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Impulsivity Profile in the Prison Population – a Comparative Case-Control Study

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ABSTRACT

Impulsivity tends to play an important role in many behavioral disorders, especially in the population of incarcerated offenders, where the prevalence of impulsivity is expected to be high. Prisoners sentenced for violent or property crimes, recruited from 12 participating prisons in the Czech Republic, completed self-reported questionnaires of impulsivity. Results were compared to a non-prison control group from the general population. Analyses pointed toward significantly higher levels of impulsivity in the prison population sample, particularly in terms of motor and non-planning impulsivity, emotion based rash action and sensation seeking, and impulsivity toward physical pleasures, social interactions and money. Findings were adjusted to demographic confounders. The relevance and importance of these findings within the forensic context is discussed.

KEYWORDS

impulsivity; prison sample; BIS-11; DGI; UPPS-P

Introduction

Impulsivity is often operationalized in various definitions. As a multidimensional construct that subsumes a number of behavioral features, impulsivity can range from impatience, indifference to the consequences to one's behavior or the inability to suppress inappropriate behavior (Ainslie, 1975, Barratt & Patton, 1983; Eysenck, 1993; Reynolds et al., 2006). Impulsivity has been studied in different populations, predominantly general and clinical populations, for its potentially desirable and detrimental qualities. It is integrated in many diagnostic criteria for psychiatric and personality disorders (DSM-5, American Psychiatric Association, 2013).

According to Chamorro et al. (2012) the lifetime prevalence of self-reported impulsivity in the general population of the United States was at 16.9%. Results

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showed that males and young adults were perceived as more impulsive. Higher levels of impulsivity in this sample were further associated with lower educational attainment and lower socioeconomic status. Furthermore, it has been shown that impulsive individuals had the tendency to engage in dangerous behaviors, including reckless driving, fighting, shoplifting, domestic violence or aggression (Chamorro et al., 2012). Hence, these acts may lead to various criminal offenses and potential incarceration.

Impulsivity has been frequently referenced in etiological theories of crime and criminal behaviors (Gottfredson & Hirschi, 1990; White et al., 1994). A recent systematic review confirmed that individual personality traits, such as psychopathy, low self-control (impulsivity), and difficult temperament (evidenced primarily by adverse childhood experiences and temperament factors related to poor emotional self-control) all contribute to criminality (Tharshini et al., 2021). In particular, dysfunctional impulsivity, defined by the Dickman Functional and Dysfunctional Impulsivity Survey as the style of responding to stimulus eliciting impulsive responses and causing difficulties (Dickman, 1990), was shown to be a better predictor of crime in comparison to functional impulsivity (Wendel et al., 2022).

Although a number of studies evaluated impulsivity in the forensic setting, the assessment of impulsivity was viewed in the unidimensional context, regardless of the theoretical multidimensional construct and the higher prevalence of pathological impulsivity in this population (Bernstein et al., 2015; Fazel et al., 2016; Tonnaer et al., 2016; Værøy et al., 2016; Warren & Burnette, 2012). For example, there is a strong relationship between impulsivity, institutional aggression, and prison adjustment, where results showed that impulsivity was a stronger predictor of aggression in comparison to ethnicity or index violent offense, and contributed to the difficulties in institutional adjustment (Fornells et al., 2002; Wang & Diamond, 1999). In correctional settings, different facets of impulsivity are therefore associated with different problematic behaviors, including breaches of discipline (Gordon & Egan, 2011), physical aggression between inmates or toward correctional staff (Værøy et al., 2016), and self-harm (Gvion & Apter, 2011).

Thus, advanced understanding and detection of risk factors related to impulsivity can better inform both treatment needs and requirements in this population, and as a result lead to increased safety of the prison environment, and potentially reduce institutional infractions during incarceration (Fazel et al., 2016). However, the role of impulsivity in maladaptive or deviant behaviors remains unclear, predominantly due to the disagreements and inconsistencies in literature about how to define, operationalize and measure this construct.

For example, low self-control, defined in terms of the inability to delay gratification, has been identified as one of the leading determinants to criminal antisocial behavior (Moreira et al., 2022). Likewise, deficits in self-control have

been associated with behavioral problems in individuals with a history of criminal convictions (DeLisi, 2013; DeLisi et al., 2008). The choice between immediate rewards and prominent long-term consequences in relation to five evolutionary significant domains of delay gratification was developed in the Delay of Gratification Inventory (DGI; Hoerger et al., 2011).

