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# Pattern of self-injurious behavior and suicide attempts in Italian custodial inmates: A cluster analysis approach

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ABSTRACT

Self-injurious behaviors and suicide attempts are more frequent in prison settings than in the general population and represent a crucial problem. The aims of this work are to assess the prevalence of self-injurious behaviors and suicide attempts in an Italian prison setting, to determine whether inmates could be differentiated based on profiles of psychological distress and impulsiveness, and to assess the predictive power of the proposed profiles.

A sample of 1422 male inmates of a north Italian penitentiary was assessed upon admission with a clinical interview and completed a set of self-report questionnaires to assess psychological distress and impulsiveness; the number of self-injurious behaviors and suicide attempts occurring in the first year of detention was recorded. A cluster analysis approach was used.

Prevalence of self-Injurious behaviors and suicide attempts is similar to what has been observed in previous work. Cluster analysis revealed four clusters: dysregulated (high impulsivity and distress), impulsive (high impulsivity and mean distress), mildly distressed (mean impulsivity and moderate distress) and well-balanced (low impulsivity and distress).

The four clusters help to discriminate subjects more at risk of self-injurious behaviors and suicide attempts and are confirmed by the inclusion of risk factors such as marital status and relatives'/social support. Clinical implications are discussed.

## 1. Introduction

Self-injurious behaviors (SIB) are a serious problem among custodial inmates (Lohner & Konrad, 2006; Bonner, 2006). self-injurious behaviors as the deliberate, direct destruction or alteration of body tissue without conscious suicidal intent (Chapman, Gratz, & Brown, 2006; Gratz, 2003; Klonsky, Oltmanns, & Turkheimer, 2003) are much more frequent in prison settings than in the general population (Fazel, Grann, Kling, & Hawton, 2011). Hawton (Hawton, Linsell, Adeniji, Sariaslan, & Fazel, 2014), through an inspection of prisons records of self-harm incidents in England and Wales between 2004 and 2009, found that prevalence ranged from 200 to 249 per 1000 prisoners during the study period. As regards Italian prisons, from 1990 to 2002 deliberate self-injuring acts involved about one in every 10 individuals (Preti & Cascio, 2006) and recently these data have been confirmed on a wide sample of 3900 inmates (Castelpietra et al., 2018).

Research has identified several risk factors for self-injurious behaviors in prison settings related, first, to the socio-demographic status and personality characteristics of the inmates and, second, to the prison environment (Fazel, Ramesh, & Hawton, 2017; Lohner & Konrad, 2007; Naud & Daigle, 2013). The absence of a partner, a low educational level and being unemployed increase the probability of self-injurious behaviors in custodial inmates, likely because of a low level of social support and the lack of future prospects (Barker, Kõlves, & De Leo, 2014).

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Furthermore, subjects with past self-harm or suicide attempts, with a psychiatric disorder, and with a history of drug abuse or dependence (Lohner & Konrad, 2007; Naud & Daigle, 2013) show a high level of risk for SIB.

As regards environmental factors, it should be considered that being imprisoned constitutes a crucial stressful event. The new condition of deprivation, an overcrowded environment, and the loss of a temporal perspective arising from being sentenced long-term or being held on remand can dramatically increase the level of psychological distress, with increased risk of physical as well as mental health problems (Konrad et al., 2007; van Ginneken, Sutherland, & Molleman, 2017). However, a recent international study (Fazel et al., 2017) found weak associations between prison-level factors and prison suicide rates, suggesting that individual-level factors might provide more explanation than solely focusing on prison-level factors.

The relationship between self-injury behaviors and suicide attempts is debated and while some authors conceptualize them as part of a continuum, others consider it "as distinct psychopathological phenomena, with meaningful differences related to lethality, aims of the act, the presence of suicidal intent, among other clinical characteristics" (Verdolini et al., 2017, p. 154). In prison setting, self-injury behaviors and suicide attempts are relevant risk factors for suicide death mainly for inmates with mental health comorbidity (Fazel et al., 2017; Hawton et al., 2014, 2015), and the same pattern is confirmed in general population (Runeson, Haglund, Lichtenstein, & Tidemalm, 2016).

