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Article

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INNOVATION IN HEALTHCARE MANAGEMENT: DRUG DECRIMINALIZATION FOR REDUCING THE HEALTH DAMAGE FROM CRIME

Abstract. *The article focuses on the positive impact of drug legalization on reducing crime and violence's impact on health. The authors considered the potential of an innovative approach to crime prevention and health care improvement. Criminalization may reduce drug harm, but the current criminal-justice approach to drugs is not working enough. Drug use is still widespread, public. The personal harms are significantly large. There are a lot of short- and long-term health effects from crime and violence. The World Health Organization affirms that rates of drug use are unrelated to how effectively drug laws are enforced. Thus, it is actually to find new possibilities and develop new methods to reduce crime level and its negative influence. Drug decriminalization is one of such important issues. This article aims to investigate drug decriminalization for reducing the health damage from crime in the context of innovation in healthcare management. There is a comparative analysis of some drug legalization policies: decriminalization of the use and possession of all illicit drugs (with the control of their legal supply) or legalization of the use and supply of cannabis etc. The dynamic analysis of data for different types of crime, such as unlawful acts involving controlled drugs or precursors, intentional homicide, assault, kidnapping, sexual assault, and other violent crime both in two groups of countries – with criminal-justice and innovation health care (including drug decriminalization) approaches were taken. Portugal, Switzerland, Netherlands, Czechia are among the countries of the second group, which have decriminalized drug use and possession for personal use and have invested in harm reduction programs. The research consists of data for 25 European countries for 2008-2018 (the time limit of 2018 is determined by available statistics of the statistical service of the European Union, World Health Organization, UN Office on Drugs & Crime Databases, etc.). Based on the correlation and regression analysis, it is substantiated that drug decriminalization is an important factor in reducing the health damage from crime.*

Keywords: crime effects on health, criminal-justice approach, crime reducing, drug decriminalization, drug legalization, healthcare approach, healthcare management, health damage from crime, innovation approach, violence.

Introduction. Drug use is widespread worldwide, and its level is higher in developed countries than in developing ones. In many cases, drugs use is associated with certain illegal actions causing health harm or death. The analysis reveals that drug use is snowballing around the world. In 2018 it was 269 million drug users, or 5.3% of the world's population aged 15-64, compared to the previously estimated 210 million users or 4.8% of the population (World Drug Report, 2020). Conditions of socio-economic and political instability observed in many countries aggravate this situation.

The economic crisis may initially lead to crime growth, but this trend is changing over time (Kaya and Lumpkin-Sowers, 2020). Some violent acts can be caused by illness or mental health problems, but most of them are caused by the intentional actions of criminals through stereotypes, aggressive behavior, and misunderstandings (Mujtaba et al., 2020). When the effects of drug abuse were observed, it was shown that most persons under observation were tormented from emotional imbalance (Akhter and Humna, 2019).

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The shadow economy influences crime too. And the terminology connected with the shadow economy began to be used more often after the WHO's Recommendations on the Decriminalization of Illicit Drugs (Zolkover and Terziev, 2020).

Many scholars and lawyers argue that the traditional criminal-justice approach to drugs is not working enough. The number of offenses connected with drugs and other violent offenses is still high. Harms are significantly large both for individuals and public health in general. Thus, drug decriminalization is seen as an innovative approach to reducing the health damage from crime.

Despite important scientific advances in this field, the influence of drug decriminalization on the dynamic of crime offenses causing health damage or death is not covered enough and requires empirical confirmation. The purpose of the article is to investigate drug decriminalization for reducing the health damage from crime in the context of innovation in healthcare management.

Literature Review. Many scholars have studied some aspects of drug decriminalization in different countries. Schmoke (1990) concluded that drug criminals only understand money. The author saw that putting them out of business was to take away their profits. Thus, drugs should be a public health responsibility, and decriminalization should be such a means. Rosse et al. (1991) studied an issue of support for legalizing drugs. They interviewed HR managers of one hundred and twenty-seven firms about perceptions of legalization consequences and analyzed received responses. Van Het Loo et al. (2002) analyzed using drugs in Portugal, its decriminalization, and possession for the use of drugs. The authors paid attention to how the law would be implemented because the law only set a framework for those communities that wished to undertake such activities.

Kreit (2010) reviewed modern law on drugs from abroad, made a brief overview of the influence of the war on drugs on national and local budgets, and some propositions for reforms. Also, the author focused on Portugal's drug decriminalization law and considered how this system compares to the model of the US criminal court on drugs. Anderson (2012) explored a problem of drug abuse and governments' policies to combat addiction and illicit drug use, including both strict Swedish adherence to rules and Portuguese total decriminalization. The author examined how such methods influence illegal drug use in Germany, Netherlands, and Portugal. He compared different policies, treatment programs, etc., and identified which one had the most significant effect on drug usage.

Virani et al. (2019) described drug decriminalization as a matter of justice and equity, not just health. The author emphasized that the central cause for drug law reform was not its relevance to health or the present public health catastrophe. It was a matter of correcting social injustice.

Hammond et al. (2020) investigated the support for drug legalization by different sociodemographic and political groups and among drug users. The authors' results demonstrated that support for drug legalization depends on the «drug user» definition and the drug type. Scheim et al. (2020) reviewed indicators and results of studies assessing the impact of decriminalization of drugs or legal regulation on the availability, use of drugs, or related social or health harm worldwide. They concluded that legal reform was not mostly associated with dynamics in use. Indicators in the assessment of drug law reform mean a necessity of improving alignment with relevant social and health outcomes.