An integrated approach to self-report measures of impulsivity was adopted by Whiteside and Lynam (2001), who identified four discrete personality facets of impulsivity (UPPS-P Impulsive Behavior Scale). These included urgency (U), (lack of) premeditation (P), (lack of) perseverance (P) and sensation seeking (S). Likewise, these identified facets of impulsivity have been associated with poor self-control, affective liability or negative urgency, and lead to self-harm or excessive alcohol use (Dir et al., 2013).

Traditionally, the concept of impulsivity has been operationalized by the Barratt Impulsiveness Scale (11th version; BIS-11; Barratt, 1965; Patton et al., 1995). Although the reliability and criterion validity of this instrument has been verified, the three original factorial structure of BIS-11 was not supported in a systematic review (Vasconcelos et al., 2012). Nevertheless, the use of BIS-11 showed generally acceptable psychometric properties when used in a forensic sample of incarcerated juvenile offenders and showed statistically significant association with the age of crime onset, seriousness of the crime, conduct disorder and alcohol/drug use (Pechorro et al., 2015).

Elaborating on the theoretical concepts and limitations in the empirical research, the purpose of the current study was to analyze the multidimensional nature of impulsivity in a prison sample and compare its various facets to a non-prison sample. Referring to the results of previous studies, the authors anticipated to observe significantly higher scores of impulsivity in the prison population. As demographic variables (such as sex, age, and educational attainment) were expected to be associated with both levels of impulsivity and the target population (prisoners), the analyses were adjusted to the demographic confounders.

Methodology

Participants

Prison population

One hundred and forty-four inmates (63% males, 37% females) were recruited from 12 participating single-sex prisons that represent 34% of the total number of prisons in the Czech Republic. The range of sampled inmates per prison was 8–37 for women's prisons (N = 3) and 7–26 for men's prisons (N = 9). The identified criminal activities ranged from property crimes (e.g., theft, fraud, obstruction of justice) to violent crimes/felonies (e.g., robbery, grievous bodily harm, attempted murder, or murder). Participating inmates were classified as medium or maximum-security level, according to the duration of the sentence, 4 🔄 K. PŘÍHODOVÁ ET AL.

the criminal nature (violence, drugs, and sex crimes), and the number of previous incarcerations. The majority of the participating inmates were males (63%). All participants were at least 18 years of age. The mean age of the sample was 35.7 years (SD = 12.0). In terms of their educational attainment, most inmates received only primary education (50.7%) or some type of vocational training (38.2%).

General population (Comparison/Control group)

Seventy-nine participants (23% males, 77% females) were recruited from a community sample in Prague via news-paper advertisements, fliers, and social media platforms. All participants were at least 18 years of age. The mean age of the sample was 41.7 years (SD = 15.8). The majority of this sample graduated from high school (40.5%), obtained a university degree (35.4%), or received some type of vocational training (19.0%).

Ethics

The following research was approved by the Ethics Committee of the National Institute of Mental Health in the Czech Republic (registered ID: 17-05791S). Prior to participating in the study, all participants signed an informed consent.

Procedures

Data were collected in participating prisons and in the National Institute of Mental Health via paper-pencil method. Participants completed all measures in a single session, which lasted approximately one hour. Treatment of the missing values included two steps. First, if two or more items per scale were missing in the questionnaires, a listwise deletion approach was invoked. Second, responses with one-missing item were handled with regression from the other items on the subscale and rounded to the nearest integer. However, this demand to correct for one-missing domain item was only minor (altogether 12 participants from the control group, none from the target/prison group). No perseverative responding was observed in the provided answers.

Measures of Impulsivity

The Barratt Impulsiveness Scale (BIS-11)

The BIS-11 is a 30-item measure of impulsiveness defined by six first-order factors (attention, cognitive instability, motor, perseverance, self-control, cognitive complexity) and three second-order factors (attentional, motor, non-planning). Items are scored on a 4-point Likert-type scale (Patton et al., 1995).

Internal consistencies of all subscales, measured by Cronbach's α , were above .7 with the exception of motor impulsivity (from the second order

factorial structure) and cognitive complexity, perseverance and cognitive instability (from the first order factorial structure). The test-retest reliability showed varying strengths, however, all correlations were statistically significant at the level p < .01 (Stanford et al., 2009).

The original structure of motor and attentional impulsiveness showed low internal consistency in forensic psychiatric patients (Haden & Shiva, 2008). Therefore, other alternative factor models of impulsivity were proposed by different authors (Haden & Shiva, 2008; Ruiz et al., 2010).