Self-injury behavior is a significant predictor of suicide attempts (Chesin et al., 2017) and while from one hand they share many similar risk factors, on the other hand, they differ in terms of suicide intent, methods to harm self, age of onset, psychosocial and epidemiological characteristics (Liu et al., 2018; Edmondson, Brennan, & House, 2016; Wichstrom, 2009).

Therefore, a comprehensive study of self-injury behaviors should also include the assessment of suicide attempts.

### 1.1. Mechanisms of self-injurious behaviors and psychological profiles

At the individual level, different psychological mechanisms have been proposed to explain self-injurious behaviors. Several studies proposed that self-injurious behaviors represent a way to control the emotions arising from stressful situations through the expression and the concretization of an emotional state (Chapman et al., 2006) (*affect regulation* model), the recovery of boundaries of the self and a sense of emotional mastery (Brown, Comtois, & Linehan, 2002) (*boundaries* model), the avoidance of negative feelings (Chapman et al., 2006) (*experiential avoidance* model), and the impulsive decision making to vent the sense of urgency of the emotional arousal model (Hamza, Willoughby, & Heffer, 2015) (*impulsiveness* model). From these perspectives, self-injurious behaviors may be viewed as an attempt to escape psychological distress by preferring to deal with physical over emotional pain (Boergers, Spirito, & Donaldson, 1998; Chandler, 2014; Ettinger, 1992; Holm & Seveinsson, 2010; Klonsky & Glenn, 2009) and/or by distraction from "problems" and "bad memories" (Osuch, Ford, Wrath, & Bartha, 2014; Rodham, Hawton, & Evans, 2004; Shearer, 1994). It should be noted that these mechanisms have a high degree of overlap and SIB is likely an overdetermined phenomenon serving multiple functions simultaneously. How these mechanisms contribute to self-injurious behaviors is not fully known; however, they work together, mutually influencing self-injurious behaviors based on the situations and individuals and lead to different processes relating to various profiles of risk (Gratz, 2003).

A recent observational study on a sample of Chinese adolescent (Liu et al., 2018) showed that those with self-injury behaviors and suicide attempts had higher level of trait anger, impulsiveness, hopelessness, internalizing and externalizing problems; however, unless similar psychological profiles suicide attempters have a more severe pattern, confirming the few previous studies available (Liang et al., 2014; Brausch & Gutierrez, 2010).

Despite the growing attention to the risk factors and mechanisms of self-injurious behaviors in general and in prison settings, a few studies have been dedicated to examining whether self-injurious behaviors among inmates varies depending on different combinations of psychological distress, critical clinical features (such as impulsiveness) or other individual and environment characteristics reflecting the different aforementioned mechanisms (Tiet, Ilgen, Byrnes, & Moos, 2006). However, in order to orient effective clinical intervention, an approach that considers self-injurious behaviors and suicide attempts in prison settings as the outcome of heterogeneous profiles of interacting risk factors with different meanings rather than focusing on a unique profile of risk is needed (Verdolini et al., 2017).

The Italian prison setting is based on the concept of re-education, and the punishment is "flexible" and, in some cases, can be reduced if the prisoner behaves according to prison and treatment rules. The profile and the needs of each prisoner should be considered in order to identify the best individual path to reintegrate the detainee into society (Marietti, 2013). In Italy there are 190 prisons with a capacity of nearly 50,000 places; however, the number of inmates is nearly 60,000 (Ministry of Justice statistics, 2018) and the overcrowding is one of the main concern and represents a risk factor for self-injurious behaviors and suicide attempts.

Starting from this need and in light of the paucity of data on self-injurious behaviors and suicide attempts in the Italian prison context, the current retrospective study has three aims:

- to assess the prevalence of self-injurious behaviors and suicide attempts in an Italian prison setting for a comparison with the literature;
- to determine, using a cluster analytic approach, whether custody inmates could be differentiated based on profiles (or combinations) of potential risk factors for self-injurious behaviors, with particular attention to psychological distress and impulsiveness;
- to assess the predictive power of the proposed profiles, assessing if they also differ in terms of self-injurious behaviors and suicide attempts prevalence one year after entering prison.

Some considerations about the management of self-injurious behaviors and suicide attempts in prison settings will be presented.