Methodology and research methods. The correlation and regression analysis based on data for 25 European countries during 2008-2018 was employed to prove the hypothesis about the influence of drug decriminalization on reducing the health damage from crime offenses (time limit in 2018 is determined by available statistics of the statistical service of the European Union, World Health Organization, UN Office on Drugs & Crime Databases, etc. The program STATA was used for calculations.

The distributed nature of the investigated indicators (unlawful acts connected with precursors or controlled drugs) was evaluated based on Shapiro – Wilk test (Shapiro and Wilk, 1965). In turn, Pearson's or Spearman's method of correlation calculating was chosen (Pearson, 1896; Spearman, 1904). The relationship's nature and strength (unlawful acts involving controlled drugs or precursors and crime

offenses causing health damage) were determined due to the correlation analysis. The duration of the time lag was revealed, after which this dependence was the most significant. The linear regression models were built to determine the impact of drug decriminalization on the dynamic of crime offenses causing health damage or death on the example of Croatia, where there was a transition to the model of drug decriminalization during the study period (2013).

Results. The EU Drugs Strategy emphasizes that the drug problem is national and international and needs to be solved globally. And it should be mentioned that one of the important objectives of the strategy is to help reduce drug demand, drug addiction, and drug-related risks and harms to health and the social sphere (EU Drugs Strategy). Generally, the European Union's position is to provide and apply alternatives instead of coercive sanctions for offenders of drugs using according to members' legal frameworks. Key ones include treatment, aftercare, social reintegration, recovery, rehabilitation, and education. Thus, we see the EU target of drug decriminalization. Of course, the use and possession of illicit drugs are criminalized in most countries. However, the criminal-justice approach does not work enough in drug fights. Drug use is still widespread, public and personal harms are significantly large. There are a lot of short- and long-term health effects from crime and violence. Besides it, the World Health Organization affirms that rates of drug use are unrelated to how effectively drug laws are enforced (Degenhardt et al., 2008; Data Logic Action, 2018).

Evidence overviews regarding the effects of drugs criminalization have reported the following key findings: 1) the drug use level is not directly connected with the severity of the fight against drug use in the country; 2) drugs criminalization increases the health risks; 3) criminalization of drug use causes a social risk; 4) punitive policies in this sphere bring a disproportionate influence on vulnerable communities and increasing risks for the public health (Evidence Overviews). Therefore, a growing number of countries have recognized that criminalizing drug possession for personal use breaches human rights standards and the population's health, and a more innovative approach is needed. They have introduced some form of decriminalization, and governments have rejected the criminalizing possession of small drug quantities for personal use both in practice and by law (UN, 2016). A concept of «decriminalization» refers to the criminal liability removal for drug-related activities (Drug Decriminalization Across the World). It has mainly been used to store drugs for personal use, grow cannabis for personal use, and distribute planned drugs with no financial benefits. Some threshold quantities are set to determine whether the person has a planned or controlled substance for personal use. When limit values are mandatory, the law is strictly adhered to. Some jurisdictions don't have limits but prefer to use «small» or «reasonable» values, and decisions about whether the activities are intended for personal use or not are based on other reasons (Talkingdrugs, n.d.). Some countries replace criminal penalties with civilian ones, while others don't apply penalties. Moreover, it is essential to distinguish a concept of «decriminalization» from concepts of «legalization» and «legal regulation» in the context of our research. So, legalization means transitioning drug-related behavior (trafficking, possession, use, production, cultivation, etc.) to legal activity. Legal regulations mean the model according to which the sale, transportation, production, and cultivation of certain drugs are regulated by the legal regime of the regulation (availability, use, marketing, transit, production, packaging, price, efficiency) and enforced by state agencies (Talkingdrugs, n.d.).

Of course, the harm and dependency on drug use would not disappear with drug decriminalization. But this approach focuses on treatment, harm reduction and prevention, rather than prosecution and stigma. Some proposals of such a health-based approach include the following: 1) decriminalize using and storing all illicit drugs (illegal supply); 2) legalize cannabis supply and use; 3) boost harm reduction, drug treatment and education services (Drug Foundation, n.d.).

The main idea is to abandon a criminal justice approach favoring health protection and harm minimization from using drugs. To sum up, these propositions decrease social and personal harm. Their outcomes will outweigh the extra costs of prevention, harm reduction, education, and treatment.

Decriminalization will benefit society by $ 34-83 million a year, mostly by reducing the cost of criminal justice ($ 27-46 million a year). There would be extra health costs too. But investment in harm reduction, drug prevention, treatment, and education could deliver significant benefits (Data Logic Action, 2018). Furthermore, the healthcare approach promotes sustainable well-being by minimizing risks to health and the economy (Us et al., 2020).