The Delay of Gratification Inventory (DGI)

The DGI is a 35-item measure with a 5-point Likert-type scale. This inventory defines impulsivity in terms of five domains of delayed behavior: i) food, ii) physical pleasures or the avoidance of unpleasantness, iii) social interactions, iv) money, and v) achievement. The psychometric properties of these domains were supported in terms of both internal consistency and test-retest reliability. Namely, the internal consistency ranging from 0.71 to 0.85, independently of sex or location, and the test-retest reliability across all factors, ranging from r = 0.74-0.90. Construct validity showed significant correlations with psychopathologic and adjustment impulsivity measures (Hoerger et al., 2011).

The UPPS-P Impulsive Behavior Scale

The UPPS-P is a 59-item measure of five different factors of impulsivity: i) positive urgency, ii) negative urgency, iii) sensation seeking, iv) lack of perseverance, and v) lack of premeditation. Items are scored on a 4-point Likert-type scale (Whiteside & Lynam, 2001). This instrument has been supported as a consistent and valid measure of impulsivity in clinical settings, particularly for disorders containing impulsiveness (Savvidou et al., 2017).

Statistical analyses

The analysis comprised several consecutive steps; all conducted in *Stata* IC/15.1 statistical software. First, psychometric scores for each of the domains of the impulsivity measures (*BIS-11*, *DGI*, and *UPPS-P*) were computed for participants from both the prison and control groups. The scores were computed as mean values of the responses across all items of the domain. In order to simplify the interpretation of the domain scores, the items were adjusted so that the increasing value of the resulting score indicated higher levels of impulsivity (some of the Likert-type responses, particularly those in the *DGI*, had to be reversed). Once the domain scores were established, differences in the level of impulsivity between the prison and control groups were tested in the second step of the analysis. These differences were tested using both the univariate and multivariate approaches.

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In order to thoroughly examine the differences in impulsivity, we conducted a series of two-way between-subjects ANOVAs. The variables of interest were the mean scores of the identified impulsivity domains measured by *BIS-11*, *DGI*, and *UPPS-P* with sample (prisoners vs controls) and sex serving as the grouping factors. Participants were subdivided into male prisoners, male controls, female prisoners, and female controls, while these were used to estimate the descriptive statistics as well as the between-group differences, assessed for significance using Tukey's *p*, on each of the *BIS-11*, *DGI*, and *UPPS-P* subscales. We must note, however, that some participants did not complete all of the administered questionnaires, which led to some variations in the sample size. For precise sample size estimates of each group, please refer to Table 2.

Furthermore, correlation analyses between impulsivity domains including demographic variables such as age, sex, and education levels of our participants were performed, as these were the factors that could potentially influence impulsivity. It was important to consider them in our analyses, in order to establish more comprehensive and accurate insights. Additionally, we addressed the variation in impulsivity across different population subsets. This was achieved by stratifying our correlation matrix into prisoners (N = 141) and control group of non-incarcerated individuals (N = 79). The chosen correlation coefficient was Spearman's *rho*. This non-parametric measure is appropriate for analyzing ranktransformed data and is less sensitive to outliers and assumptions of normality, thereby providing a robust option for assessing the relationships in our dataset.

Results

Table 1 provides demographic characteristic of the participants, presented separately by the study group (target prisoners, control group) and for the

Tuble 1. Demographie	e characteristics o	i the dataset, by	the study gi	oup.	
			Gro	oup	
		Prisoners (N	₁ = 144)	Control group	$(N_0 = 79)$
Categorical variables		%	n	%	n
Sex	Males	63.2%	91	22.8%	18
	Females	36.8%	53	77.2%	61
Educational attainment	Primary	50.7%	73	5.1%	4
	Secondary lower	38.2%	55	19.0%	15
	Secondary upper	9.7%	14	40.5%	32
	University	1.4%	2	35.4%	28
Scale variable		Mean (Std. dev.)	Min. – Max.	Mean (Std. dev.)	Min. – Max.
Age		35.7 (12.0)	19–72	41.7 (15.8)	18-83

Table 1. Demographic characteristics of the dataset, by the study group

Note. $\chi^2_{\text{sex by group}}$ (1) = 33.34, p < .001; $\chi^2_{\text{education by group}}$ (3) = 104.17, p < .001.

