The Epidemiology of Self-Harm in the Romanian Juvenile Prison System: A Two-Year Cohort Study

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Abstract

Background: There is no extensive literature on social predictors of self-harm in the juvenile justice system, over the time of a prisoner's sentence. Self-harm behavior displays a higher prevalence in prison, 11 to 14 times greater than in the general population. Our study extended the current research in self-harm by examining dynamic factors of self-harm in adolescents over their sentence in the Romanian juvenile prison system. **Method:** The present research examined longitudinal predictors of self-harm behaviors in 439 adolescent inmates (Mage = 16.21; 5.2% female, 94.8% male), enrolled in prison during 2011-2012, following them for two years. A series of time-to-event analyses were applied to start from the time of the subject's internment in the juvenile prison system. **Results:** Findings from the multivariate survival analyses show that adherence to self-harm conduct in prison was consistently influenced by family factors and prison contexts; although low ability to cope with frustration, sensitivity and emotion dysregulation also mattered. Keeping the other covariates invariant, serving a prison sentence in a closed regime reduces the probability of remaining free of self-harm events, increasing the monthly hazard of self-harm by a factor of 5.26 on average (HR = 5.26, 95% CI = 2.37 - 11.64) compared to the open regime. **Conclusion:** A greater focus on longitudinal studies may help improve the screening process and also follow the progress of each juvenile to warrant the efficacy of preventive programs in self-harm, according to their emerging needs.

Keywords

Self-Harm, Risk-Assessment, Survival Analysis, Juveniles, Prison System

1. Introduction

According to the international society for the study of self-injury, the term "self-harm" refers to deliberate acts that aim to inflict tissue damage on one's self without the intention of taking one's life [1]. In the general population, rates of self-harm result disproportionately prevalent among adolescents, with rates of approximately 14% - 17% compared with those in adults of 4% - 6% [2]. Within correctional facilities, self-harm and suicidal behavior appear to be even higher, with as few as 7% and as many as 48% of incarcerated individuals manifesting an array of self-harm behaviors [3]; these behaviors display a higher prevalence in prison, 11 to 14 times greater than in the general population [1].

For the general population, it was demonstrated that self-harm normally acts as the main process of emotional regulation. In their model, Gross *et al.* conceptualized the process of emotional regulation as "the mechanism by which a person consciously or unconsciously influences the occurrence, experience, expression, duration, and magnitude of emotions" [4]. The emotional regulation could be either adaptive (using mindfulness to displace negative emotions) or maladaptive (misusing substances or committing self-harm to get rid of negative emotions) [4]. Even though incidents of self-harm can appear similar to one another, different distinct functions lay beneath this destructive behavior. Current evidence suggests that people who self-harm in prison reported a reduction in their distress levels or a reduction of negative emotions, such as fear and sadness [3]. Nevertheless, it is unclear why people use self-harm as a strategy to control their emotions. An explanation proposed by the literature is that people use deliberate self-harm in order to get rid of self-blame and negative emotions [5] [6]. Self-harm is interpreted as a manner of escapism to avoid negative feelings towards one's self. This emotional regulation, though maladaptive, suggests that this self-flagellation behavior could operate as a physiologically and mentally effective mechanism for releasing tension in situations perceived as unendurable [3] [6].

1.1. The Current Study

In Romania, a comparative analysis of violence in the juvenile prison system between 2010 and 2014 revealed a significant reduction in attacks against staff, but at the same time, there was an upward trend in terms of self-harm and/or aggressions against other inmates. During 2011-2012, in the Romanian Prison System, there were 1339 registered self-harm episodes. The following year the number increased by 17%. Moreover, this behavior increased tenfold from 2010-2013, compared to 2005-2009 with a dramatic increase in per-prisoner health care costs incurred by the justice system [7]. The human costs of self-harm are even higher than the institutional costs, as self-harm is significantly associated with suicide, being the strongest predictor of suicide attempts and completed suicide in offender populations [8].

This nature and extent of self-harm in prison raise important, but often troub-

ling questions as to why the incidence of self-harm and suicide in the prison environment is higher than in a community setting, and what part of imprisonment plays in self-harm as a process of "environmental coping" associated with incarceration.

The current study aims to address these questions, longitudinally investigating the characteristics and dynamic evolution of self-harm over time while serving a sentence in the Romanian juvenile prison system. It examines a range of pre-incarceration and incarceration factors that may interrelate and determine the discontinuation or perpetuation of self-harm behavior in Romanian juveniles, a population that has never been studied in any previous longitudinal studies.

