempt, **DES:** Dissociative Experiences Scale, **MAIA:** Multidimensional Assessment of Interoceptive Awareness, **VAS:** Visual Analogue Scale, **PVAQ:** Pain Vigilance and Awareness Questionnaire, **RFQ:** Reflective Functioning Questionnaire, **TAS:** Toronto Alexithymia Scale, **PAS:** Psychache Scale, **ACSS-FAD:** Acquired Capability for Suicide Scale – Fearlessness About Death.

representation of the observed data patterns. Although information criteria continued to decrease with additional profiles, 5- to 7-profile models yielded diminishing improvements in fit relative to the increase in model complexity, with some classes represented by fewer than 100 individuals, thus reducing their interpretability and practical relevance.

Finally, both 3-class and 4-class solutions showed good fit, but the 4-class solution was preferred and chosen for our main analyses, as it balanced fit, classification accuracy and parsimony. However, analyses based on the 3-class solutions can be accessed in supplementary materials. The 4-class model also provided good profile discrimination and theoretically meaningful profiles with appropriate sizes (i.e. the smallest profile included $N = 105$ individuals, 7.4% of the sample). Classification quality was satisfactory, with an entropy of 0.801 and average posterior probabilities for class membership of 0.869, 0.906, 0.839, and 0.921 for profiles 1 through 4 respectively, all exceeding the recommended threshold of 0.80.

Our analysis revealed 4 meaningful profiles:

1) a 'low-risk' profile ($N = 720$, 50.7%) characterized by below-average dissociation, lower-than-average levels of physical and mental pain, low pain vigilance and awareness, average not-distracting from painful stimuli capacities, better-than-average capacity not-to-worry excessively about painful stimuli, and low mentalizing deficits;
2) a 'hypervigilant' profile ($N = 393$, 27.7%) defined by low dissociation, higher-than-average physical pain, slightly elevated mental pain, but very high pain vigilance and awareness, moderately good not-distracting capacities, a tendency to worry excessively about

Table 2
Fit indices of Latent Profile Analysis models.

Classes	LL	AIC	BIC	SABIC	Entropy	BLRT(p)
1	−16,115.14	32,262.28	32,346.42	32,295.59	–	–
2	−15,635.29	31,320.58	31,452.04	31,372.62	0.67	0.010
3	−15,322.82	30,713.64	30,892.43	30,784.42	0.76	0.010
4	**−15,196.79**	**30,479.57**	**30,705.68**	**30,569.09**	**0.80**	**0.010**
5	−15,093.47	30,290.95	30,564.38	30,399.20	0.78	0.010
6	−14,995.32	30,112.63	30,433.40	30,239.62	0.76	0.010
7	−14,956.87	30,053.74	30,421.83	30,199.47	0.71	0.010

LL: Loglikelihood, **AIC:** Akaike Information Criterion, **BIC:** Bayesian Information Criterion, **SABIC:** Sample-size-Adjusted BIC, **BLRT(p):** *p*-value for the Bootstrap Likelihood Ratio Test.