## 2. Materials and methods

### 2.1. Participants

The sample consisted of 1422 adult male inmates of a penitentiary in Northern Italy from September 2012 to September 2016. The penitentiary – with a combination of low to high level of security – has a capacity of 403 inmates and two-person cells, however, host generally > 600 male inmates (60% Italians) as overcrowding is one of the main problems in the Italian penitentiary system. Depending on the situation of every inmate a range of educational and working activities are available (and involve 20% of inmates). Inclusion criteria were: (1) age 18–65 years; (2) ability to proficiently read and process information in Italian and (3) ability to fill in a self-report questionnaire by themselves. All the new inmates were assessed within one week of entrance with a clinical interview aimed at detecting the risk of self-injurious behaviors and suicidality; before the interview and the completion of questionnaires, the participants received a letter with an explanation of the study and were informed that the choice not to give permission to use the data for research purposes would not in any way influence subsequent interventions or the length of the prison sentence, given that the data obtained from the questionnaires were being used in the service of clinical purposes.

Participants were assessed via screening interviews conducted by a clinical psychologist and those with an imminent risk of suicide or self-

injurious behaviors were referred to the psychiatrist for proper treatment. As a retrospective study, the approval by an ethics committee was not applicable but the protocol was submitted and approved by the research office of the ASST Monza and institutional review board approval was obtained where required.

### 2.2. Assessment

The entrance psychological assessment includes the following data:

*Socio-demographic and background characteristics*. Participants' characteristics such as age, ethnicity, marital status, social contacts with relatives and non-relatives, legal position, length of the sentence, substance use, abuse or dependence, previous self-injurious behaviors and suicide attempts were assessed via a screening interview (the Jail Screening Assessment Tool; Nicholls, Roesch, Olley, Ogloff, & Hemphill, 2005) conducted by a clinical psychologist.

*Psychological distress*. Psychological distress was assessed with the Italian version (Palmieri et al., 2009) of the *Clinical Outcome in Routine Evaluation–Outcome Measure* (CORE-OM; Evans et al., 2002). The CORE-OM has 34 items that measure psychological distress and has been used in studies with the general population, a clinical population and, specifically, with prisoners in custody (Connell et al., 2007; Leach et al., 2005; Perry, Barkham, & Evans, 2013). Participants were asked on a 5-point Likert-type scale how they felt over the last week (0 = *not at all*, 4 = *most or all of the time*) in terms of subjective well-being, problems/symptoms, life functioning and risk. Items scores were averaged to produce a mean score to indicate the level of current psychological global distress (from "*healthy*" to "*severe*") with higher values indicating higher level of distress. Internal consistency reliability was $\alpha = 0.81$ (range: 0.70–0.93).

*Impulsiveness*. Impulsiveness was measured with the Italian version (Fossati, Di Ceglie, Acquarini, & Barratt, 2001) of the *Barratt Impulsiveness Scale-11* (BIS-11; Patton, Stanford, & Barratt, 1995). The BIS-11 has 30 items that measure common impulsive behaviors and preferences related to three dimensions (i.e., attentional, motor and non-planning) on a 4-point Likert-type (1 = *Rarely/Never*, 4 = *Almost Always/Always*). It has been used in studies with the general population, a clinical population and in prison settings (Dom, Hulstijn, & Sabbe, 2006; Fields et al., 2015; Weinstein, Crocker, Ayllon, & Caron, 2015). Item scores were summed for each subscale and then globally to arrive at the total score, with higher values indicating higher level of impulsiveness. Internal consistency reliability was $\alpha = 0.75$ (range: 0.69–0.82).

*Self-injurious behaviors and attempted suicide*. Data about self-injurious behaviors, in terms of number of deliberate self-harm attempts in custody, and suicide attempts, were collected over a period of one year from the incarceration based on the official records of the Penitentiary Police.