1.2. Heterogeneity of Risk Factors

The main theoretical models that explain self-harm in the general adolescent population consider emotional distress and arousal downregulation as primary reasons for self-harm [3]. Adolescents who self-harm reported a reduction in their distress levels, and self-harm operates as an effective mechanism of releasing tension in situations perceived as overwhelming [6]. However, emotional regulation through this maladaptive behavior is not clearly explained; it is unknown why people may decide to control their emotions by using self-harm. There is no extensive literature on the interpersonal and social correlates of self-harm. Many adolescent inmates who self-harm reported they were consistently more exposed to strains in childhood. These strains include: insecure/avoidant attachment styles and affection-less parental bonding [9], childhood trauma and psychological vulnerabilities [10], low levels of social support and poor ability to cope with prison distress [11] [12], exposure to domestic violence [13] [14], and being physically/sexually abused [15].

In the community samples, self-reports refer to the social functions of self-harm as a desire to "control the situation" or "to get a reaction from someone", as well as "trying to see if someone loves me" [16].

In prison, manipulative intent of committing acts of self-harm in order to gain control over the prison environment is stressed instead. Committing self-harm in order to be moved to a less restrictive regime of detention and attention-seeking are among the environmental strategies used to cope with the powerlessness of incarceration [3]. There are multiple models on misbehavior and self-harm in prison that are complementary to one another. In his deprivation model, Clemmer anticipated that it is the agency of imprisonment that becomes a distinct factor of decompensation *per se*, impacting an individual's maladjustment and fostering destructive ideation [17]. Fruehwald *et al.* provided further support of the relationship between the individual risk of self-harm/suicide and the danger of decompensation related to prison's internal life [18]. Fruehwald *et al.* linked self-harm and suicide in custody to the proximal strains of being incarcerated such as overcrowding, the length of the sentence, and the typology of the detention regime. Their findings revealed that isolation in a single cell, psychiatric di-

agnoses, and being condemned for an offense where violence was used upon a victim are relevant predictors in prison suicide [18].

In contrast to Fruehwald's study, Rivlin *et al.* claimed that prison factors such as length of a sentence or serving a life sentence, being imprisoned in solitary confinement, or having prison stay extended as a disciplinary sanction were not related to acts of self-harm. The authors compared distal and proximal risk factors in young inmates who self-harm in prison with those who had never committed severe acts of self-harm. Their results supported the idea that cases were more likely to be victimized in prison, to report lower levels of social support, and to indicate a poor social network outside of prison [10]. Therefore, considering the social function of self-harm is relevant to understanding social risk factors, which are highly significant in the initiation and perpetuation of self-harm behavior.

Other authors have instead suggested that misbehavior in prison cannot be attributed to prison maladaptation or the poor social network outside of prison, but is an outcome that differs amongst short-term and long-term prisoner groups [19]. They argue that the length of the sentence that prisoners are serving affects the conduct they display during the course of their imprisonment; the longer a prisoner remains in prison, the better the prisoner adapts to prison life [19].

Taken together, these studies uncover important—albeit retrospective—risk determinants of self-harm. None of them identified prospective predictors of self-harm in prisoners, which could instead explain the increase of self-harm and destructive ideation in custody, including suicide.

To date, almost the entire existing body of evidence on correlates for self-harm in prison is cross-sectional, and there remains a paucity of evidence on how individual and prison variables elucidate the perpetuation or discontinuation of self-harm behaviors over sentence time. The goals of the present study are to examine predictors of self-harm events after incarceration and investigate how self-harm changes over time while serving a sentence in the juvenile prison system.

2. Method

2.1. Study Design

The research is designed as a longitudinal study. This cohort study is a historic observational study including both retrospective and prospective information from the time of a prisoner's entry into the prison system (which could be anywhere from January 2009 to September 2012) until the end of the study timeline (December 2012).

2.2. Participants

The National Administration of Penitentiaries (NAP) provided computerized data containing informational fields for each individual. This database provided the researcher with files of all the juvenile inmates in custody from the beginning

of 2011 to the end of 2012. This resulted in a population of 439 juvenile inmates, comprising 23 females and 416 males, who were in custody in the Romanian juvenile prison system from January 1, 2009 to December 31, 2012. The researcher accessed data in an anonymized form and was unable to infer any names or private information from these anonymous forms. The research sample comprised more than 90% of the prison population in the juvenile system, and 23 of them were females under the age of 18. Females in prison represented 4% of the total juvenile prison population. The total juvenile prison population makes up 1.5% of the total prison population in Romania.

2.3. Demographic and Pre-Incarceration Factors

A summary of relevant risk factors [20] mapped to the Romanian prison system includes both static and dynamic factors such as predictors of prison self-harm (see Table 1), starting with personal background and pre-incarceration factors (including exposure to violence in the family, or inconsistent parenting, criminal history, and other psychological vulnerabilities) [20].

The Romanian prison service database collects information on daily incidents resulting in self-harm or other negative destructive events such as other-directed violence and property damage. These data incorporate two dimensions: the time factor and the occurrence of self-harm events. Furthermore, this administrative database provides rich information for each individual in the following fields: demographics, socio-economic data, personal background, penitentiary and criminogenic history and psychological variables as shown in Table 2.