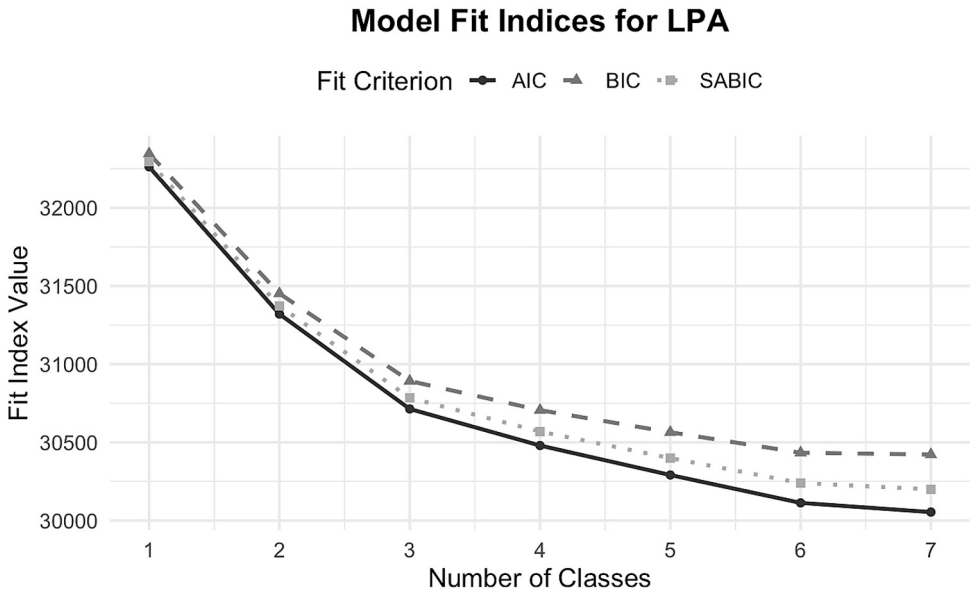

Fig. 1. Fit indices for latent profile analysis (LPA) models with one to seven classes. Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC (SABIC) are shown, with lower values indicating better model fit. All indices decrease with increasing numbers of classes, with a marked improvement up to the three-class solution and more gradual gains thereafter. Although a four-class solution was retained in the present study, the three-class solution also demonstrated acceptable fit, supporting its consideration as a parsimonious alternative.
Line graph showing three model fit indices — Akaike Information Criterion (solid black line with circle markers), Bayesian Information Criterion (dashed dark grey line with triangle markers), and Sample-size Adjusted Bayesian Information Criterion (dotted light grey line with square markers) — plotted across latent profile solutions from one to seven classes. All three indices decrease steeply from one to three classes, then continue declining more gradually, suggesting improvement in model fit with increasing class solutions.

pain and discomfort in the body, accompanied by average mentalizing capacities;

3) a 'dissociative-hypovigilant' profile (N = 202, 14.2%) with higher-than-average dissociative traits, high levels of physical pain and even higher levels of mental pain, but scarce awareness and vigilance toward pain, a tendency to distract from painful or uncomfortable sensations and moderately high mentalizing deficits; and.
4) a 'dissociative-hypervigilant' profile (N = 105, 7.4%) characterized by very high levels of dissociation, the highest levels of both physical and mental pain, moderately high pain awareness but higher pain vigilance, just-below-average not-distracting capacity, extremely low abilities not-to worry excessively about pain and discomfort in the body, and the highest mentalizing deficits, as compared to the other profiles.

The profile's defining features are represented in Fig. 2, while a detailed description of their overall characteristics is summarized in Table 3.

Alternative LPA models including TAS and PAS as indicators were estimated and yielded comparable patterns of model fit and profile interpretation (Supplementary Tables S6–S7), suggesting that the final solution was not driven by a specific indicator selection.

3.3. Logistic regressions with SROs

The four profiles were entered into logistic regressions with the 'low-risk' profile as comparison and SROs as dependent variables. The results are summarized in Table 4.

3.3.1. SI

Concerning lifetime SI, the odds were respectively 1.5, 4.6 and 6.4 times significantly higher for the 'hypervigilant' (OR = 1.49, 97.5% CI [1.13, 1.96], p = .005), the 'dissociative-hypovigilant' (OR = 3.61, 97.5% CI [2.61, 5.01], p < .001) and the 'dissociative-hypervigilant' profile (OR = 6.40, 97.5% CI [4.13, 9.92], p < .001), as compared with the 'low-risk' profile.

With respect to current SI, only the dissociative profiles were significantly more likely than the 'low-risk' profile to report such thoughts, and with very large effect sizes. The 'dissociative-hypovigilant' profile reported over seven times the odds (OR = 7.58, 97.5% CI [3.70, 15.53], p < .001) of current SI, and the 'dissociative-hypervigilant' reported more than nineteen times the odds (OR = 19.42, 97.5% CI [9.43, 39.00], p < .001) of having had SI in the last month.