### 2.3. Data analysis

The profiles of risk for self-injurious behaviors were obtained through a cluster analysis procedure; this is a promising method for identifying and describing subgroups of individual cases defined by similarities and allows consideration of the multidimensional nature of self-injurious behaviors. In addition, cluster analysis may provide an advantage over more traditional statistical techniques (such as regression) by assisting mental health professionals in identifying distinct risk profiles to which prison inmates might belong and, subsequently, develop more targeted interventions for every cluster. The cluster analytic procedure applied to CORE-OM and BIS-11 total scores included two steps (Hair, Anderson, Tatham, & Black, 1998; Henry, Tolan, & Gorman-Smith, 2005). In the first step, the standardized data of the dependent variable were examined using a hierarchical cluster analysis method. A statistical criterion – called Ward's linkage clustering – was used as an agglomerative method with the minimized squared Euclidean distances as the distancing metric. In the second step, a non-hierarchical (k-means) cluster analysis was used to confirm the number of clusters identified by the hierarchical clustering. As a validation test of the cluster solution, MANOVAs and post hoc tests – specifically Tukey's honest significance test – were used with cluster membership as an independent variable and the BIS-11 and CORE-OM total scores as dependent variables (Aldenderfer & Blashfield, 1984).

Finally, differences in self-injurious behaviors and suicide attempts during detection and socio-demographic and background characteristics between clusters were explored with chi-square tests of association for categorical data (i.e., ethnicity, marital status, social contacts with relatives and non-relatives, legal position, substance use, previous self-injurious behaviors and suicide attempts, marital status, and contact with relatives and non-relatives) and univariate ANOVA for continuous data (i.e., age, length of the sentence). SPSS 22.0 (IBM) statistical package was used for the analyses.

## 3. Results

### 3.1. Socio-demographic characteristics

Of the 1489 eligible participants, 1422 provided assent to participate and signed an informed consent but 16 were excluded for incomplete data, and the final sample was composed of 1406 participants. Mean age was 37.76 (*SD* = 10.94; range 18–64 years). The majority of the participants were Italian (n = 1126), with the remainder being citizens of other European countries (n = 139), Africans (n = 81), South Americans (n = 58), and Asians (n = 2), but demonstrating an adequate comprehension of the Italian language. As regards their legal position, 928 participants were defendants while 478 were sentenced. The other socio-demographic characteristics of the sample are reported in Table 1.

### 3.2. Prevalence of self-injurious behaviors and suicide attempts

The number of self-injurious behaviors and suicide attempts were collected over a period of one year from the incarceration based on the official records of the Penitentiary Police Participants; there were 67 (4.8%) inmates who had at least one episode of self-injury during the period of observation and 28 (2.0%) inmates with at least one suicide attempt.

### 3.3. Cluster analyses

The correlation between CORE-OM and BIS-11 was moderate ($r = 0.51$) suggesting the absence of multicollinearity and confirming that the two questionnaires measured independent constructs. Five multivariate outliers were identified on CORE-OM and BIS-11 total scores using the critical value of Mahalanobis distance ($X^2_{(2)} > 13.82$, $p < .001$); eleven subjects had uncompleted data on CORE-OM or BIS-11. Data from these participants were excluded from the subsequent analysis.

In the first step, a hierarchical cluster analysis was performed. Based on the agglomeration schedule coefficients and the interpretability of the cluster solution, the results suggested a four-cluster solution. The non-hierarchical cluster analysis confirmed this four-cluster solution. The MANOVAs revealed that the four-cluster differed significantly among them [$V = 1.28$, $F$ (6,2804) = 835.96, $p < .001$, $\eta_p^2 = 0.64$]. Separate univariate ANOVAs revealed that the four clusters differed significantly in terms of the two dependent variables ($p < .001$) confirming the final solution (Fig. 1).

The first cluster (cluster 1; N = 175) was labeled *dysregulated* and represents participants with high scores on both the BIS-11 (z = 1.16) and the CORE-OM (z = 1.81). The second cluster (cluster 2; N = 309) represents participants with a high score on the BIS-11 (z = 0.97) and a score near the mean on the CORE-OM (z = −0.17). This cluster was

**Table 1**
Descriptive characteristic of the sample and of the four clusters (the sum of the subjects of the clusters is 1406 because 16 subjects has been excluded by the analysis for missing data).