2.4. Measures of Mental Well-Being

This study research contains objective measures of mental well-being derived from the "Symptom Checklist 90" (SCL-90). These measures are reliable indicators of psychological health [21], widely used in the medical literature [22], and have been shown to be robust to retesting effects in a variety of settings [23].

Upon their entry into the prison system, the juveniles were asked to complete the "Symptom Checklist 90" (SCL-90). The 90 items in the questionnaire are scored on a 5-point Likert scale. It is used to measure a symptom's severity on 9 different subscales [22]. The SCL-90 was used both as a measure of mental status and also as a screening instrument. It is designed to measure a psychological symptom at the time of the interview and is not a measure of personality. Respondents are asked to rate the severity of a particular thought or feeling in the last seven days. Each item on the questionnaire is scored on a 5-point scale of distress, starting from 0 (none) to 4 (extreme).

The dimensions of the SCL-90 symptom inventory are: 1) somatization; 2) obsessive-compulsive; 3) interpersonal sensitivity; 4) depression; 5) anxiety; 6), hostility; 7) phobic anxiety; 8) paranoid ideation; and 9) psychoticism. The standard time set within the SCL-90 is 7 days.

Each item was dichotomized by rescoring scores 0 as 0 and scores 1, 2, 3 and

Table 1. Prison self-harm factors from international literature mapped to Romanian dataset.

Evidence from the international literature	Availability in the Romanian dataset	Predictor description in the Romanian dataset
Sex	Yes	Gender (Male, Female)
Ethnicity	Yes	Categorical (6 categories)
Age	Yes	Continuous (Years)
Educational Level	Yes	Categorical (5 categories)
Family		
Adoption/Institutionalization	Yes	Categorical (2 categories)
Income	Yes	Categorical (6 categories)
Homelessness	Yes	Binary variable
Previous criminal records within the family	Yes	Categorical (4 categories)
Previous suicide attempts in the family	Not recorded	_
Medical History		
Self-harm before imprisonment	Not recorded	_
Comorbidities (HIV, TBC, Hepatitis, etc.)	Not recorded	_
Substance abuse	Yes	Binary variable
Prison history		
Typology of prison	Yes	Categorical (3 categories)
Detention regime	Yes	Categorical (4 categories)
Criminal history		
Prior prison sentence	Yes	Binary variable
Recidivism (repeat offender)	Not complete data	_
Penal act committed	Yes	Categorical (6 categories)
Violent crime	Yes	Binary variable
Property crime	Yes	Binary variable
Sexual assault	Yes	Binary variable
Public order	Yes	Binary variable
Other	Yes	Binary variable
Length of the sentence	Yes	Continuous (Days)
Psychological risks		
Exposure to violence in the family	Yes	Binary variable
Abuse (physical and emotional)	Yes	Binary variable
Abandonment history	Yes	Binary variable
Parent absence	Yes	Categorical (4 categories)
Interpersonal sensitivity	Yes	Binary variable
Hostility	Yes	Binary variable

Table 2. Characteristics of adolescents in custody during the period 2011-2012.

Variable	Category	Male (%)	Female (%)	Total (%)
Parenthood status	Dual parent	219 (52.64%)	13 (56.52%)	232 (52.85%)
	No dual parent	131 (31.49%)	5 (21.74%)	136 (30.98%)
	Missing	66 (15.87%)	5 (21.74%)	71 (16.71%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Homelessness	Yes	60 (14.42%)	10 (43.48%)	70 (15.45%)
	No	346 (83.17%)	11 (47.83%)	357 (81.32%)
	Missing	10 (2.40%)	2 (8.70%)	12 (2.73%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Violence in family	Yes	97 (23.32%)	9 (39.13%)	106 (24.15%)
	No	274 (65.87%)	12 (52.17%)	286 (65.15%)
	Missing	45 (10.82%)	2 (8.70%)	47 (10.71%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Penal rec. parents	Yes	78 (18.75%)	3 (13.04%)	81 (18.45%)
	No	321 (77.16%)	17 (73.91%)	338 (76.99%)
	Missing	17 (4.09%)	3 (13.04%)	20 (4.56%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Education	Illiterate	98 (23.56%)	6 (26.09%)	104 (23.69%)
	Elementary	117 (28.13%)	5 (21.74%)	122 (27.79%)
	Middle school	178 (42.79%)	10 (43.48%)	188 (42.82%)
	High school	23 (5.53%)	2 (8.70)	25 (5.69%)
	Missing	0 (0%)	0 (0%)	0 (0%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Substance abuse	Yes	76 (18.27%)	6 (26.09%)	82 (18.68%)
	No	311 (74.76%)	15 (65.22%)	326 (74.26%)
	Missing	29 (6.97%)	2 (8.70%)	31 (7.06%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Hostility	Yes	247 (59.38%)	15 (65.22%)	262 (59.68%)
	No	162 (38.94%)	6 (26.09%)	168 (38.27%)
	Missing	7 (1.68%)	2 (8.70%)	9 (2.05%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)
Sensitivity	Yes	214 (51.44%)	13 (56.52%)	227 (51.71%)
	No	193 (46.39%)	8 (34.78%)	201 (45.79%)
	Missing	9 (2.16%)	2 (8.70%)	11 (2.51%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)