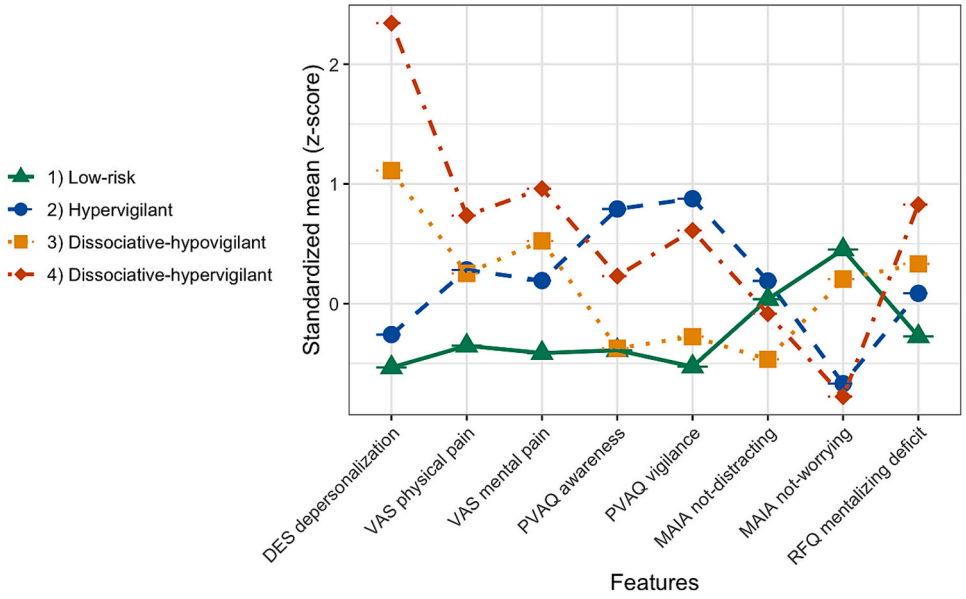

Fig. 2. Profiles identified by the LPA are displayed as standardized mean scores (z-scores) across the following variables: depersonalization (DES), physical and mental pain (VAS), pain vigilance and awareness (PVAQ), interoceptive attentional styles (MAIA: not-distracting, not-worrying), and mentalizing deficits (RFQ). Positive values indicate above-average scores; negative values indicate below-average scores. Four distinct profiles emerged: (1) a **low-risk profile**, characterized by low dissociation, low physical and mental pain, low pain vigilance and awareness, and low mentalizing deficits; (2) a **hypervigilant profile**, characterized by elevated pain, very high pain vigilance and awareness, and a tendency to worry about pain, alongside low dissociation; (3) a **dissociative-hypovigilant profile**, characterized by high dissociation, high pain (particularly mental pain), low pain vigilance and awareness, a tendency to divert attention away from pain, and elevated mentalizing deficits; and (4) a **dissociative-hypervigilant profile**, characterized by very high dissociation, the highest pain levels across all profiles, high pain vigilance and awareness, a worried attentional orientation toward pain, and the greatest mentalizing deficits.
Line graph showing standardized mean z-scores across eight features for four latent profiles. The 'Low-risk' profile (solid green line with triangle markers) scores consistently below average across all maladaptive features (i.e., dissociation, physical and mental pain levels, pain vigilance and awareness, excessive worry or tendency to distract from painful stimuli), while exhibiting intact mentalization. The 'Hypervigilant' profile (dashed blue line with circle markers) scores low on dissociation, but very high on pain vigilance and awareness, as well as worry about pain. The 'Dissociative-hypovigilant' profile (dotted ochre yellow line with square markers) shows high dissociation and pain levels but low pain vigilance and awareness, along with a tendency to distract from pain and more severe mentalizing deficits. The 'Dissociative-hypervigilant' profile (dot-dash vermillion line with diamond markers) scores highest on dissociation, as well as on physical - and especially mental - pain levels, with high pain vigilance and awareness, intense worry about pain, and the most impaired mentalizing capacity. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

3.3.2. SP

For lifetime SP history, both dissociative profiles were significantly more likely to report this outcome, with the 'dissociative-hypovigilant' profile having three times the odds (OR = 3.01, 97.5% CI [2.09, 4.33], $p < .001$) and the 'dissociative-hypervigilant' having almost seven times the odds (OR = 6.72, 97.5% CI [4.34, 10.41], $p < .001$) or reporting SP history than the 'low-risk' profile.

3.3.3. NSSI

Concerning lifetime NSSI history, dissociative profiles were also the only ones predicting significantly greater odds in comparison with the 'low-risk' profile. The 'dissociative-hypovigilant' profile had over two times the odds (OR = 2.55, 97.5% CI [1.85, 3.50], $p < .001$), while the 'dissociative-hypervigilant' profile had six times the odds (OR = 6.00, 97.5% CI [3.80, 9.34], $p < .001$) of having enacted these behaviors in their life.

3.3.4. SA

Both dissociative profiles were more likely to report having made a SA in their lifetime. The 'dissociative-hypovigilant' profile was linked to four times the odds (OR = 4.16, 97.5% CI [2.57, 6.73], $p < .001$), while the 'dissociative-hypervigilant' profile was associated with more than six times the odds of reporting lifetime SA history (OR = 6.21, 97.5% CI [3.60, 10.73], $p < .001$), as compared with the 'low-risk' one.

3.4. Sensitivity analyses

Associations with lifetime SI, SP, NSSI and SA and both dissociative profiles remained significant after adjusting for age, gender, current psychopharmacological medication, current medical condition, and lifetime psychiatric/neuropsychiatric diagnosis, although with reduced effect sizes, especially for the 'dissociative-hypervigilant' profile. The logistic regression on current SI was only adjusted for age and gender, due to limited number of events, but associations were still preserved for both dissociative profiles, with comparable effect sizes. All sensitivity analyses are further detailed in Supplementary Table S9.

4. Discussion

In this study, we sought to identify latent profiles of dissociative detachment, pain experience, interoceptive attention regulation and mentalization, and examine their associations with different SROs. Four distinct profiles emerged within our sample, which showed markedly different associations with SROs. While a large low-risk profile was characterized by low dissociation and adaptive interoceptive regulation, two dissociative profiles emerged as strongly associated with SI, SP, NSSI, and SA. Dissociative detachment was a key discriminator of risk: a hypervigilant profile without elevated detachment showed only modest associations with SROs, whereas dissociative profiles, particularly the dissociative-hypervigilant profile, exhibited very large increases in risk, especially for current SI and SA. Consistent with the exploratory nature of the study, the set of indicators was selected partly on empirical consideration (e.g. redundancy, entropy or interpretability), and partially on theoretical grounds. For this reason, the generalizability of these results is constrained, and the identified profiles may partly reflect the chosen set of indicators. The profiles presented here should therefore

Table 3
Descriptive statistics of the profiles.