However, scientists reveal the issues related to the introduction of investment influence on healthcare. The integrated and systematic practice of socially responsible healthcare business support or healthcare public-private partnerships could be transformed into profitable investment projects (Yelnikova and Kwilinski, 2020). So, drug decriminalization is an alternative policy option, according to which possession of small quantities of illegal drugs is not a criminal offense, but only in the case of personal use (Eastwood et al., 2016). This study agrees with these authors calling decriminalization the new misleading version. Because in certain countries, legalization policies have been since the 1970s, and other countries have never criminalized drug storage and use. It should be stated that there are two models of drug decriminalization:

1) de jure decriminalization that provides the consolidation of the legal framework in law through the statute or decision of the constitutional court);

2) de facto decriminalization when the chosen activity is still a criminal offense under the law, but it isn't enforced (mostly achieved due to the official instructions from the police or the prosecutor's office) (Talkingdrugs, n.d.).

Thus, cross-country analysis of drug decriminalization is presented in Table 1.

Table 1. Drug decriminalization: a cross-country analysis

Country (decriminalization date)	Model / Legal framework	Decriminalized activities	Thresholds	Decision maker	Sanctions
1	2	3	4	5	6
Antigua and Barbuda (2018)	De jure	Cannabis cultivation and possession (personal use)	Cannabis (herbal) 15g / 4 homegrown plants	Police	Drug confiscation, criminal conviction, fines, hefty. In public spaces smoking cannabis is an offense
Argentina (2009)	De jure	Any drug possession (personal use), cannabis cultivation	No thresholds	Judiciary, prosecution	Drug confiscation, voluntary referral to education course, fine
Armenia (2008)	De jure	Any drug possession and social supply	No thresholds (No financial gain, 'small' quantity)	Police	Drug confiscation, voluntary referral to education course, fine
Belize (2017)	De jure	Cannabis possession (personal use)	Cannabis (herbal) 10g	Police	Drug treatment or counseling program for minors. In public spaces smoking cannabis is an offense
Bolivia (2009)	De jure	Coca possession (personal use), cultivation of coca in 'authorized zones', any drug social supply	Coca (coca leaf) 1-15 pounds	Police	No sanction for private and personal use
Chile (2005)	De jure	Any drug possession, cannabis cultivation (private personal use)	No thresholds	Judiciary	Public consumption – fine, treatment, rehabilitation programs, mandatory civil service, suspension of the drivers' license

Continued Table 1

1	2	3	4	5	6
Colombia (1994)	De jure	Any drug possession, cannabis cultivation (private personal use)	Herbal cannabis 20g, plants up to 20, cocaine 1g, resin 5g, methaqualone 2g	Judiciary, prosecution	Public consumption attracts penalties
Costa Rica (1988)	De jure	Any drug possession, cannabis cultivation (personal use)	No thresholds	Judiciary, prosecution	Drug confiscation, voluntary referral (mandatory for minors)
Croatia (2013)	De jure	Any drug possession (personal use)	No thresholds	Prosecution	Drug confiscation, fines, mandatory treatment
Czech Republic (1990)	De jure	Any drug possession, cannabis cultivation (personal use)	Cannabis (herbal) 10g, heroin 1.5g, cocaine 1g, methamphetamine 1.5g, MDMA / ecstasy tablets 4 / powder 1.2g	Police	Drug confiscation, fine
Estonia (2002)	De jure	Any drug possession (personal use)	Expert opinion (a single dose is 10 times)	Police	Drug confiscation, fine, administrative detention, voluntary referral (social service)
Germany (1992)	De jure	Any drug possession (personal use)	Cocaine 1-3g, herbal cannabis 6-15g, MDMA / ecstasy 5g	Police, prosecution	No sanctions for personal use
Italy (1990)	De jure	Any drug possession, cannabis cultivation, and social supply	No thresholds	Police	Drug confiscation, suspension of driver license, fine, warning, voluntary referral (treatment)
Jamaica (2015)	De jure	Possession of cannabis, cultivation of cannabis	Herbal cannabis 56.7g, plants up to 5 for household	Police	No sanction (for Rastafarian faith and medical purposes), fine, referral to education course
Mexico (2009)	De jure	Any drug possession, cannabis cultivation	Cannabis 5g, cocaine 0.5g, heroin 50mg, opium 2g, MDMA / ecstasy powder 40mg or tablet 200mg	Judiciary, police, prosecution	Administrative penalty, voluntary referral to treatment (mandatory in case of 3rd one)
Netherlands (1976)	De facto	Any drug possession, cannabis cultivation	Cannabis 5g / plants 5, other drugs 0.5g	Police	No sanctions
Paraguay (1988)	De jure	Possession of any drug	Heroin 2g, cocaine 2g, cannabis 10g	Judiciary	Administrative penalty, treatment (compulsory) for dependent persons
Peru (1991)	De jure	Possession of any drug	Cannabis 8g, cocaine 2-5g, opium 1g, MDMA 0.25g	Police	No sanction
Poland (2013)	De jure	Any drug possession (personal use, no big social harm, small quantity)	No thresholds	Prosecution	Fine, administrative penalty, voluntary referral (treatment, education course)