| | Total sample N = 1422 | Cluster 1 Dysregulated N = 175 | Cluster 2 Impulsive N = 309 | Cluster 3 Mildly-distressed N = 465 | Cluster 4 Well-balanced N = 457 |
|---|---|---|---|---|---|
| Mean age | 37.79 ± 19.92 | 36.84 ± 10.10 | 35.59 ± 10.25 | 38.67 ± 10.88 | 38.73 ± 11.46 |
| Italian | 1126 (80.1%) | 133 (76%) | 238 (77%) | 384 (82.6%) | 371 (81.2%) |
| Non Italian | 296 (19.9%) | 42 (24%) | 71 (23%) | 81 (17.4%) | 86 (18.8%) |
| Marital status | | | | | |
| Single | 375 (26.7%) | 56 (32%) | 113 (36.8%) | 112 (24.1%) | 94 (20.6%) |
| Married/co-resident | 845 (60.2%) | 96 (54.9%) | 157 (51.1%) | 284 (61.1%) | 308 (67.5%) |
| Separated/divorced/widowed | 183 (13%) | 23 (13.1%) | 37 (12.1%) | 69 (14.8%) | 54 (11.8%) |
| Stability of the relationship | | | | | |
| No relationship | 586 (13%) | 83 (47.4%) | 158 (51.5%) | 189 (40.6%) | 156 (34.1%) |
| < 1 year | 66 (13%) | 6 (3.4%) | 14 (4.6%) | 24 (5.2%) | 22 (1.6%) |
| > 1 year | 752 (13%) | 86 (49.1%) | 135 (44.0%) | 252 (54.2%) | 259 (61.1%) |
| Children | | | | | |
| With children | 785 (55.9%) | 92 (52.6%) | 155 (50.5%) | 262 (56.3%) | 276 (60.4%) |
| Without children | 619 (44.1%) | 83 (47.4%) | 152 (49.5%) | 203 (43.7%) | 181 (39.6%) |
| Family visits | | | | | |
| No visits | 147 (10.5%) | 37 (21.3%) | 29 (9.5%) | 55 (11.9%) | 26 (5.7%) |
| Sporadic visits | 102 (7.3%) | 18 (10.3%) | 23 (7.5%) | 44 (9.5%) | 17 (3.8%) |
| Frequent visits | 1146 (82.2%) | 119 (68.4%) | 254 (83.0%) | 363 (76.8%) | 410 (90.5%) |
| Perceived social support | | | | | |
| No | 412 (29.8%) | 85 (48.9%) | 102 (33.3%) | 137 (29.7%) | 92 (20.3%) |
| Yes | 979 (70.2%) | 89 (51.1%) | 204 (66.7%) | 324 (70.3%) | 362 (79.2%) |

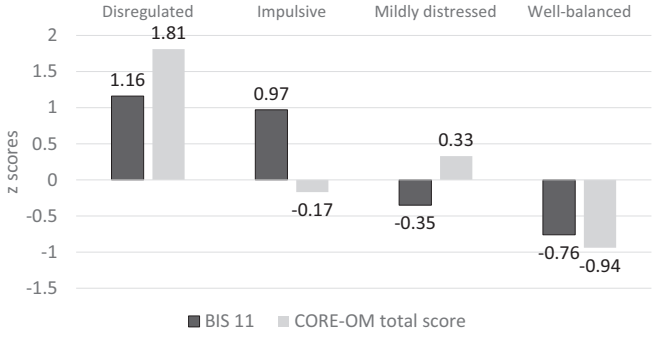


**Fig. 1.** Cluster composition in terms of standardized scores at BIS-11 and CORE-OM total score.

labeled *impulsive*. The third cluster (cluster 3; N = 465) consists of participants characterized by a score near the mean on the BIS-11 (z = −0.35) as well as the CORE-OM (z = 0.33). This cluster was labeled *mildly distressed*. The fourth cluster (cluster 4; N = 457) was labeled *well-balanced* and consists of participants characterized by low scores on both the BIS-11 (z = −0.76) and the CORE-OM (z = −0.94).

### 3.4. Clusters, risk of self-injurious behaviors and suicide attempts

Results from chi-square tests of association indicated that the number of participants with self-injurious behaviors was significantly different across the four clusters ($X^2_{(3)} = 20.59$, $p < .001$). Standardized residuals indicated that the *dysregulated* cluster had the highest number of inmates with subsequent self-injurious behaviors (z = 3.6; SIB = 30), followed by the *impulsive* cluster 2 (z = 1.2; SIB = 21). On the contrary, the cluster *well-balanced* showed the lowest number of subsequent self-injurious behaviors (z = −1.9; SIB = 3), followed by the cluster *mildly distressed* (z = −1.3; SIB = 13). Results for the suicide attempts did not detect significant differences between clusters, although from a descriptive point of view the *dysregulated* cluster showed the highest number of suicide attempts (13) followed by the *mildly distressed* cluster (9) and the *impulsive* cluster (5). The *well-balanced* cluster showed only one suicide attempts (Table 2).