Characteristic		'Low-risk' $N = 720^1$	'Hypervigilant' $N = 393^1$	'Dissociative-hypovigilant' $N = 202^1$	'Dissociative-hypervigilant' $N = 105^1$
Sociodemographic and clinical features					
Age		21.41 (2.41)	21.38 (2.50)	20.62 (2.21)	20.44 (1.76)
Education					
Bachelor's Degree		147 (20%)	67 (17%)	21 (10%)	8 (7.6%)
Master's Degree or higher		25 (3.5%)	17 (4.3%)	3 (1.5%)	5 (4.8%)
Undergraduate		548 (76%)	309 (79%)	178 (88%)	92 (88%)
Gender					
Female		501 (70%)	307 (78%)	146 (72%)	85 (81%)
Male		205 (28%)	81 (21%)	43 (21%)	13 (12%)
Other		14 (1.9%)	5 (1.3%)	13 (6.4%)	7 (6.7%)
Sexual orientation					
Heterosexual		588 (82%)	319 (81%)	137 (68%)	66 (63%)
Homosexual		29 (4.0%)	21 (5.3%)	12 (5.9%)	10 (9.5%)
Other		103 (14%)	53 (13%)	53 (26%)	29 (28%)
Occupation					
Full-time student		527 (73%)	272 (69%)	145 (72%)	81 (77%)
Student + full-time job		18 (2.5%)	14 (3.6%)	6 (3.0%)	3 (2.9%)
Student + part-time job		162 (23%)	100 (25%)	47 (23%)	18 (17%)
Other		13 (1.8%)	7 (1.8%)	4 (2.0%)	3 (2.9%)
Nationality					
Italian		672 (93.3%)	363 (92%)	181 (90%)	90 (86%)
Other or Italian + other		45 (6.3%)	30 (8%)	21 (10%)	6 (14%)
Prefer not to answer		3 (0.4%)	0 (0%)	0 (0%)	0 (0%)
Origin Country					
Italy		679 (94%)	368 (94%)	185 (92%)	95 (90%)
Other or Italy + other		41 (6%)	25 (6%)	17 (8%)	9 (9%)
Prefer not to answer		0 (0%)	0 (0%)	0 (0%)	1 (1%)
Italian region					
North		476 (66%)	252 (64%)	116 (58%)	67 (64%)
Center		115 (16%)	58 (15%)	35 (17%)	12 (11%)
South and Islands		126 (18%)	79 (20%)	45 (22%)	26 (25%)
Prefer not to answer		3 (0.4%)	4 (1%)	6 (3%)	0 (0%)
Commuter		132 (18%)	62 (16%)	34 (17%)	21 (20%)
Relationship status					
Single		371 (52%)	200 (51%)	117 (58%)	56 (53%)
Engaged cohabiting		40 (5.6%)	27 (6.9%)	10 (5.0%)	3 (2.9%)
Engaged not cohabiting		309 (43%)	166 (42%)	75 (37%)	46 (44%)
Parent		1 (0.1%)	3 (0.8%)	0 (0%)	0 (0%)
Medical condition		93 (13%)	72 (18%)	36 (18%)	27 (26%)
Chronic pain	N = 228	20 (22%)	21 (29%)	11 (31%)	14 (52%)
Current medication	N = 228	66 (71%)	44 (61%)	26 (72%)	22 (81%)
Psychotherapy (lifetime)		270 (38%)	190 (48%)	99 (49%)	84 (80%)
Psychiatric/neuropsychiatric diagnosis (lifetime)		67 (9.3%)	60 (15%)	36 (18%)	48 (46%)
Psychopharmacological medication (current)		31 (4.3%)	28 (7.1%)	15 (7.4%)	26 (25%)
Psychoactive substances (current)		42 (5.8%)	24 (6.1%)	12 (5.9%)	11 (10%)
SROs					
DW or SI (lifetime)		352 (49%)	247 (63%)	154 (76%)	90 (86%)
DW or SI (last month)		98 (14%)	79 (20%)	74 (37%)	55 (52%)
DW (lifetime)		335 (47%)	237 (60%)	148 (73%)	88 (84%)
DW intensity (lifetime)	N = 808	5.87 (2.57)	6.35 (2.57)	7.26 (2.25)	7.97 (2.03)
DW (last month)		98 (14%)	79 (20%)	73 (36%)	54 (51%)
DW intensity (last month)	N = 304	5.47 (2.28)	5.78 (2.12)	6.16 (1.97)	6.93 (2.04)
DW frequency (last month)	N = 304				
Less than once a week		55 (56%)	39 (49%)	25 (34%)	16 (30%)
Once a week		23 (23%)	20 (25%)	21 (29%)	10 (19%)
2–5 times a week		14 (14%)	10 (13%)	17 (23%)	9 (17%)
Everyday or almost		6 (6.1%)	8 (10%)	8 (11%)	13 (24%)
Many times a day		0 (0%)	2 (2.5%)	2 (2.7%)	6 (11%)
SI (lifetime)		166 (23%)	121 (31%)	105 (52%)	69 (66%)
SI intensity (lifetime)	N = 461	6.58 (2.50)	7.04 (2.20)	7.06 (2.43)	7.68 (2.25)
SI (last month)		12 (1.7%)	11 (2.8%)	23 (11%)	26 (25%)
SI intensity (last month)	N = 72	7.25 (1.66)	5.55 (2.16)	6.83 (1.90)	7.46 (1.92)
SI frequency (last month)	N = 72				
Less than once a week		6 (50%)	5 (45%)	11 (48%)	3 (12%)
Once a week		3 (25%)	3 (27%)	3 (13%)	6 (23%)
2–5 times a week		2 (17%)	3 (27%)	6 (26%)	6 (23%)
Every day or almost		1 (8.3%)	0 (0%)	3 (13%)	8 (31%)
Many times a day		0 (0%)	0 (0%)	0 (0%)	3 (12%)
SP (lifetime)		98 (14%)	69 (18%)	65 (32%)	54 (51%)
NSSI (lifetime)		206 (29%)	128 (33%)	102 (50%)	74 (70%)
NSSI frequency (last year)	N = 510				
Never		130 (63%)	85 (66%)	51 (50%)	33 (45%)