Continued

Typology of prison	Rehabilitation	139 (33.41%)	16 (69.57%)	155 (35.31%)
	Prisons for minors	218 (52.40%)	1 (4.35%)	219 (49.89%)
	Adult prison	59 (14.18%)	6 (26.09%)	65 (14.81%)
	Missing	0 (0%)	0 (0%)	0 (0%)
Detention regime	Open	161 (38.70%)	16 (69.57%)	177 (40.32%)
	Semi open	140 (33.65%)	3 (13.04%)	143 (32.57%)
	Closed	36 (8.65%)	0 (0%)	36 (8.20%)
	Preventive	79 (18.99%)	4 (17.39%)	83 (18.21%)
	Missing	0 (0%)	0 (0%)	0 (0%)
	Total	416 (94.76%)	23 (5.24%)	439 (100%)

Note. The variable "Penal rec. parents" indicates a dichotomous variable including two categories "1"—a parent has been imprisoned previously. "0"—Parents without prior imprisonment experience. The variable "Parenthood Status" indicates a dichotomous variable including two categories "1"—both parents at home. "0"—One or both parents absentee.

4 as 1. An offender was flagged for high need if he or she exceeded the average score of 1 on any scale. The team employs two cut-off points one for high need cases and another for low need cases. Decisions on whether offenders need further attention from mental health professionals were then made after discussions with the full mental health team. The interpersonal sensitivity and hostility target symptom represented 91% of those who completed the questionnaire namely 398 cases, whereas the remaining 30 cases were phobic anxiety, depression, general anxiety, somatization, paranoid ideation and obsessive compulsion. Consequently, we only included the two major target symptoms: interpersonal sensitivity (IS) and hostility (HOS) in the outcome analyzed below.

IS includes 9 items and is represented by feelings of inferiority, low self-esteem, or personal inadequacy during interpersonal interactions. Hostility is a dimension (HOS), which includes 6 items. For example, items such as "I'm treated unfairly" or "Everyone is against me" are the strongest indicators of those who score highly in this dimension. A high score in this dimension indicates that the subject needs to be considered vulnerable and at risk of having disruptive behavior. Feelings, thoughts, or actions related to the negative state of anger are reflected in this dimension. Symptoms such as irritability, rage, or resentment are included within these 6 items.

2.5. Criminal History and Prison Factors

Consistent with the prison factors relevant in the aforementioned literature, this study also investigates the influence on self-harm of the following variables: "Previous penal records," "Typology of prison institution" and "Regime of detention." In this analysis variables such as "Offense against property," "Physical

damage against a victim" and criminal records (e.g., "relapse status," "conviction type," "convicted act," "length of the sentence") were included.

2.6. Outcome—Self-Harm Behaviors

For each case in the database, individuals' behavior was observed on a daily basis, starting from the moment of internment (*i.e.*, time 0) until the time of exit from the study (censored time). In order to achieve greater understanding of the motivational forces behind self-destructive behaviors in prison, this study extends the research to event history analyses. Thus, the dependent variable is elapsed time until the occurrence of an event of self-harm. Self-harm may be displayed in any of two forms: (1) self-mutilating behavior; or (2) suicide attempts.

2.7. Analytical Procedure

The "time to event" analysis was used to investigate the way the co-variables (social, psychological and institutional) influence the risk of self-harm during the detention period. This technique tolerates uneven time intervals for individuals in the sample (varying schedules), as well as different numbers of people in the analysis at different points in time (unbalanced data) [24]. This kind of technique allows people to enter and exit the study at different points in time. Sample size and power calculations for comparing groups using censored data was considered [24]. Calculations of a sample size, with 80% power at a significance level of alpha = 0.05 and a follow-up time of two years were developed for each group comparison. The survival probability was compared between different groups, using the K-M survival estimates for a number of variables, which resulted significant at p < 0.05 from the Log-rank test. The Log-rank test and differences between the groups are provided in Table 3. However, the Log-rank test does not offer detailed information such as estimates about the effect size of a variable or the assessment of a factor's impact. In order to gather information regarding the simultaneous impact of more factors and their effect estimation on the survival time (time free of self-harm behavior), the multivariate statistical model was used (Table 4). A multivariate Cox model was issued with all the significant (p < 0.05) factors resulting from the univariate analyses. The existing variables were measured at the time of entry into the correctional facility. The statistical quality of the model was assessed with the Akaike information criterion (AIC), which compares each model's goodness of fit. Data analysis was performed using the package "survival," R Statistical System, version 2.36-12.