Continued Table 1

1	2	3	4	5	6
Portugal (2001)	De jure	Possession of any drug for personal use	Herbal cannabis 25g, oil 2.5g, resin 5g, MDMA / ecstasy 1g, THC 5g, cocaine 2g heroin 1g	Police	Drug confiscation, proceedings suspension, fines, seizure of driving license, passport, voluntary referral to treatment or harm reduction services
Russian Federation (2004)	De jure	Any drug possession (the approach is limited)	Herbal cannabis 6g, resin 2g, MDMA / ecstasy 0.3g, heroin 0.5g	Police	Fine, administrative detention, proceedings suspension, voluntary referral to treatment
South Africa (2018)	De jure	Cannabis possession, cannabis cultivation (personal use)	No thresholds	Police, prosecution	No sanction
Spain (1983)	De jure	Any drug possession, cannabis cultivation,	Herbal cannabis 100g, MDMA / ecstasy 2.4g, cocaine 7.5g, heroin 3g	Police	Administrative fine, seizure of documents, treatment, or rehabilitation for minors
Switzerland (2013)	De facto De jure	Any drug possession (personal use), cannabis cultivation, any drug social supply	Cannabis (herbal) 10g No thresholds for other substances	Police	Confiscation of substance, fine, confiscation of driver license, referral (education course - minors, harm reduction services)
Uruguay	De jure	Any drug possession, cannabis cultivation (personal use)	No thresholds	Judiciary	No sanction
Virgin Islands (US territory) (2013)	De jure	Possession of cannabis	Cannabis (herbal) 2oz	Police	Confiscation of drug, fine, drug awareness program (minors)
Some Australian states (1987–1996)	De jure	Possession of cannabis, cultivation of cannabis	Cannabis (herbal 50-100g, oil 1g, resin 10-20g), 1 or 2 (non-hydroponic) plants	Police	Confiscation of the drug, fine
Some US states (2012–2020)	De jure	Possession of cannabis, cultivation of cannabis, social supply of cannabis	Cannabis 1 oz / plants 6 (personal use), transfer 1oz (no remuneration)	Police	Drug confiscation, fine

Sources: developed by the author based on (TalkingDrugs, n.d.; CityWide, n.d.).

Besides it, the nexus between drugs and violence is a complex issue with multiple facets. Both the economic-compulsive and psychopharmacological models refer to the impact of drug use on the behavior of people who use drugs in terms of their propensity to engage in violence or other criminal activity (World Drug Report, 2020). A sample of 25 European countries for 2008-2018 was performed to realize this research. The time limit is 2018 is determined by available statistics on the EU Statistical Office and United Nations Office on Drugs and Crime data for all studied indicators: unlawful acts involving controlled drugs or precursors, intentional homicide, assault, kidnapping, sexual assault, sexual violence, and rape. There are countries of two groups – with criminal-justice and innovation health care (including drug decriminalization) approaches. The examination of drug decriminalization's impact on reducing the health damage from crime offenses was conducted on the dynamics of the above indicators.

Data on unlawful acts connected with precursors or controlled drugs in selected countries are given in Table 2.

Table 2. Unlawful acts connected with precursors or controlled drugs (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	139,25	139,12	136,07	125,67	102,16	102,31	493,09	468,59	491,17	510,74	509,82
Bulgaria	38,00	49,04	50,73	38,80	40,40	41,90	44,70	55,68	66,23	70,25	78,52
Czechia	27,19	29,22	28,77	34,66	36,30	48,66	53,24	52,66	52,75	52,93	51,51
Germany	291,85	287,60	282,39	294,77	295,22	314,85	342,63	348,05	368,23	400,60	423,54
Estonia	573,13	317,50	223,28	287,36	348,32	351,32	307,95	378,90	429,58	441,46	341,51
Ireland	523,93	483,75	435,06	384,43	357,45	333,82	342,03	311,12	324,10	340,48	368,54
Greece	109,97	113,93	93,99	87,98	91,50	95,18	99,34	99,35	102,80	118,82	125,95
Spain	31,89	31,02	30,96	32,61	30,99	30,59	28,83	25,98	26,80	27,85	30,29
France	9,57	9,33	9,08	9,12	9,04	9,84	10,46	11,25	336,40	344,93	345,07
Croatia	182,79	163,88	180,90	181,05	170,60	62,95	63,74	67,26	67,72	67,72	55,39
Cyprus	100,34	88,59	103,89	111,46	119,49	115,03	125,87	109,80	103,26	109,97	132,14
Lithuania	57,18	68,75	70,47	73,90	100,08	79,21	87,89	86,40	79,21	92,07	114,64
Malta	44,14	45,51	43,72	42,89	48,62	49,36	44,71	35,71	48,18	67,35	73,16
Netherlands	115,05	112,70	100,84	95,37	96,50	95,86	90,28	81,80	74,65	70,05	73,05
Austria	23,83	25,18	25,95	27,70	23,67	322,19	342,83	385,72	416,97	485,70	465,23
Portugal	35,33	40,40	43,08	39,86	43,99	44,34	45,56	51,07	55,56	62,86	63,55
Romania	17,55	15,79	17,95	16,14	14,29	12,28	12,07	21,28	20,26	25,24	36,84
Slovenia	71,33	103,13	85,79	73,41	85,62	83,15	80,64	84,20	69,62	78,61	73,06
Finland	292,08	347,78	368,57	379,40	372,17	417,49	399,56	428,25	457,80	505,61	529,21
Switzerland	626,72	1113,26	1145,32	1158,95	1167,39	1210,20	994,96	1045,54	999,96	951,05	899,42
England and Wales	54,72	60,36	58,30	55,99	52,77	51,71	49,21	45,07	43,55	45,38	50,59
Scotland	198,90	189,79	136,05	126,58	102,35	668,07	688,34	660,41	605,01	596,43	638,49
Northern Ireland	34,29	35,33	41,24	44,54	50,14	243,40	269,42	291,46	295,74	334,61	363,97
Montenegro	74,73	64,49	49,60	50,98	30,15	27,70	28,80	29,58	33,11	37,12	39,53
Serbia	82,13	74,98	76,27	68,14	66,15	78,65	86,99	80,20	99,20	119,41	145,90

Sources: developed by the author.