### 3.5. Clusters and known risk factors

The differences among clusters in terms of self-injurious behaviors before incarceration were examined through chi-square tests. A significant association emerged ($X^2_{(3)} = 82.86$, $p < .001$) and standardized residuals indicated that the *dysregulated* cluster had a significant number of participants with prior self-injurious behaviors (z = 7.5) followed by the *impulsive* cluster (z = 1.6). On the contrary, the *well-balanced* and *mildly distressed* clusters showed a number of participants with past self-injurious episodes lower than expected (respectively, z = −14.0 and z = −1.9).

As regards marital status, the chi-square test indicated a significant association ($X^2_{(6)} = 32.12$, $p < .001$), with the *impulsive* and *dysregulated* clusters having a significant number of participants without a partner (respectively: z = 3.4 and z = 1.3). On the contrary, the *well-balanced* and the *mildly distressed* clusters have a high number of participants with a partner (*Healthy*: z = −2.5; *Mildly distressed*: z = −1.1). Furthermore, a chi-square test revealed an association between clusters and frequency of contacts with relatives ($X^2_{(6)} = 51.80$, $p < .001$), with many *well-balanced* participants reporting frequent contacts (z = 2.00) and many *dysregulated* participants with no contacts (z = 4.4). A similar pattern of association between clusters and social contacts with non-relatives was found ($X^2_{(3)} = 51.73$, $p < .001$), revealing a high number of participants with social contacts in the *well-balanced* cluster (z = 2.4) and a low occurrence of social contacts in the *dysregulated* cluster (z = −3.0). No other significant associations between clusters and background characteristics were found.

## 4. Discussion

In the current study, we examined self-injurious behaviors and suicide attempts in a sample of Italian adult male inmates diverse in terms of both prevalence rate and profiles of risk factors. The presence of self-injurious behaviors and suicide attempts over a period of one year from the incarceration was detected through the penitentiary's official records. The prevalence rate was 4.8% for self-injurious behaviors and 2.0% for suicide attempts; these values are in line with the previous data in other international settings, taking into account the variability due to the different definitions and registrations of self-injury (Fazel et al., 2011; Fazel et al., 2017; Hawton et al., 2014; Preti & Cascio, 2006).

**Table 2**
Means and standard deviations of SIB, SA, BIS-11 and CORE-OM variables.

| | Total sample N = 1406 | Cluster 1 Dysregulated N = 175 | Cluster 2 Impulsive N = 309 | Cluster 3 Mildly-distressed N = 465 | Cluster 4 Well-balanced N = 457 |
|---|---|---|---|---|---|
| SIB during detention | 67 (4.8%) | 30 (17.1%) | 21 (6.8%) | 13 (2.8%) | 3 (0.7%) |
| SA during detention | 28 (2.0%) | 13 (7.4%) | 5 (1.6%) | 9 (1.9%) | 1 (0.2%) |
| CORE-OM subscales | | | | | |
| Total score | 40.90 ± 22.03 | 81.36 ± 12.00 | 37.38 ± 14.66 | 48.40 ± 9.55 | 20.16 ± 8.77 |
| Wellbeing[a] | 1.649 ± 1.03 | 3.083 ± 0.64 | 1.493 ± 0.84 | 2.060 ± 0.72 | 0.787 ± 0.60 |
| Problems or symptoms | 1.311 ± 0.87 | 2.805 ± 0.52 | 1.200 ± 0.66 | 1.570 ± 0.54 | 0.551 ± 0.39 |
| Functioning[a] | 1.416 ± 0.68 | 2.380 ± 0.50 | 1.322 ± 0.51 | 1.676 ± 0.43 | 0.844 ± 0.46 |
| Risk | 0.264 ± 0.51 | 1.135 ± 0.85 | 0.189 ± 0.31 | 0.201 ± 0.30 | 0.044 ± 0.13 |
| BIS-11 subscales | | | | | |
| Total score | 54.48 ± 12.43 | 69.42 ± 11.25 | 66.89 ± 7.81 | 50.14 ± 7.20 | 44.79 ± 5.54 |
| Attentional | 13.43 ± 3.80 | 17.75 ± 3.72 | 16.48 ± 3.16 | 12.23 ± 2.62 | 10.93 ± 2.07 |
| Motor | 18.40 ± 5.09 | 23.97 ± 5.61 | 22.64 ± 4.57 | 16.83 ± 2.97 | 14.99 ± 2.57 |
| Non planning | 22.66 ± 5.55 | 27.70 ± 5.04 | 27.77 ± 3.95 | 21.08 ± 4.15 | 18.88 ± 3.59 |