3. Results

3.1. Key Findings

Characteristics of Adolescents in Custody during the Period 2011-2012

Table 2 summarizes the variables of interest for male and female adolescents serving a sentence in the Romanian Juvenile Prison System.

Table 3. Log-rank test, exploring the association between predictive factors of self-harm.

Variables	n	Events Observed (Expected) LRT
Gender		
Male	n = 416	61 (57.23)
Female	n = 23	0 (3.77)
		Chi2 (1) = 4.00
	N = 439	p = 0.04
Prior Criminal Records Parents		
Yes	n = 338	42 (47.9)
No	n = 81	17 (11.1)
		Chi2 (1) = 3.8
	N = 419	p = 0.05
Typology of Prison		
Rehabilitation	n = 155	9 (24.38)
Prisons for Minors	n = 219	41 (29.47)
Adult Prison	n = 65	11 (7.15)
		Chi2 (2) = 16.5
	N = 439	p < 0.001
Detention Regime		
Open	n = 177	12 (26.81)
Semi-Open	n = 143	20 (19.75)
Closed	n = 36	14 (5.77)
Preventive	n = 83	15 (8.68)
		Chi2 (3) = 24.7
	N = 439	p < 0.001
Prior Prison Sentence		
Yes	n = 315	-
No	n = 123	-
		ns
	N = 438	
Hostility		
Yes	n = 262	49 (37.4)
No	n = 168	12 (23.6)
		Chi2 (1) = 9.4
	N = 430	p = 0.002
Sensitivity		
Yes	n = 201	38 (29.2)

Continued

No	n = 227	23 (31.8)
		Chi2 (1) = 5.1
	N = 428	p = 0.02

Note. LRT—Log-Rank test, explores the association between predictive factors of self-harm types at the time of the first event within a 30-month-period of time following entry into prison. The analysis is based on the events' times (e.g., self-harm occurrences). The Log-Rank test is distributed according to a χ2 distribution with m-1 degrees of freedom (where m is the number of groups that were compared). The observed number of self-harm occurrences was calculated for each event time in each group, and the number of expected self-harm occurrences was calculated by hypothesizing that there is no difference between the groups.

The first key finding from this research is that juveniles coming from disadvantaged backgrounds (*i.e.*, children with one or both parents missing, abandoned children, institutionalized children, homeless children, impoverished children, etc.) are overrepresented in prison. More than 20% of the adolescents in our study were missing at least one parent at home; the rate of neglect was unusually high in males at 68%, more than double the female rate. Those who had at least one parent sentenced to some period of time in prison were also numerous, making up 1/5 of those in the Romanian juvenile prison population. Individuals who have experienced domestic violence are also overrepresented in this study, making up almost a quarter of those incarcerated. The findings indicate that female prisoners were more likely to have experienced episodes of domestic abuse than male prisoners (39.13% and 23.32%, respectively).

The second finding for this research question was that inmates in this study had a very high risk of presenting various combinations of low self-control, low ability to cope with frustration and emotion dysregulation. Table 2 shows that more than 60% of inmates in the Romanian juvenile prison system presented a low ability to cope with frustration and conflict when screened at their entry into the prison. These factors were more prevalent in female prisoners. However, due to the scarcity of female inmates in the data (*i.e.*, 23 female prisoners), sample size was insufficient to allow separate estimations by gender. Thus, male and female groups were joined into a single sample.

Minors detained in rehabilitation centers comprised 35% of the juvenile prison population. 50% of inmates were incarcerated in detention centers for minors. A small proportion of the juvenile prisoners served their sentence in an adult prison at 15%. Minors confined to a rehabilitation center are rewarded by the center administration with permission to visit their family during the holidays, school trips, or going shopping when they make honest and balanced behavior evident. In prisons, however, these privileges are not generally permitted, not even for good behavior. However, the prison regulations provide when minors are notable for good behavior. For example, they could be rewarded with a reduction in length of the sentence, as well as other rewards such as permission

to receive visits from the family more often, larger care packages, etc.

Juveniles sentenced from to 2 to 15 years are routed into detention centers. Those who were required to serve shorter sentences (1-3 years) were directed to educational centers. Due to their minor status, juvenile inmates cannot be sentenced to life in prison, even if condemned for an act that would otherwise be sanctionable with a life sentence. Proximity to the prisoner's family is also an important factor in deciding what location prisoner goes to. There are situations (not uncommonly) when families, for financial reasons or other objective causes, are unable to travel long distances to visit their juvenile relatives.