It should be noted that Czechia, Germany, Estonia, Spain, Croatia, Netherlands, Portugal, and Switzerland are the countries with drug decriminalization policies. However, there are only two countries among the above where the transition to the new model took place during the study period (2008–2018). They are Croatia (2013) and Switzerland (2013). Other countries have moved to drug decriminalization before 2008.

Figure 1 demonstrates the dynamics of several unlawful acts connected with precursors or controlled drugs during 2008–2018.

The highest values of unlawful acts involving controlled drugs or precursors indicator are in Switzerland, Scotland, Finland, Ireland, Germany, etc. The lowest ones are in Spain, Czechia, Croatia, Portugal, etc. Special attention should be paid to Croatia and Switzerland, where a declining trend has lasted since 2013.

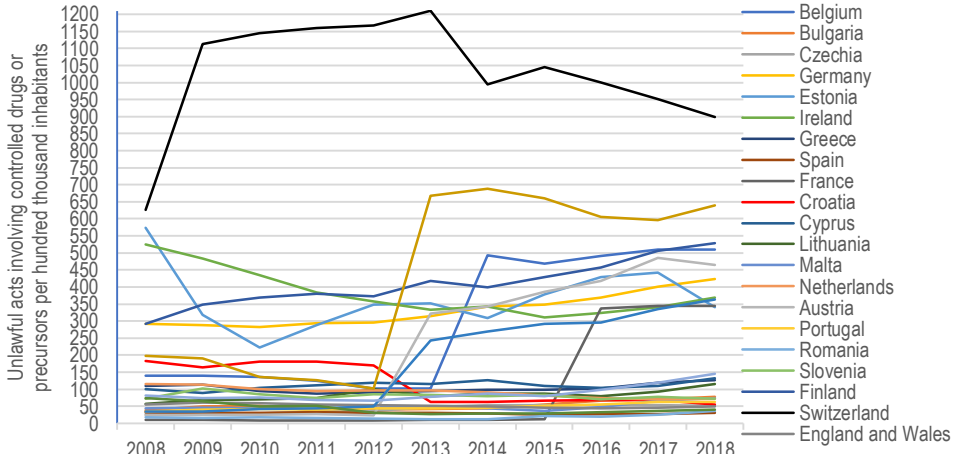

Figure 1. The dynamic analysis of unlawful acts connected with precursors or controlled drugs in 2008–2018

Sources: developed by the author.

It was a time of policy transition to drug decriminalization. Intentional homicide data in selected countries are presented in Table 3.

Table 3. Intentional homicides indicator (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	2	3	4	5	6	7	8	9	10	11	12
Belgium	1,91	1,76	1,74	1,95	1,86	1,83	1,88	2,06	1,54	1,73	1,55
Bulgaria	2,29	2,01	1,99	1,74	1,92	1,50	1,55	1,75	1,10	1,34	1,30
Czechia	1,09	1,01	1,00	0,79	0,90	0,86	0,77	0,84	0,62	0,38	0,52
Germany	0,80	0,88	0,85	0,86	0,77	0,77	0,80	0,81	0,91	0,89	0,76
Estonia	6,28	5,24	5,25	4,89	4,75	3,94	3,12	3,80	2,51	2,20	1,90
Ireland	1,14	1,17	1,21	0,92	1,13	1,11	1,15	0,64	0,74	0,88	0,87
Greece	1,29	1,36	1,58	1,65	1,49	1,28	0,96	0,79	0,75	0,72	0,88
Spain	0,89	0,89	0,86	0,82	0,78	0,65	0,69	0,65	0,63	0,66	0,62
France	1,52	1,25	1,23	1,35	1,25	1,22	1,16	1,55	1,33	1,22	1,16
Croatia	1,65	1,14	1,44	1,14	1,19	1,08	0,85	0,88	1,05	1,11	0,58
Cyprus	1,16	2,38	0,85	0,95	2,20	1,27	1,17	1,42	1,30	0,82	1,62
Lithuania	8,90	7,54	6,33	6,19	6,03	5,79	5,27	5,75	4,92	3,97	3,45
Malta	1,47	0,97	0,97	0,72	2,39	1,42	1,41	0,93	1,11	1,96	1,26
Netherlands	0,91	0,93	0,93	0,93	0,93	0,88	0,86	0,71	0,64	0,92	0,69
Austria	0,70	0,61	0,73	0,96	1,05	0,75	0,51	0,49	0,56	0,70	0,83
Portugal	1,17	1,23	1,17	1,08	1,16	1,37	0,88	0,96	0,64	0,74	0,79
Romania	2,28	1,94	1,88	1,56	1,88	1,68	1,49	1,46	1,25	1,30	1,37
Slovenia	0,55	0,64	0,54	0,83	0,68	0,58	0,82	0,97	0,48	0,92	0,48
Finland	2,51	2,25	2,22	2,05	1,63	1,64	1,61	1,50	1,35	1,24	1,63
Switzerland	0,71	0,66	0,68	0,58	0,57	0,71	0,50	0,69	0,54	0,53	0,59
England and Wales	1,17	1,08	1,14	0,94	0,97	0,92	0,89	0,95	1,16	1,20	1,14
Scotland	1,83	1,61	1,91	1,76	1,19	1,15	1,16	1,10	1,15	1,09	1,10
Northern Ireland	1,36	1,62	1,28	1,27	1,15	1,09	0,93	1,30	0,97	1,29	1,23
Montenegro	3,57	1,62	2,10	3,07	2,42	1,45	3,06	2,73	3,86	1,77	2,09
Serbia	1,74	1,85	1,56	1,57	1,44	1,84	1,60	1,35	1,50	1,12	1,49

Sources: developed by the author.