[a] Higher scores indicate lower level of wellbeing and functioning.

Matching together the results from cluster analyses and chi-square tests of association on the data collected, four profiles emerged. The first profile (*dysregulated*) involved inmates with a critical pattern in almost all of the variables considered, such as severe levels of impulsiveness and psychological distress, compromised social involvement (absence of a partner and no contacts with relatives during the custody period) and a significant presence of self-injurious episodes in past prison experiences. The second profile (*impulsive*) involved inmates with severe levels of impulsiveness but with an average level of distress. The third pattern (*mildly distressed*) showed specifically low levels of impulsiveness but psychological distress above the mean of the sample. Finally, the fourth profile (*well-balanced*) involved inmates reporting a relatively low level of both impulsiveness and psychological distress, better social involvement (presence of a partner and frequent contacts with relatives) and the absence of past self-injury attempts. The prevalence of self-injurious behaviors in the four clusters was different. The *dysregulated* profile showed the greatest number of inmates reporting self-injurious behaviors episodes followed by the *impulsive* and, finally, the *mildly distressed* profiles. The *well-balanced* profile showed a very low level of SIB. Our study provides evidence for different clinical profiles related to varying levels of risk for self-injurious behaviors and suicide attempts.

### 4.1. The role of psychological distress and impulsiveness

Two at risk profiles (*dysregulated* and *mildly distressed*) were related to severe-to-moderate levels of psychological distress. As we argued in the introduction, the most common reason for engaging in self-injurious behaviors seems to be regulating distressing internal experiences such as negative emotions, thoughts and/or feelings (Brown et al., 2002). Furthermore, several studies stated that people engaging in self-injurious behaviors tend to report low tolerance for psychological distress and frequent avoidant behaviors (Chapman et al., 2006). Consistent with this perspective, SIB in these profiles may be thought of as an attempt to attenuate or escape from the psychological distress arousing from the incarceration.

In contrast, the *impulsive* profile was associated with average levels of distress but a still severe level of impulsiveness. A first hypothesis could be that inmates in this cluster showed a specific high impulsiveness trait related to a specific lower tolerance of distressing feelings. Consequently, it could be assumed that they tended to engage themselves in self-injurious behaviors even at lower levels of negative arousal due to a high level of reactivity for emotional states (Lauriola, Panno, Levin, & Lejuez, 2014). Another plausible explanation could be that severe levels of impulsiveness may elicit self-injurious behaviors as a specific novelty-seeking attempt rather than a mere avoidance behavior. In the *impulsive* profile, self-injurious behaviors could be less dependent on the level of psychological distress and more connected with the urgency of the emotional arousal in the inmates governed by personality traits interacting with the environmental factors and custody experience. Several studies found that some psychopathological conditions connoted by impulsiveness such as, for example, bipolar disorder, borderline personality disorder, and substance abuse (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001), show a greater risk for self-injurious behaviors (Lohner & Konrad, 2007; Swann, Birnbaum, Jagar, Dougherty, & Moeller, 2005). Furthermore, indirect support for the specific impulsiveness-related self-injurious behaviors comes from the presence in our study of a relatively high number of past self-injurious acts (9%) even in the personal history of the inmates belonging to this profile, likely due to personality characteristics of the inmates prior to the incarceration.