		We	ean			Std.	dev.									
	Pris	oners	Cor	itrol	Prisc	ners	Con	itrol				р- _т	ukey			
	Males	Females	Males	Females	Males	Females	Males	Females	Group	Sex	M _c ×F _c	M _c ×M _p	$M_c \times F_p$	$F_c \times M_p$	F _c ×F _p	M _p ×F _p
BIS-11	N = 88	N = 53	N = 18	N = 61	N = 88	N = 53	N = 18	N = 61								
Attention 1 OF	2.13	2.33	1.98	2.23	0.570	0.696	0.609	0.530	.184	.020*	.406	.758	.139	.764	.798	.223
Cognitive Instability 1'OF	1.88	1.97	1.57	1.82	0.685	0.600	0.456	0.613	.024*	.101	.480	.244	.102	.933	.572	.845
Attentional 2'OF	2.04	2.20	1.83	2.07	0.517	0.610	0.464	0.487	.052	.018*	309	.423	.056	.975	.617	.319
Motor 1'OF	2.03	2.27	1.75	1.96	0.514	0.567	0.369	0.532	<.001*	.010*	.476	.164	.002*	.802	*600.	.054
Perseverance 1'OF	2.01	2.12	1.68	1.76	0.568	0.596	0.319	0.378	<.001*	.259	.934	.060	.011*	.018*	.002*	.650
Motor 2'OF	2.03	2.21	1.73	1.89	0.457	0.516	0.292	0.414	<.001*	.018*	.557	.053	<.001*	.240	<.001*	.085
Self-Control 1 OF	2.42	2.61	1.99	2.21	0.561	0.608	0.415	0.544	<.001*	.022*	.475	.018*	<.001*	.108	<.001*	.187
Cognitive Complexity 1'OF	2.60	2.63	2.13	2.32	0.518	0.570	0.434	0.479	<.001*	.204	.525	.003*	.003*	.006*	.010*	.995
Nonplanning 2'OF	2.50	2.62	2.06	2.26	0.472	0.558	0.381	0.431	<.001*	.037*	.387	.002*	<.001*	.013*	<.001*	.503
DGI	N = 80	N = 39	N = 18	N = 56	N = 80	N = 39	<i>N</i> = 18	N = 56								
Food	2.84	2.88	2.59	2.82	0.634	0.844	0.746	0.915	.235	.305	.677	.584	.564	666.	989.	766.
Physical	2.78	2.68	2.60	2.53	0.635	0.672	0.536	0.569	.106	.389	.970	.674	970.	.084	.632	.829
Social	2.93	2.77	2.65	2.60	0.558	0.640	0.465	0.556	.018*	.276	.991	.226	.874	*900.	.487	.468
Money	2.61	2.94	1.82	2.12	0.833	1.119	0.534	0.910	<.001*	.036*	.610	.005*	<.001*	.011*	<.001*	.230
Achievement	2.82	2.92	2.75	2.68	0.625	0.906	0.579	0.677	.181	.915	.985	.975	.831	.638	.369	.906
UPPS-P	N = 79	N = 39	N = 18	N = 59	N = 79	N = 39	<i>N</i> = 18	N = 59								
Negative Urgency	2.59	2.81	1.99	2.28	0.626	0.802	0.593	0.594	<.001*	.021*	.359	.003*	<.001*	.032*	<.001*	.332
Positive Urgency	2.38	2.77	1.83	1.86	0.618	0.753	0.592	0.667	<.001*	.059	998.	.008*	<.001*	<.001*	<.001*	.017*
Emotion Based Rash Action 2'OF	2.48	2.79	1.91	2.07	0.548	0.716	0.570	0.570	<.001*	.021*	.750	.001*	<.001*	<.001*	<.001*	.050*
Sensation Seeking 2'OF	2.89	2.84	2.66	2.02	0.676	0.886	0.488	0.830	<.001*	.007*	.010*	.666	.848	<.001*	<.001*	.987
(Lack of) Premeditation	1.98	2.18	1.88	2.03	0.599	0.933	0.412	0.625	.258	.124	.854	.943	.401	979.	679.	.422
(Lack of) Perseverance	1.88	2.08	1.85	1.98	0.542	0.744	0.402	0.553	.498	.083	.829	766.	.492	.732	.835	.280
Deficits in Conscientiousness 2'OF	1.93	2.13	1.87	2.01	0.492	0.757	0.333	0.530	.298	.066	.788	.970	.332	.864	679.	.247
Note. The BIS-11, DGI, and UPPS-P dc	omains ar	e measure:	s of impul	sive behav	ior. Highe	r scores in	dicate hig	iher levels	of impuls	ivity. * =	Statistic	ally signifi	cant; M _c :	= male co	ntrols; M _i	, = male
prisoners; F_c = female control; F_p =	female p	risoners.														
The 2'OF states for a second-order do	main, cor	isisting of t	wo first-on	der domaii	ns. The UP	PS-P doma	iin on Sens	sation Seek	ing acted	as both fi	rst-order	and seco	nd-order	score, con	sisting of '	l 2 items.

Table 2. Descriptive statistics and p-values of the input measures on impulsiveness.