Figure 2 demonstrates the dynamic visualization of the number of intentional homicides during 2008–2018.

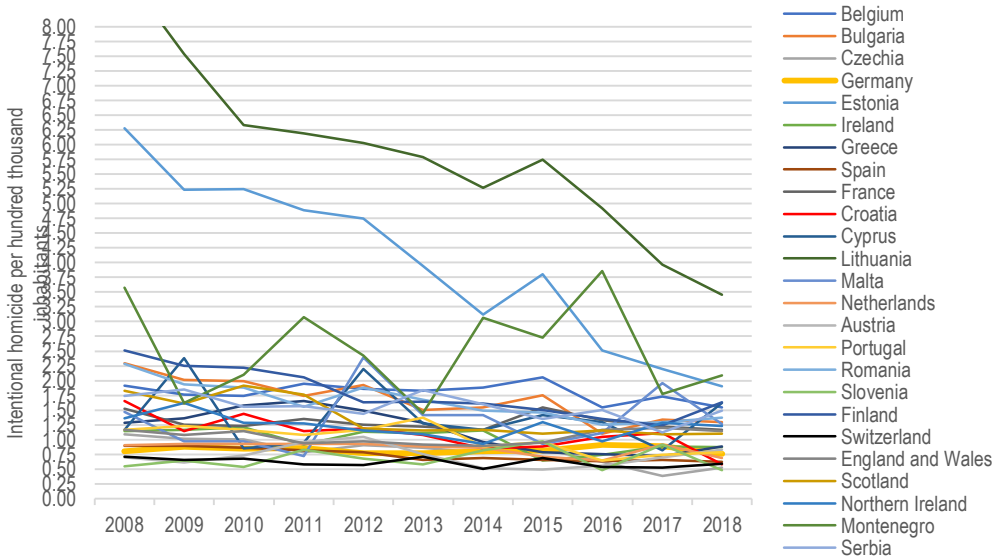

Figure 2. The dynamic analysis of intentional homicides indicator in 2008–2018

Sources: developed by the author.

The highest values of intentional homicides indicator are in Lithuania, Estonia, Montenegro, Malta, etc. The lowest ones are in Czechia, Croatia, Switzerland, etc. We cannot see a certain trend in Croatia and Switzerland because of indicators jumping up and down. However, after 2013 there were no higher values than before 2013 in these countries. These countries had the best (the lowest) estimates in 2018. Data on selected countries on the assault per hundred thousand inhabitants are shown in Table 4.

Table 4. Assaults indicator (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	2	3	4	5	6	7	8	9	10	11	12
Belgium	715,43	722,26	717,33	716,12	651,76	624,87	629,75	555,13	556,48	550,15	553,95
Bulgaria	42,78	41,81	40,93	33,41	32,89	33,91	34,96	34,99	34,53	39,58	35,72
Czechia	52,18	45,62	45,75	50,20	49,88	51,14	49,46	49,62	47,85	45,06	46,81
Germany	630,64	182,07	174,69	173,38	169,40	158,80	155,70	156,90	170,41	166,09	165,14
Estonia	10,46	7,94	7,73	7,82	7,47	7,50	5,85	7,45	7,07	5,78	6,82
Ireland	86,20	82,23	80,91	77,46	70,11	66,89	68,20	75,17	76,89	85,30	93,28
Greece	3,89	4,30	9,90	12,81	15,26	14,63	13,35	14,96	14,05	14,02	14,77
Spain	159,41	174,98	53,94	39,19	37,06	35,74	36,07	62,55	37,32	38,87	39,20
France	293,62	342,07	358,67	355,97	355,00	355,64	360,80	364,25	363,86	363,86	363,86
Croatia	26,16	24,57	22,92	20,35	21,12	19,31	18,04	19,03	18,85	19,21	17,85
Cyprus	21,51	27,48	21,12	19,53	17,17	15,24	15,62	16,88	17,09	16,85	15,27
Lithuania	7,81	6,91	7,80	6,75	5,93	7,10	6,93	7,33	7,48	6,25	6,59
Malta	48,06	42,10	43,48	43,62	41,67	51,74	37,61	42,62	44,40	40,41	38,47
Netherlands	420,62	398,46	39,85	39,36	37,09	33,25	31,73	30,18	29,57	28,01	26,63
Austria	47,48	48,27	43,18	46,53	47,93	39,36	37,97	40,31	43,60	41,32	42,06