3.2. Differences among Groups in Observed and Expected Self-Harm Occurrences

Table 3 shows that there is no difference between groups (*i.e.*, inmates who had had prior altercations with the law vs otherwise) for the probability of a self-harm event at any point in time. The analysis is based on the events' times (e.g., self-harm). The observed number of self-harm occurrences was calculated for each event time in each group, and the number of expected self-harm occurrences was also calculated by hypothesizing that there is no difference between the groups. The Log-rank tests the differences in survival rates between the two groups. Differences in the survival rates on self-harm events are tested to examine if they are statistically significant. Significant differences emerged for covariates "parental criminal history," "hostility," "sensitivity," "prison regime," and "typology of detention facility."

Survival probability was compared for groups resulted significant from Log-Rank test at p < 0.05, using the K-M survival estimates. The survival estimate is calculated as the proportion surviving on the current day × cumulative survival over the previous period. For example (see Figure 1), the probability of surviving without a self-harm event at 15 months is 77.3% for an inmate coming from the group characterized by prior criminal history involvement of their parents (group 2) and, conversely, the survival probability is slightly more than 88% for those from the other group (group 1). The relative risk of having a self-harm event for group 2 is almost twice (RR = 1.69) that of group 1.

The covariates which had significant results from the Kaplan-Meier analysis at a p-value lower or equal to 0.05 were used to estimate the hazard ratio for each covariate in a joint regression. Significant predictors resulting from the univariate analysis were entered into the Cox regression on a stepwise basis according to statistical significance of the hazard ratios (HR). These covariates included: "parental criminal history," "hostility," "sensitivity," "prison regime," and "typology of detention facility." The analysis was run by introducing all six variables into the regression. For each step, a variable was considered for elimination from the set of independent variables, based on the Akaike information criterion (AIC). Confidence intervals (95%) for the HRs were calculated for each significant predictor. Significant hazard ratios were obtained for only "detention regime" and "sensitivity" as Table 4 shows.
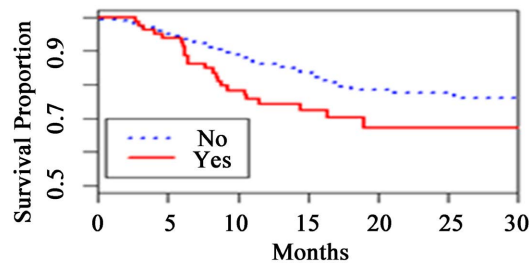
Note. Estimates of the Kaplan-Meier survival curves describing inmates' rate of self-harm by absence or presence of parental criminal history involvement. The probability of surviving without a self-harm event at 15 months is 77.3% for an inmate coming from the group characterized by prior criminal history involvement of their parents ("Yes") and, conversely, the survival probability is slightly more than 88% for those from the other group ("No").

Figure 1. Survival curves for inmates' self-harm rate by absence or presence of prior criminal history involvement of their parents.

Table 4. Multivariate semi-parametric cox regression estimates for self-harm, followed by the HR, 95% confidence intervals, and linear correlations coefficient between the Schoenfeld standardised residuals and the time for each of the covariates.

Variable	β	P	Exp (β)	IC (95%)	Fit	Quality
					rH0	P-Value
Prior Criminal Records Parents	-	ns	-	-	-	
Hostility	-	ns	-	-	-	-
Sensitivity	−0.65	0.02	0.52	0.30 - 0.89	0.01	0.9
Detention Regime						
Open	ref	-	-	-	-	
Semi-Open	0.96	0.01	2.62	1.25 - 5.5	−0.02	0.86
Closed	1.66	<0.001	5.26	2.37 - 11.64	0.14	0.25
Preventive	1.55	<0.001	4.72	2.11 - 10.56	−0.06	0.66
	N = 409	N Events	59			

Note. The statistical quality of the model was assessed with the Akaike information criterion (AIC), which compares each model's goodness of fit. For each step, a variable was considered for elimination from the set of independent variables. The exponentiated coefficients in the third column of the output table are interpretable as multiplicative effects of the hazard. For example, keeping the other covariates invariant, serving a prison sentence in a closed regime reduces the survival probability, and in this study, increases the monthly hazard of self-harm by a factor of 5.26 on average, compared to the open regime. The correlation coefficients between scaled Schoenfeld residuals for each covariate and the overall model in the fifth column are close to zero and non-significant. This aspect indicates no evidence for rejection of the proportional hazards assumption, hence, corroborating the hazards proportionality that was required by the Cox model.