### 4.2. The absence of boundaries and social support

A specific association between profiles and the interpersonal experience of the inmates emerged. The inmates with the highest risk for self-injurious behaviors and suicide attempts (*dysregulated*) showed at the same time the absence of a significant partner in their life and an absolute lack of social contacts with their relatives and friends during the custody period. Mirroring this, the *well-balanced* inmates reported an involvement in a significant relationship with a partner and frequent social contacts with their families and other people living outside the prison. These opposite patterns in the social experience of the inmates of the two profiles add an interpersonal meaning to self-injurious behaviors in the prison setting. According to the *boundaries* model (Brown et al., 2002), intense psychological distress may be perceived as threatening to the integrity of the "self," and self-injurious behaviors may be viewed as a way to reaffirm this integrity. This could be particularly true in the absence of social contacts during the custody experience, which could lead to a sense of abandonment and a loss of affective references that keep identity on course. For inmates, specifically those with the *dysregulated* pattern, heightened levels of distress and impulsiveness in a context of deprivation of family contacts could elicit intense emotional reactions with a high level of urgency that threaten the boundaries of personal identity. Self-injurious behaviors for these inmates may work as recovery or strengthening of these boundaries. Whereas in the *impulsive* and *mildly distressed* profiles, self-injurious behaviors may be a self-regulating act, for inmates with a severe *dysregulated* pattern involving the absolute absence of emotionally important relationships, self-injurious behaviors may also function as an other-regulation strategy. Namely, self-injurious behaviors for these inmates could be a means of eliciting a caring attitude in the prison context and coercing others into providing support and attention (Conterio & Lader, 1998).

#### 4.2.1. Clinical implications

The Italian Penitentiary situation is characterized by a high level of overcrowding and scarcity of resources for the mental health of inmates while many efforts are made for education, recreation, and work thanks to no profit organization. However, the relevance of the mental health situation of inmates is a barrier for access to the available resources, and only a few persons can benefit from the available projects (Marietti, 2013).

The establishment of a regular assessment for every inmate, that include impulsiveness, psychological distress and self-reported level of self-injury behaviors (as suggested in previous papers, Verdolini et al., 2017), is a basic starting point for the implementation of preventive interventions. Due to the scarcity of resources is necessary to identify the at-risk population to which address the interventions.

### 4.3. Limitations

The most significant limitation of the current research is that we used a broad definition of self-injurious behaviors and suicide attempts that included heterogeneous acts of self-harm that could assume different psychological meanings based on the situations and individuals. This is related also to the process of registration of these behaviors that was done by penitentiary police and sometimes can be inaccurate or underestimate the phenomena. An interesting question that should be examined in future research is whether certain types of self-injurious behaviors are more likely to occur in certain environments and reflect specific psychological mechanisms.

Another limitation arises from the absence of a causal frame in the analysis that we used. The present study indicates an association between different clinical profiles of risk and self-injurious behaviors and suicide attempts. Hypotheses about causal links were beyond the scope of the current study, but further research should test the predictive capability of the profiles in relation to self-injurious behaviors and suicide attempts. Finally, since we focused on emotional and social variables related to self-injurious behaviors and suicide attempts, other potential behavioral and clinical variables remain unexplored such as copying behaviors and personality related variables.

Our sampled include only male subjects, and results cannot be generalized to female prison inmates; previous research has found a higher rate of self-injurious behaviors in female prison inmates (Hawton et al., 2014), and for this reason, a different cluster structure could be expected.

### 4.4. Conclusion

Despite these limitations, this study found that the presence of different heterogeneous patterns (or profiles) of psychological and situational variables related to the custody experience and a *real-life* variable such as self-injurious behaviors and suicide attempts. Describing the risk for self-injurious behaviors and suicide attempts among inmates in terms of combinations of factors reflecting different psychological mechanisms is potentially more useful for orienting effective and ecological clinical assessments and prevention programs in prison settings (Fazel, Hayes, Bartellas, Clerici, & Trestman, 2016). The results of the current study are indeed promising, and argue for future research that focuses on a more direct relationship between self-injurious behaviors, suicide attempts and specific mechanisms and on the effect of clinical interventions aimed at modulating impulsivity and psychological distress.

Future research should also focus on the relationship between the timing of self-injurious behaviors, suicide attempts and the level of impulsivity and psychological distress.

## Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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