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total sample. Altogether, N = 223 individuals were included into the study; about two-thirds of the respondents were recruited from the target prison population ($N_1 = 144$; 65%), and one-third from the non-prison control group ($N_0 = 79$; 35%). Comparing demographics between the two study groups, the prisoners were characterized by significantly higher share of males [$\chi^2(1) = 33.34$, p < .001], lower educational attainment [$\chi^2(3) = 104.17$, p < .001], and younger age [t (221) = 3.20, p < .001] in comparison to the participants from the control group. The demographic structure of the sample, as described in Table 1, was therefore used in calculating the correlation matrix.

Table 2 provides descriptive statistics and *p*-values of the key measures of impulsivity and their partial domains consecutively for *BIS-11* through *UPPS-P* questionnaires stratified by sample and sex. As the psychometric scores were computed as means of Likert-type responses for an individual across the set of domain items, the range of descriptive statistics averaged across all the individuals is also bounded within the same range of values. Namely, as the items of domains for *BIS-11* and *UPPS-P* used a four-point Likert scale, the descriptive statistics in Table 2 range between 1.0 and 4.0. Likewise, as the items of the *DGI* applied a five-point scale, the psychometric scores of its domains are bounded by 1.0 and 5.0.

Some of the respondents, particularly those from the prison group, refused to fill out or did not complete all three questionnaires on impulsivity. Therefore, the total number of observations for each of the measures was lower than the total sample size and varied between $N_{BIS} = 88$ and $N_{UPPS} = 79$ for male prisoners, and between $N_{BIS} = 53$ and $N_{UPPS} = 39$ for female prisoners.

In Table 2, pairwise comparisons of the mean domain scores stratified by group (prisoners vs controls) and sex are presented. Here, mean values are compared between the groups. The comparisons are presented consecutively for each of the domains and measures of impulsivity. For most of the domains in Table 2, the mean comparisons specifying only sample as the grouping variable point to a significantly higher level of impulsiveness among the target group as compared to the controls. When introducing sex as a grouping variable, the greatest number of significant differences across domains is visible between female prisoners and controls followed by female prisoners and male controls; interestingly, there were not as many significant differences between male prisoners and controls.

The correlation matrix of the three measures of impulsivity (particularly their domains) and age, sex, and education is available in Table 3. In the prisoners' group, the majority of the significant associations (rho < .05) were observable between the three impulsivity measures and age, whereas the least amount of measures were correlated with education. For age and educational level, all of the significant correlations were negative, whereas for sex the significant correlations were positive. Comparably to the target group, in the

Table 3. Spearman rank correlat	tion coeffi	cients of the	BIS-11, DC	5I, and UPP	5-P domair	ns scores w	ith demog	raphic confc	ounders.			
			Prisoners	(<i>N</i> = 141)					Control	(N = 79)		
	-	٩ge	Ō	ex	Educ	ation	A	ge	Ň	ex	Educ	ation
BIS-11	rho	<i>p</i> -value	rho	<i>p</i> -value	rho	<i>p</i> -value	rho	<i>p</i> -value	rho	<i>p</i> -value	rho	<i>p</i> -value
Attention 1'OF	183	.030*	.135	.110	024	.781	169	.136	.178	.117	016	.888
Cognitive Instability 1'OF	363	<.001*	.102	.228	065	.411	224	.047*	.173	.127	.078	.492
Attentional 2'OF	264	.002*	.124	.144	046	.587	219	.054	.206	.069	.047	.681
Motor 1'OF	245	.003*	.215	.010*	120	.157	208	.065	.172	.130	.057	.616
Perseverance 1'OF	136	.107	060.	.288	.013	.879	222	.050*	.121	.289	014	.902
Motor 2'OF	220	*600.	.171	.043*	080	.346	280	.012*	.149	.190	.041	.718
Self-Control 1 OF	201	.017*	.170	.044*	176	.037*	121	.289	.154	.176	024	.836
Cognitive Complexity 1 OF	367	<.001*	.023	.790	142	.093	149	.189	.170	.135	233	.039*
Nonplanning 2'OF	308	<.001*	.128	.130	182	.031*	153	.177	.182	.108	112	.324
Food	243	*800.	093	.602	093	.313	048	.684	.136	.248	.149	.206
Physical	149	.105	078	.400	.028	.763	266	.022*	053	.656	.084	.476
Social	071	.446	114	.217	.073	.431	.064	.589	070	.556	233	.045*
Money	295	.001*	.144	.118	031	.741	276	.017*	.107	.363	045	.705
Achievement UPPS-P	076	.412	.006	.946	219	.017*	172	.144	030	797.	246	.035*
Negative Urgency	119	.199	.123	.184	078	.403	139	.229	.254	.026*	.014	906.
Positive Urgency	056	.544	.244	.008*	.049	.597	097	399	.00	066.	.050	.668
Emotion Based Rash Action 2'OF	106	.254	.203	.027*	015	.873	115	.318	.146	.206	.062	.594
Sensation Seeking 2'OF	264	.004*	011	.905	.107	.249	452	<.001*	357	.001*	.116	.317
(Lack of) Premeditation	161	.082	.050	.594	045	.631	270	.017*	.093	.423	.045	.697
(Lack of) Perseverance	160	.084	.121	.191	020	.830	217	.058	.087	.454	051	.662
Deficits in Conscientiousness 2'OF	186	.043*	.086	.353	038	.685	277	.015*	.084	.466	600.	.936
<i>Note.</i> * = Statistically significant.												