3.3. Cox Regression Predicting Self-Destructive Behavior

Somewhat surprisingly, demographic and adverse life experiences—such as be-

ing homeless, institutionalized, or in foster care, and/or being abused—did not contribute to the prediction of self-harm and suicide attempts in the stepwise Cox regression analysis. The forced incorporation of these variables into the model did not improve the quality of the statistical information criterion of the model (*i.e.*, AIC). Thus, results are presented without these variables. The correlation coefficients between scaled Schoenfeld residuals for each covariate and the overall model in the fifth column are close to zero and non-significant. This aspect indicates no evidence for rejection of the proportional hazards assumption, hence, corroborating the hazards proportionality that is required by the Cox model.

The exponentiated coefficients in the third column of Table 4 are interpretable as multiplicative effects of the hazard. A hazard ratio above 1 indicates an increasing event hazard and a consequent decreasing survival probability. Keeping the other covariates invariant, serving a prison sentence in a closed regime reduces the probability of remaining free of self-destructive events, and in this study, increases the monthly hazard of self-harm by a factor of 5.26 on average (HR = 5.26, 95% CI = 2.37 - 11.64), compared to the open regime. Similarly, being in custody in a preventive regime of detention increases the risk of having self-aggressive events by a factor of 4.72 (HR = 4.72, 95% CI = 2.11 - 10.56) compared to being in an open regime. A negative sign of the regression coefficients (β) means that the hazard (risk of having a self-injury episode) is lower, and thus the prognosis is better for subjects who have higher values of that variable. In Table 4, the beta coefficient for sensitivity equals -0.65 indicating that the ability to regulate emotion and sensitivity in response to one's self and in response to those in close proximity accounts for a lower risk of self-harm behaviors. The Cox model gives the effect size of this covariate in the form of exponentiated coefficients (exp(coef.) = exp (−0.65) = 0.52) (HR = 0.52, 95% CI = 0.30 - 0.89), also known as the "hazard ratios", indicating that adequately regulating emotional resources and sensitivity reduces the hazard of self-harm behaviors by a factor of 0.52, or 48% compared with the emotionally dysregulated group.

4. Discussion

The goals of the present study were to examine predictors of self-harm events after incarceration and to investigate how this behavior changes over time while serving a sentence in the juvenile prison system.

Findings from this study indicated that upon entry into juvenile detention, adolescent offenders with poor parental relationships presented a higher frequency of hostility and interpersonal sensitivity dysregulation. Most of them grew up in dysfunctional families, had at least one episode of institutionalization (including foster care or orphanages), experienced neglect or abuse, or were homeless. In addition, those prisoners who had multiple adverse childhood experiences were also at higher risk of experiencing mental health warning signs and dropping out of

school earlier than their peers.

4.1. Interpersonal Sensitivity and Prison Strains as Risks

Two conditions shown to contribute towards self-harm behavior were interpersonal sensitivity inaccuracy and low ability to cope with threats and conflict and the increasing levels of isolation in more restrictive detention regimes. In this study, psychological difficulties were connected to deliberate self-harm in prison and/or also to pre-incarceration deleterious experiences. This relationship between self-harm, interpersonal sensitivity inaccuracy and hostility suggests a process that links ineffective parental practices to institutionalization/foster care, homelessness, having incarcerated parents, and witnessing domestic violence, as found in this sample (see Table 2).

It is interesting to note that in the multivariate Cox analyses, the estimates of the covariate "interpersonal sensitivity" indicate that being able to regulate emotion and empathy in response to another's proximity or one's own self-awareness is associated with a good prognosis, reducing the hazard of self-harm by a factor of 0.58, or 42%. This finding is consistent with Gross's theory that stresses the concept of self-harm as an intrapersonal strategy to cope with negative emotions—an effective mechanism of releasing tension in situations perceived as overwhelming [4] [6]. Also, consistent with the importation theory, parental inconsistency resulted in a salient finding in this research suggesting that children internalize improper strategies of coping with stress from their interaction with parents prior to incarceration and further manifest their own deficits in behavior.

It could therefore be assumed that in households where dysfunctional dynamics are present, children could experience stressful situations, inducing them to react accordingly to these chaotic emotional models, and display disruptive methods of coping, including physical aggression towards themselves as shown in our study.

As mentioned in the literature review, there are many different branches of thought on prison misbehavior including self-harm. For instance, Clemmer anticipated in his deprivation theory that the agency of imprisonment could become a distinct factor of decompensation *per se*, impacting an individual's maladjustment and fostering self-harm and suicidal ideation [17]. Thus, it might be expected that the most restrictive detention regimes should be also the safest due to the higher security measures in place. That is not apparent in the present study.

In our study, the more constricting the detention environment, the higher the risk of behaving violently against one's self becomes. Coefficients of the "detention regime" variable indicate that, holding the other covariates constant, being in custody in a semi-open and/or closed regime increases the hazard of being self-destructive by a factor of 3 and 5 respectively, compared with the open regime. In conclusion, being incarcerated in a detention regime other than the

open regime is associated with a poor prognosis of remaining free of self-harm occurrences. This finding provides further support for the conceptual premise that the agency of imprisonment in a more restrictive prison regime becomes a distinct factor of decompensation *per se*, impacting an individual's maladjustment and fostering destructive ideation, reflecting the findings of Fruehwald *et al.* [18].