(*continued on next page*)

Table 3 (*continued*)

Characteristic		'Low-risk' $N = 720^1$	'Hypervigilant' $N = 393^1$	'Dissociative-hypovigilant' $N = 202^1$	'Dissociative-hypervigilant' $N = 105^1$
1–4 times		56 (27%)	33 (26%)	37 (36%)	20 (27%)
5 or more		20 (9.7%)	10 (7.8%)	14 (14%)	21 (28%)
SA (lifetime)		38 (5.3%)	29 (7.4%)	38 (19%)	27 (26%)
Most recent SA	N = 132				
Last 2 years		7 (18%)	6 (21%)	9 (24%)	12 (44%)
More than 2 years ago		31 (82%)	23 (79%)	29 (76%)	15 (56%)
Self-report measures					
DES total score		16 (9)	22 (12)	39 (11)	50 (14)
DES depersonalization		7 (8)	13 (11)	41 (11)	66 (13)
DES amnesia		9 (9)	13 (12)	23 (14)	30 (21)
DES absorption		23 (15)	31 (18)	49 (17)	57 (19)
MAIA noticing		2.55 (1.10)	3.27 (1.09)	3.12 (1.03)	3.40 (0.97)
MAIA not-distracting		2.39 (0.84)	2.53 (0.94)	1.91 (0.94)	2.27 (1.08)
MAIA not-worrying		2.76 (0.90)	1.44 (0.91)	2.50 (0.97)	1.33 (0.91)
MAIA attention-regulation		2.49 (0.97)	2.49 (0.99)	2.36 (0.97)	2.00 (1.18)
MAIA emotional awareness		2.70 (1.25)	3.39 (1.16)	3.11 (1.17)	3.14 (1.26)
MAIA self-regulation		2.09 (1.13)	1.98 (1.19)	1.84 (1.12)	1.42 (1.15)
MAIA body listening		2.09 (1.18)	2.68 (1.29)	2.00 (1.23)	1.93 (1.35)
MAIA trusting		3.03 (1.30)	2.89 (1.25)	2.17 (1.34)	1.58 (1.39)
VAS physical pain (current)		1.27 (1.72)	2.10 (2.07)	2.28 (2.18)	2.86 (2.37)
VAS physical pain (habitual 15d)		2.04 (1.72)	3.42 (2.20)	3.39 (2.00)	4.21 (2.40)
VAS physical pain (maximal 15d)		3.94 (2.46)	5.35 (2.65)	5.50 (2.41)	5.98 (2.72)
VAS mental pain (current)		2.85 (2.36)	4.21 (2.61)	5.04 (2.70)	6.83 (2.37)
VAS mental pain (habitual 15d)		3.57 (2.32)	5.24 (2.50)	6.06 (2.33)	7.23 (2.18)
VAS mental pain (maximal 15d)		5.29 (2.89)	6.93 (2.57)	7.84 (2.21)	8.69 (1.74)
PVAQ awareness		17.6 (4.7)	24.8 (4.5)	17.6 (5.1)	21.3 (5.6)
PVAQ vigilance		11.3 (3.9)	19.9 (4.2)	12.9 (5.0)	18.0 (6.2)
RFQ total score		3.69 (1.15)	4.10 (1.19)	4.46 (1.15)	5.03 (1.10)
TAS total score		51 (12)	52 (12)	58 (12)	63 (12)
PAS total score		28 (10)	35 (11)	40 (11)	50 (10)
ACSS-FAD score		15 (7)	12 (7)	16 (8)	14 (8)