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		Pr	isoners	(N = 141))		(Control	(<i>N</i> = 79)	
DGI	Food	Physical	Social	Money	Achievement	Food	Physical	Social	Money	Achievement
BIS-11										
Attention 1'OF	.176	.315*	.300*	.458*	.419*	.186	.348*	.255*	.156	.199
Cognitive	.135	.261*	.186*	.387*	.170	.260*	.385*	.126	.184	.088
Instability 1 ´OF										
Attentional 2 OF	.188*	.331*	.296*	.478*	.365*	.241*	.436*	.234*	.214	.157
Motor 1'OF	.133	.245*	.249*	.476*	.291*	.110	.372*	.286*	.436*	.290*
Perseverance 1 ´OF	.088	.272*	.265*	.495*	.471*	.074	.283*	.037	.323*	.329*
Motor 2'OF	.131	.316*	.306*	.557*	.409*	.132	.422*	.283*	.502*	.369*
Self-Control 1 ´OF	.296*	.412*	.343*	.570*	.449*	.211	.402*	.390*	.433*	.477*
Cognitive Complexity 1 ´OF	.256*	.240*	.196*	.527*	.388*	.108	.225	.279*	.335*	.271*
Nonplanning 2 ´OF	.303*	.365*	.307*	.608*	.484*	.204	.365*	.397*	.435*	.447*

 Table 4. Spearman rank correlation coefficients of the BIS-11 and DGI for prisoners and controls.

 Driven are (N = 141)

Note. * = Statistically significant.

control group the majority of the significant associations (*rho* < .05) were observable between the three measures of impulsivity and age of the participants; yet, the least amount of significant correlations was between the impulsivity measures and the sex of the participants. As for the prisoners' group, age, and education were negatively correlated with the domains of the three measures of impulsivity. Furthermore, sex was positively correlated with Negative Urgency (*UPPS-P*), but negatively correlated with Sensation Seeking (also *UPPS-P*).

In Tables 4–6, correlation coefficients were calculated for all impulsivity measures. Spearman correlation coefficients between the *BIS-11* and *DGI*

		Pr	isoners	(N = 141)			C	ontrol (/	N = 79)	
DGI	Food	Physical	Social	Money	Achievement	Food	Physical	Social	Money	Achievement
UPPS-P										
Negative Urgency	.140	.200*	.228*	.425*	.239*	.254*	.318*	.129	.322*	.296*
Positive Urgency	.199*	.131	.245*	.365*	.250*	.184	.397*	.340*	.338*	.427*
Emotion Based Rash	.189*	.172	.261*	.433*	.264*	.232*	.391*	.249*	.348*	.393*
Action 2'OF										
Sensation Seeking	.012	.039	.195*	.081	084	030	.305*	.121	.197	.172
2´OF										
(Lack of)	.254*	.420*	.363*	.473*	.490*	.028	.292*	.272*	.325*	.383*
Premeditation										
(Lack of)	.215*	.455*	.425*	.488*	.584*	.320*	.467*	.408*	.407*	.605*
Perseverance										
Deficits in	.244*	.486*	.423*	.530*	.589*	.180	.431*	.396*	.421*	.548*
Conscientiousness										
2´0F										

Table 5. Spearman rank correlation coefficients of the UPPS-P and DGI for prisoners and controls.

Note. * = Statistically significant.

Table 6. Spearman rank correlation coefficients of the BIS-11 and UPPS-P for prisoners and controls.