Continued Table 4

1	2	3	4	5	6	7	8	9	10	11	12
Portugal	7,20	6,85	8,16	7,68	6,65	5,53	5,20	4,52	5,04	5,66	5,63
Romania	45,83	44,38	57,31	57,43	85,68	87,77	11,43	1,50	1,54	1,38	1,29
Slovenia	106,20	107,11	106,59	96,28	98,85	89,81	80,39	74,65	72,23	67,67	74,70
Finland	42,03	39,11	36,89	37,86	34,36	33,00	30,18	28,56	29,01	28,73	29,18
Switzerland	117,11	6,80	6,25	6,18	7,50	7,07	7,48	7,48	6,88	6,96	6,90
England and Wales	767,40	726,23	661,46	602,28	551,63	566,50	653,16	746,93	802,85	875,94	927,84
Scotland	1540,54	107,75	104,70	88,87	68,65	55,47	54,39	69,34	73,47	72,84	74,47
Northern Ireland	87,50	89,86	80,66	79,91	70,26	59,84	63,79	65,29	59,78	56,41	56,66
Montenegro	31,84	30,14	31,18	25,97	27,08	27,86	20,76	22,50	20,57	23,62	24,58
Serbia	21,48	19,66	19,04	18,05	18,33	24,37	21,07	19,99	18,92	18,25	17,47

Sources: developed by the author.

The lowest level of assaults in Romania, Portugal, Lithuania, Switzerland, and Estonia was in 2018. The highest ones are in England and Wales, France, and Belgium (Figure 3).

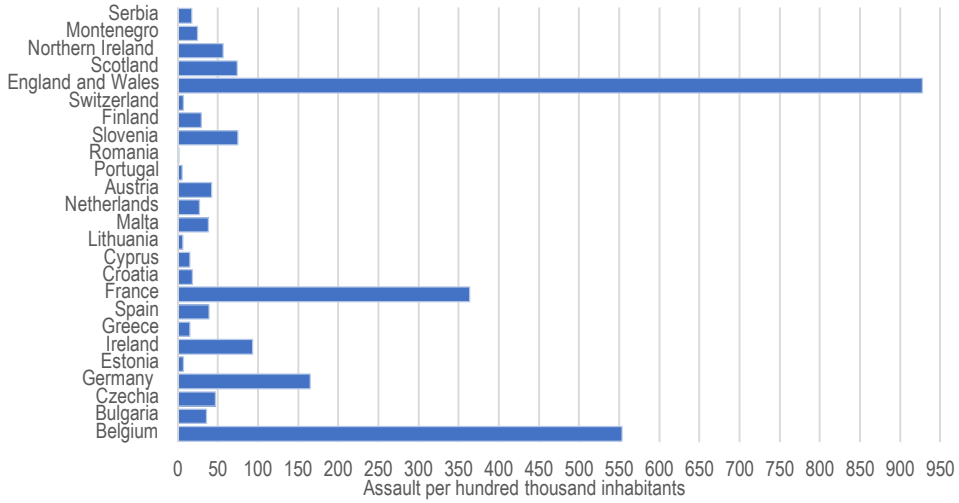

Figure 3. The dynamic analysis of assaults indicator in 2008–2018

Sources: developed by the author.

Data on selected countries on the kidnapping per hundred thousand inhabitants in 2008–2018 are shown in Table 5.

Table 5. Kidnapping data (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	2	3	4	5	6	7	8	9	10	11	12
Belgium	9,50	10,04	10,35	10,85	10,68	10,42	10,29	10,42	10,62	10,31	10,31
Bulgaria	1,69	1,90	1,59	1,04	1,02	1,19	1,31	1,03	0,98	1,44	0,89
Czechia	0,15	0,12	0,15	0,10	0,16	0,19	0,14	0,11	0,17	0,16	0,12
Germany	2,26	6,25	5,99	6,14	6,45	6,12	6,18	5,87	5,79	5,60	5,51
Estonia	0,15	0,00	0,00	0,23	0,00	0,08	0,00	0,00	0,00	0,00	0,00
Ireland	1,30	1,85	1,80	1,68	1,41	1,74	1,30	1,97	1,57	1,59	1,59

1	2	3	4	5	6	7	8	9	10	11	12
Greece	0,27	0,14	1,56	1,42	1,25	0,86	0,53	0,82	0,57	0,72	0,69
Spain	0,52	0,37	0,27	0,24	0,25	0,26	0,21	0,20	0,20	0,15	0,17
France	3,24	3,24	3,24	3,44	3,24	3,45	4,48	5,74	5,72	5,72	5,72
Croatia	0,37	0,28	0,30	0,14	0,14	0,02	0,02	0,00	0,02	0,00	0,00
Cyprus	1,55	3,26	3,30	1,43	0,58	0,46	0,93	0,00	0,12	1,05	0,46
Lithuania	1,90	1,85	2,20	1,57	2,16	1,55	0,00	0,00	0,00	0,00	0,00
Malta	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Netherlands	4,63	3,79	3,92	3,45	3,59	3,13	2,47	2,57	2,47	2,28	2,44
Austria	0,13	0,06	0,11	0,06	0,13	0,05	0,01	0,03	0,02	0,03	0,06
Portugal	4,66	5,10	4,74	4,80	3,97	4,12	3,61	3,56	2,86	2,83	2,65
Romania	1,28	1,28	1,50	1,43	1,95	1,55	1,45	1,48	1,75	1,58	1,56
Slovenia	0,35	0,10	0,20	0,10	0,19	0,19	0,24	0,15	0,15	0,05	0,29
Finland	0,00	0,06	0,02	0,06	0,02	0,02	0,02	0,02	0,05	0,02	0,07
Switzerland	0,02	0,05	0,00	0,05	0,06	0,04	0,01	0,05	0,04	0,04	0,09
England and Wales	3,73	3,38	3,10	2,71	2,46	3,04	3,83	5,24	6,62	7,73	8,86
Scotland	6,15	5,16	4,96	4,15	4,28	4,76	4,38	4,26	4,28	4,30	4,93
Northern Ireland	4,69	4,59	3,11	3,65	2,47	3,23	2,39	3,52	4,36	3,59	4,37
Montenegro	0,49	0,49	0,32	0,48	0,00	0,16	0,00	0,00	0,32	0,00	0,00
Serbia	0,22	0,33	0,27	0,12	0,15	0,13	0,17	0,20	0,11	0,17	0,20