[1] Mean (SD); n (%)

SROs: Suicide-related outcomes**, DW:** Death Wish**, SI:** Suicidal Ideation, **SP:** Suicidal Planning, **NSSI:** Non-suicidal Self-injury, **SA:** Suicide Attempt, **DES:** Dissociative Experiences Scale, **MAIA:** Multidimensional Assessment of Interoceptive Awareness, **VAS:** Visual Analogue Scale, **PVAQ:** Pain Vigilance and Awareness Questionnaire, **RFQ:** Reflective Functioning Questionnaire, **TAS:** Toronto Alexithymia Scale, **PAS:** Psychache Scale, **ACSS-FAD:** Acquired Capability for Suicide Scale – Fearlessness About Death.

be viewed as provisional, sample-derived patterns rather than established subtypes; replication is needed to confirm their generalizability. Although limited to the present sample, these findings suggest that dissociation may be a key feature of the relationship between pain, bodily attention, and suicide risk.

4.1. Sample characteristics

Lifetime prevalences of DW (57%) and SI (32%) exceeded those of most pre-pandemic studies of university students, which generally estimated rates of 20–26% for DW and 11–20% for SI (Mortier et al., 2018; Paiva et al., 2025), but were consistent with some post-pandemic estimates (Magliocca et al., 2024; De Oliveira Crispim et al., 2021). Current SI (around 5%) was prevalence comparable to previous estimates using similar timeframes (Mortier et al., 2018; Wang et al., 2020). SP (20%) and SA (around 9%) also exceeded pre-pandemic meta-analytic benchmarks while aligning with post-pandemic evidence (Magliocca et al., 2024; De Oliveira Crispim et al., 2021; Zhao et al., 2025). NSSI (36%) fell within the upper range of prior reviews (Cipriano et al., 2017; Hasking et al., 2025). These estimates ought to be taken cautiously, and may be inflated, since they were assessed with a self-reported adaptation of the C-SSRS. Additionally, the sample may be subject to self-selection bias, as students who chose to complete the survey may have had a pre-existing interest in mental health topics; therefore, our estimates may not be fully representative of the broader Italian university student population.

4.2. Profiles' characteristics

The four profiles identified in this sample captured meaningful heterogeneity in how individuals experienced and regulated bodily and mental states related to pain, differing in dissociative detachment, attentional orientation toward bodily cues, cognitive-affective responses to pain, and mentalizing capacities.

The low-risk profile showed the most adaptive overall functioning, characterized by a pattern consistent with balanced interoceptive processing, in which bodily signals are perceived without amplification or avoidance (Mehling, n.d.), and supported by intact mentalizing abilities (Fotopoulou and Tsakiris, 2017). Balanced interoceptive awareness has been described as a protective factor for emotional regulation (Price and Hooven, 2018) and linked to adaptive use of cognitive appraisal and downregulation of emotional responses (Füstös et al., 2013).

The hypervigilant profile showed a configuration (i.e. elevated pain accompanied by pronouced worry/vigilance toward pain) resembling both fear-avoidance models of chronic pain, in which attentional bias and pain-anxiety contribute to pain amplification and avoidance (Norton and Asmundson, 2003), and prior hypervigilant profiles observed in chronic pain samples (Oliveira et al., 2024). Relatively preserved mentalizing and only moderately elevated mental pain suggest that distress in this group is primarily driven by physical pain and attentional biases.

The dissociative-hypovigilant profile may suggest an avoidant or numbing mode of interoceptive processing, consistent with models conceptualizing depersonalization as a downregulation of interoceptive signals (Saini et al., 2022) and with altered intracortical pain control in highly dissociative individuals (Ducasse et al., 2014). Depersonalization has been associated with ignoring and disengagement as maladaptive emotion regulation strategies (Cavicchioli et al., 2021; Fortuna and Golonka, 2024), and with reduced pain perception during experimentally induced detachment (Defrin et al., 2015; Ludäscher et al., 2007;

Table 4
Logistic regressions with profiles and SROs.