				Prisone	ers (N = 141)						Contr	ol (N=79)		
			Emotion Based							Emotion Based				
	Negative	Positive	Rash	Sensation	(Lack of)	(Lack of)	Deficits in	Negative	Positive	Rash	Sensation	(Lack of)	(Lack of)	Deficits in
UPPS-P	Urgency	Urgency	Action	Seeking	Premeditation	Perseverance	Conscientiousness	Urgency	Urgency	Action	Seeking	Premeditation	Perseverance	Conscientiousness
BIS-11														
Attention 1 'OF	.412*	.425*	.453*	.030	.398*	.548*	.504*	.522*	.435*	.538*	.072	.337*	.400*	.414*
Cognitive Instability 1 OF	.433*	.470*	.500*	.215*	.303*	.296*	.331*	.540*	.370*	.505*	.143	.194	.253*	.247*
Attentional 2´OF	.481*	.500*	.535*	.094	.393*	.515*	.486*	.587*	.456*	.586*	760.	.320*	.382*	.393*
Motor 1 'OF	.537*	.434*	.547*	.330*	.455*	.331*	.436*	.509*	.485*	.551*	.235*	.560*	.361*	.515*
Perseverance 1 'OF	.365*	.265*	.335*	.176	.469*	.432*	.489*	.264*	.290*	.290*	.106	.330*	.405*	.409*
Motor 2 'OF	.538*	.422*	.533*	.292*	.545*	.427*	.536*	.509*	.530*	.568*	.261*	.582*	.448*	.576*
Self-Control 1 ′OF	.480*	.397*	.481*	.117	.579*	.560*	.630*	.404*	.511*	.518*	.184	.665*	.624*	.728*
Cognitive Complexity 1′OF	.461*	.240*	.378*	.159	.426*	.371*	.445*	.355*	.371*	.391*	-069	.226*	.378*	.327*
Nonplanning 2´OF	.505*	.346*	.466*	.131	.568*	.522*	.604*	.437*	.510*	.526*	.047	.525*	.585*	.620*
<i>Note.</i> *= Statistic	cally signific	ant.												

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subscales are displayed in Table 4, and stratified according to the sample. For both samples, majority of the correlations between Food (*DGI*) and *BIS-11* subscales were not statistically significant (rho > .05). Regardless, significant positive correlations were observed across most of the *DGI* and *BIS-11* subscales in both prisoner and control samples.

Similar results are observed in Table 5 between the DGI and UPPS-P subscales. Nevertheless, more positive significant correlations between Food (*DGI*) and the UPPS-P subscales were found in the prisoners' sample, whereas the control group showed more positive significant correlations between Physical (*DGI*) and the UPPS-P subscales.

Finally, Table 6 reports correlation coefficients between the BIS-11 and the UPPS-P subscales. For both samples, significant positive correlations were observed across most of the BIS-11 and the UPPS-P subscales. The only exception was seen in the correlations between Sensation Seeking (*UPPS-P*) and the BIS-11 subscales for both samples.

Discussion

Results of this study identified and confirmed higher levels of impulsivity in the prison population. The significant domains of impulsivity in prisoners included all of the BIS-11 domains aside from the Attention and Attentional scales (second order factor); Social Interactions and Money scales in the DGI, and Negative and Positive Urgency, Emotion-Based Rash Action and Sensation Seeking scales in the UPPS-P. The comparison of male prisoners and controls showed significant differences in Self-Control, Cognitive Complexity, and Nonplanning scales in the BIS-11; Money scale in the DGI; and Negative Urgency, Positive Urgency, and Emotion-Based Rash Action scales in the UPPS-P. Females, however, showed significant differences in all of the BIS-11 Cognitive Instability, subscales aside from the Attention, and Attentional scales (second order factor); in Money scale (DGI); and in Negative and Positive Urgency, Emotion-Based Rash Action, and in Sensation Seeking scales (UPPS-P).

These results provide an important insight into the issue of impulsivity and impulsive behavior in prisoners that in previous studies were discussed only to a limited extent, whereas this type of assessment for the Czech Republic has been virtually non-existent. Furthermore, based on the type or domain of impulsivity the examiner would like to assess, he/she can select the appropriate measure required for the evaluation. In general, the *UPPS-P model* of impulsivity has been supported as one of the preferential scales recommended for use in practice due to its composite domains and good internal consistency (Hook et al., 2021). Furthermore, the *UPPS-P model* of impulsivity has been studied in terms of the prison population, specifically in relation to the

association between aggression, negative urgency and coping deficits, which should be targeted in therapy interventions for this type of population (Bousardt et al., 2016).

One of the primary strengths of this study lies in the specificity of its target population, prisoners serving their sentence, which is not easily accessible in comparison to the general population. Moreover, advanced understanding and research/data-driven detection of risk factors can better inform treatment needs and requirements in this type of population.