The current analyses lend partial support to the direct impact of dysfunctional parenting as a predictor for self-harm in juvenile prisons. This might be due to the strong association between pre-incarceration adverse experiences, including violence in the family, abuse, neglect/abandonment, deceased parents with higher scores of deficits in interpersonal sensitivity and hostility.

Self-harm is frequently assumed to be perpetrated by people who are "hot-blooded," meaning that they behave impulsively and instinctively in response to their emotions even in less stressful conditions; their impulsiveness appears uncontrollable [9]. Individuals with a self-harming attitude may be compelled by their urges to suppress themselves without any kind of rationale. There are similarities between the attitudes expressed by emotions [9] in this study and those described by Franklin *et al.* [25]. Franklin *et al.* supported the idea that self-harm serves a cognitive adjustment role in addition to an affect regulation function. Self-harm has become an effective strategy for individuals to manage their cognitive processing. Their thinking presents itself as inflexible to some extent, leaving them unable to adjust to new events and uncertainties [25]. Cognition and emotion take part in an intertwined way in controlling thinking and behavior and they are complementary in mediating self-harm behavior. Looking into the juvenile corrections system, it is revealed that negative emotion is at a peak. The interaction between organism and environment, between the individual and socio-cultural reality, is very complex, and the exogenous factors have profound consequences for endogenous processes. Therefore, considering the social function of self-harm, it is also relevant in understanding early risk factors, which might be highly significant in the initiation and perpetuation of self-harm behavior.

4.2. Limitations

There are some limitations to the current study that are noteworthy for discussion.

First, the data measuring misconduct in this database are somewhat limited as they were based on official information which was taken by parole officers and prison psychologists, and probably devoid of context. However, these research limitations are congruent with the issue of reliability and validity in international literature. For example, for the self-harm occurrence, anonymous answers to a survey tended to illustrate self-harm occurrences up to three times higher compared with data collected in a face-to-face session. Conversely, institutional data collected during the prison sentence tended toward underreporting deliberate self-harm [26].

Second, as this study used individual-level data, a problematic process of data collection for reasons associated with inmates' relocation or unavailability could be an additional limitation of the current study. However, data collection was developed via a standardized method for all participants and additional archival data related to self-harm occurrences within the detention center was collected from the prisons' database.

4.3. Implications

In our study, individuals screened with interpersonal sensitivity dysregulation and low ability to cope with frustration are at higher risk of self-harm. Therefore, it would be effective to consider the process of diverting juveniles at risk of mental illness away from the criminal justice system in the first place, and/or providing mental health assessments and support during incarceration.

There should be an alternative to current security-based placement when classifying juveniles to determine where they should serve their sentence and deciding to which programs they will be assigned to. Contrary to expectations, in this study, being classified as a high-risk offender and placed in a more restrictive detention regime had no beneficial effect on instances of self-harm. It might be expected that a more restrictive regime could increase surveillance and curtail misconduct, but that is not shown to be the case.

4.4. Conclusions

Two key findings emerged from this work: 1) juveniles who experienced adverse events in their childhood are overrepresented in the Romanian prison system; and 2) self-harming conduct was consistently influenced by psychological factors (e.g., emotional dysregulation) associated with a dysfunctional family and some prison contextual factors (*i.e.*, typology of detention and detention regime).

What makes our current study distinct from past work is that we were able to examine the causality between a number of distal and proximal factors and self-harm in prison across a population of juvenile inmates in custody in the Romanian prison system over time, starting from their entry date until the end of follow-up (Me = 2 years).

Both boys and girls who had been screened with maladaptive personality traits at the time of their prison sentence displayed a low ability to cope with the prison environment and presented poor individual adjustment, fostering self-harm behaviors. Future studies need to examine risk factors that are supposed to be comorbid, both for mental illness and criminality to further include specific needs and treatment for this particular vulnerable inmate population. A greater focus on longitudinal studies may help improve the screening process and also follow the progress of each juvenile as to determine the efficacy of self-harm preventive programs according to their emerging needs.

Acknowledgements

sity of Trento for providing his invaluable guidance and support in statistical analysis. This project would not be possible without the Management Services at the National Administration of Penitentiaries in Romania, who allowed us the access needed to develop this research. We would particularly like to thank the managers: Dr. Ioana-Mihaela Morar, the Deputy Director; Prof. Ioan Bala, the Executive Director; and Mr. Dorin Muresan, the Director of the Penitentiary Hospital, for their practical support and understanding over the course of this study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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