SI (lifetime)							
Profile	Estimate	SE	z value	p-value	OR	2.5% CI	97.5% CI
(Intercept)	−1.205	0.088	−13.621	<0.001	0.300	0.252	0.356
2. Hypervigilant	0.395	0.141	2.810	0.005	1.485	1.127	1.956
3. Dissociative-hypovigilant	1.284	0.166	7.723	<0.001	3.613	2.608	5.005
4. Dissociative-hypervigilant	1.856	0.224	8.291	<0.001	6.397	4.125	9.919
SI (current)							
Profile	Estimate	SE	z value	p-value	OR	2.5% CI	97.5% CI
(Intercept)	−4.078	0.291	−14.010	< 0.001	0.017	0.010	0.030
2. Hypervigilant	0.530	0.422	1.255	0.209	1.699	0.743	3.886
3. Dissociative-hypovigilant	2.026	0.366	5.538	< 0.001	7.581	3.702	15.526
4. Dissociative-hypervigilant	2.966	0.369	8.048	< 0.001	19.418	9.429	39.987
SP (lifetime)							
Profile	Estimate	SE	z value	p-value	OR	2.5% CI	97.5% CI
(Intercept)	−1.848	0.109	−17.003	< 0.001	0.158	0.127	0.195
2. Hypervigilant	0.301	0.171	1.758	0.079	1.352	0.966	1.891
3. Dissociative-hypovigilant	1.102	0.186	5.935	< 0.001	3.011	2.092	4.334
4. Dissociative-hypervigilant	1.905	0.223	8.525	< 0.001	6.720	4.337	10.414
NSSI (lifetime)							
Profile	Estimate	SE	z value	p-value	OR	2.5% CI	97.5% CI
(Intercept)	−0.914	0.082	−11.088	< 0.001	0.401	0.341	0.471
2. Hypervigilant	0.187	0.136	1.377	0.169	1.205	0.924	1.572
3. Dissociative-hypovigilant	0.934	0.163	5.727	< 0.001	2.545	1.849	3.504
4. Dissociative-hypervigilant	1.784	0.229	7.783	< 0.001	5.956	3.800	9.335
SA (lifetime)							
Profile	Estimate	SE	z value	p-value	OR	2.5% CI	97.5% CI
(Intercept)	−2.887	0.167	−17.324	< 0.001	0.056	0.040	0.077
2. Hypervigilant	0.358	0.255	1.402	0.161	1.430	0.867	2.357
3. Dissociative-hypovigilant	1.425	0.245	5.809	< 0.001	4.159	2.571	6.726
4. Dissociative-hypervigilant	1.827	0.279	6.555	< 0.001	6.213	3.598	10.726

SE: standard error, **OR:** odd ratio, **CI:** confidence interval, **SI:** suicidal ideation, **SP:** suicidal planning, **NSSI:** non-suicidal self-injury, **SA:** suicide attempt.

Ludäscher et al., 2010). Despite elevated physical pain, attention was actively disengaged from it, possibly to regulate worry in the short term, albeit at the cost of disrupted interoceptive integration and mentalization (Fotopoulou and Tsakiris, 2017; Rüfenacht et al., 2023). Emotional numbing alongside psychological pain may reflect long-term costs of dissociative detachment and avoidance (Bruno et al., 2025b; Simeon et al., 2002).

The dissociative-hypervigilant profile showed the most globally impaired functioning. The apparently paradoxical combination of detachment and hypervigilance may suggest that dissociation from the body could coexist with heightened threat-focused body-monitoring, consistent with intact interoceptive accuracy but disrupted integration in depersonalization (Michal et al., 2014), with models emphasizing rumination over bodily sensations in depersonalization (Ciaunica et al., 2022), and empirical evidence linking dissociation and rumination, worry, and catastrophizing (Cavicchioli et al., 2021; Fortuna and Golonka, 2024; Vannikov-Lugassi et al., 2021). Compulsive body-monitoring may represent an attempt to manage intense pain, paradoxically amplifying both physical and psychological suffering. Finally, on one hand heightened pain may overload integrative capacities and disrupt reflective functioning. On the other hand, pre-existing mentalizing deficits may narrow the behavioral and cognitive repertoire to maladaptive coping strategies, such as avoidance and rumination. Mentalizing impairment may also reflect early aversive experiences within attachment relationships: disorganized attachment predisposes individuals to dissociative stress responses (Liotti, 2004; Lyons-Ruth et al., 2006), and early relational trauma and dissociation may interfere with the integration of interoceptive discomfort, hindering the development of reflective functioning (Fotopoulou and Tsakiris, 2017).

4.3. Profiles and their relationships with suicide risk

Heightened pain vigilance, in the absence of dissociative detachment, was not sufficient to confer high suicide risk. These results converge with early theories on how dissociative detachment facilitates SA (Orbach, 1994) and with meta-analytical evidence linking dissociative traits to SI, NSSI, and SA (Calati et al., 2017; Bruno et al., 2025a). A clear gradient of risk emerged across profiles with increasing levels of depersonalization and maladaptive pain-related hypervigilance.

The dissociative-hypervigilant profile consistently showed numerically larger odds of SI, SP, NSSI and SA, and especially of current SI, combining depersonalization pain hypervigilance, and severely impaired mentalization. This configuration may be associated with greater SI, potentially through the amplification of psychological pain alongside reduced reflective functioning and regulatory processes. The dissociative-hypovigilant profile was also associated with significantly

elevated odds across SROs. Although the cross-sectional nature of our design does not allow any definite interpretation in this regard, it is possible that attentional disengagement from bodily cues may partially buffer immediate distress while nonetheless producing long-term risk. These findings parallel evidence from undergraduate samples showing that negative dissociative symptoms more strongly predicted SI, while positive symptoms distinguished SA history (Nedelmann et al., 2025). Contrary to previous hypotheses (Bianco et al., 2025), in the present sample, a combination of pain-hypervigilance and dissociative detachment, rather than either factor alone, was found as the cluster of features associated with the greatest risk for SROs.