According to Alford and colleagues (2020) factors associated with increased levels of impulsivity in forensic population were a history of traumatic brain injury (TBI), substance/alcohol misuse, a history of traumatic events, and difficulty sleeping. Likewise, increased impulsivity in the prison population has been associated with violence (Fazel et al., 2016), aggression (Værøy et al., 2016), lifetime drug use (Bernstein et al., 2015), and various psychopathology, including personality disorders (Warren & Burnette, 2012). Furthermore, selfreported measures of impulsivity have been shown to be a consistent predictor associated with problematic behaviors, specifically for substance use samples and for individuals with higher levels of psychopathology (Huddy, n.d.). Accordingly, interventions targeted at emotion-based rash action, conscientiousness-based impulsivity, and sensation seeking will help reduce not only institutional aggression and improve prison adjustment, but will further tap into different patterns of substance misuse in this population (Værøy et al., 2016; Vassileva & Conrod, 2019). Likewise, interventions aimed at rapidresponse impulsivity could help with management of the Antisocial Personality Disorder, which is highly prevalent in the prison population, 71,9% in a European sample of prisoners (Azevedo et al., 2020; Swann et al., 2009). However, it is important to remember that in terms of Criminality other characteristics, such as Alienation and Interpersonal Problems (Kroner & Reddon, 1995) are equally as important as impulsivity and should be collectively targeted in the multidimensional treatment/prevention efforts.

Referring to the limitations of this study, it is essential to emphasize certain limitations that have potentially influenced our findings. One of the primary considerations pertains to the sample structure of our target and control groups. Regrettably, we were unable to achieve a fully balanced demographic distribution across these groups due to a combination of logistical and unforeseen constraints. These disparities in demographic characteristics could potentially introduce confounding variables, thereby complicating our interpretation of the data. Therefore, two complementary statistical approaches were utilized. The first was conducting multivariate analyses that controlled for demographic characteristics, thus adjusting our findings for potential confounding effects. The second was using stratified analyses, which allowed us to compare the effect of impulsivity within each demographic subgroup. Despite this limitation, we believe in the value and validity of our 14 👄 K. PŘÍHODOVÁ ET AL.

substantive findings, which can still provide a solid foundation for future research.

In further limitations of this study, it should be noted that some of the prisoners did not complete or refused to finish all three self-reported questionnaires of impulsivity. One might hypothesize that this unwillingness could be associated with higher levels of impulsivity in this group, in terms of more impulsive individuals refusing to cooperate in longer assessments. Furthermore, regardless of the informed consent and guaranteed data anonymity, some of the prisoners likely feared the influence of the assessment on their conditional release, parole, or other benefits in the prison. Likewise, impulsive prisoners could have underreported their levels of impulsivity, in order to produce socially desirable responses and appear less impulsive, aggressive or problematic. Therefore, the measured levels of impulsivity in the prisoner group could be significantly higher than reported results with its corresponding effect size, making the differences of our results even more pronounced.

Impulsivity was assessed by self-report questionnaires. Due to the time constraints and anonymity, no clinical evaluation or information about the number of institutional infractions was obtained by the researchers. Furthermore, analyses based on the type of crime and criminal history were difficult since many of the participants had long-standing history of crime, which included property crimes, such as theft, robbery or justice obstruction, as well as violent type of crimes, such as larceny, battery, bodily harm or grievous bodily harm.

Thus, future studies should incorporate other measures of impulsivity, such as the behavioral measures of risk taking or delay discounting, in order to mitigate the influence of social desirability and potential dissimulation. The self-reported measures of impulsivity could be also accompanied by clinical evaluation of the researchers or prison psychologists or assessed in the context of objective measures related to prison adjustment, such as the number of institutional infractions. Furthermore, the methodology of the assessment should be clear and concise, in order to avoid any unnecessary prolongation of the testing period.

In general, a better understanding of impulsivity in the prison population may lead to better psychoeducation of prisoners and correctional staff, better communication between prisoners and correctional staff, more effective and targeted interventions for problematic prisoners, and increased safety and security in the prison. For example, the relationship between impulsivity and emotion-based rash action or sensation seeking could be incorporated into special programs or therapeutic groups for prisoners with behavioral problems, such as anger management, aggression, or drug abuse. One of these special programs in the Czech Prison Service is TP KEMP, which is based on the principle of cognitive behavioral therapy and focused on emotion regulation, impulsivity, conflict resolution, and crime (Prchal, 2021). The deconstruction of impulsivity in this type of program would allow for better in-depth assessment and examination of this concept. Likewise, this relationship could be clarified to correctional staff, in order to help identify factors leading to emergency and crisis situations in the prison.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, K.P., upon reasonable request.

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