Notably, dissociative detachment, especially when combined with hypervigilance, was not merely linked to lifetime SROs but also to current SI, suggesting that these profiles may capture ongoing vulnerability. This meets the call for more dynamic models of suicide risk (Kivelä et al., 2022; Lengvenyte and Courtet, 2025) and is consistent with the fluid vulnerability theory (Rudd, 2007), which emphasizes acute, fluctuating dimensions alongside baseline risk factors (Bryan et al., 2020). Whether the dissociative hypo- and hypervigilance configurations are generalizable to different samples, and whether they reflect actual traits or alternating modes of functioning, as proposed by the Structural Dissociation of Personality model (Van der Hart et al., 2006), remain as questions requiring further, and possibly longitudinal investigation.

The hypervigilant (non-dissociative) profile showed a more selective pattern of risk, associated with greater odds of lifetime SI but not of SP, NSSI or SA, suggesting that pain vigilance alone may be linked to SI but not with more behaviorally oriented outcomes. This partially contradicts the hypothesis of a non-dissociative pain hypersensitive profile in suicide risk (Bianco et al., 2025) and it aligns with models positing that suicidal thoughts and behaviors are partially distinct phenomena and that dissociative processes may lower the threshold for behavioral enactment (Orbach, 1994; Armey and Crowther, 2008; Pachkowski et al., 2021).

4.4. Clinical implications

These findings emphasize the importance of configurations of dissociation, pain-related attentional styles, and mentalizing deficits, when evaluating suicide risk. Subgroups of people marked by co-occurring depersonalization, maladaptive engagement with bodily pain, and impaired reflective functioning appeared to constitute particularly high-risk latent profiles in this sample. Clinically, these results support interventions jointly targeting dissociative symptoms, interoceptive integration, and mentalization in suicide prevention. Several meta-analyses have identified MBT as an evidence-based intervention with strong efficacy in reducing SAs and NSSI (Calati and Courtet, 2016; Ougrin et al., 2015; Uribe et al., 2024), and trauma-focused MBT (MBT-TF) has been proposed to specifically address dissociation and alien-self experiences, while promoting embodied mentalization (Bateman et al., 2024; Rüfenacht et al., 2023). Longitudinal studies will be essential to clarify how these dimensions co-vary over time and if they may contribute to transitions from SI to SA, thereby informing more precise, person-centered interventions.

4.5. Limitations

Several limitations should be acknowledged. First, we pre-registered a different analysis plan than with a confirmatory aim; we deviated from it because the original analyses did not yield satisfactory model fit, and these results are reported in the supplementary materials. Second, the cross-sectional design precludes causal inferences, and longitudinal studies are needed to clarify whether specific profiles prospectively predict SI-to-SA transitions. Third, all constructs were assessed via self-report, which may be influenced by reporting biases and limited introspective access, particularly in highly dissociative individuals; future research would benefit from multimethod assessments including behavioral and physiological measures. Fourth, SROs were assessed using a self-report adaptation of the C-SSRS, which differs from clinician-administered interviews and may have affected prevalence estimates. Fifth, the absence of adjustment for current global symptom distress may further limit the generalizability of our results, as profiles might have differed had such a covariate been included. Sixth, although we did not specify the precise topic of the study, it is possible that the students who responded to the survey were the ones who were generally more interested in mental health and may not be representative of the entire population of Italian students. Finally, the sample consisted of Italian university students, limiting generalizability to other age groups, cultural contexts, or clinical populations.

5. Conclusions

This study suggested that suicide risk in this sample of young adults was characterized by qualitatively distinct profiles of dissociative detachment, pain experience, interoceptive regulation, and mentalization, rather than uniform elevations in distress. Dissociative detachment emerged as a central organizing dimension of risk, characterizing how pain is perceived, attended to, and integrated, and strongly distinguishing individuals with elevated vulnerability to suicide risk. By adopting a person-centered perspective, our findings highlighted heterogeneity in suicide risk that remains invisible to variable-centered approaches and underscore the importance of assessing dissociation and embodied self-regulation in preventive and clinical contexts.

CRediT authorship contribution statement

Francesca Bianco: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Carla Gramaglia:** Writing – review & editing, Resources. **Patrizia Zeppegno:** Writing – review & editing, Resources. **Fabio Madeddu:** Writing – review & editing, Resources. **Daniele Romano:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Conceptualization. **Raffaella Calati:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Conceptualization.

Funding sources

This study was not supported by any sponsor or funder.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2026.122382.

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