Sources: developed by the author.

Regarding the kidnapping indicator, Estonia, Croatia, Lithuania, Malta, and Montenegro had zero values in 2018. Switzerland, Czechia, Finland, Austria, etc., have the lowest estimates too. And the highest level of kidnapping is characteristic of Belgium, England and Wales, France, Germany, and Northern Ireland in 2018 (Figure 4). Besides it, in Croatia, there is a declining trend after decriminalizing drugs use in 2013.

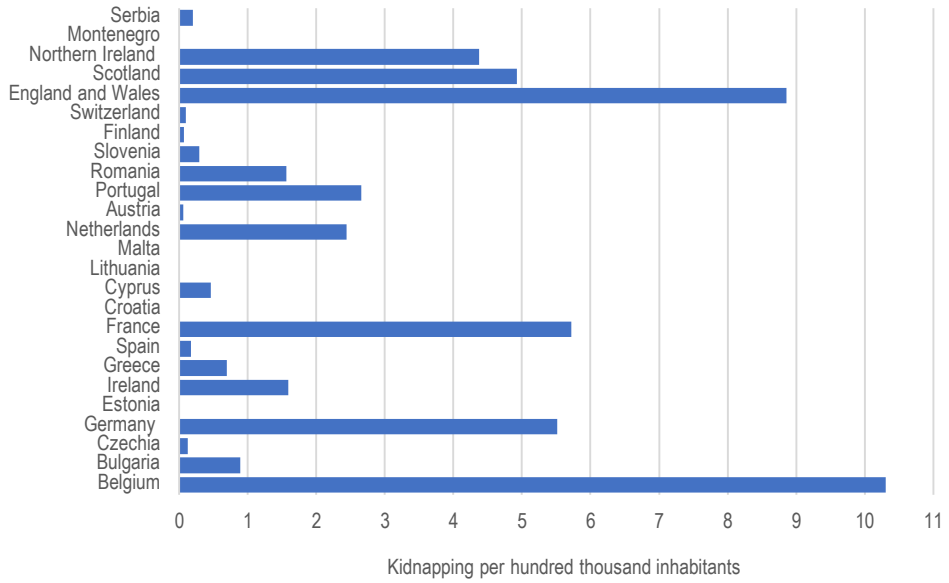

Figure 4. The dynamic analysis of kidnapping indicator in 2008–2018

Sources: developed by the author.

Table 6 presents the sexual violence data.

Table 6. Sexual violence (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	101,05	98,66	100,77	102,72	96,77	102,13	61,69	61,30	68,59	72,97	68,39
Bulgaria	9,96	9,72	9,38	8,81	9,36	8,68	8,42	8,37	7,74	9,19	8,16
Czechia	16,24	16,59	12,78	13,88	13,42	13,47	13,62	13,49	13,20	13,37	13,65
Germany	69,07	59,86	44,70	45,32	45,16	43,88	43,28	42,20	45,23	42,19	49,02
Estonia	20,02	19,02	13,35	13,54	18,71	18,18	15,12	21,60	20,59	19,69	22,44
Ireland	26,91	31,98	46,88	39,53	40,04	38,73	40,19	49,30	53,87	60,47	66,12
Greece	6,10	8,33	4,59	3,91	4,38	4,25	4,26	5,10	4,57	4,21	3,94
Spain	23,84	21,03	21,41	21,20	19,24	19,10	20,36	16,14	18,79	20,34	24,89
France	37,54	36,14	35,51	36,74	41,03	42,34	46,95	50,06	56,24	62,25	73,82
Croatia	17,74	15,41	9,23	8,81	8,02	13,51	14,22	14,32	16,13	11,46	13,18
Cyprus	12,49	9,79	9,64	5,60	3,83	2,77	2,21	2,48	2,83	2,34	3,36
Lithuania	11,45	11,37	16,36	17,33	14,68	8,58	10,77	9,00	7,20	7,94	7,80
Malta	19,62	19,95	21,98	16,63	19,64	22,31	18,10	24,22	19,54	16,95	19,55
Netherlands	63,97	62,14	33,00	31,16	29,08	26,34	25,49	24,61	27,89	28,19	30,21
Austria	50,37	46,02	41,86	47,25	48,05	44,72	41,90	40,57	50,53	48,48	50,16
Portugal	21,33	24,20	20,86	20,64	20,24	20,37	22,35	23,57	23,91	24,62	23,93
Romania	7,59	7,85	6,92	6,19	7,67	8,67	7,60	8,76	9,05	7,78	8,97
Slovenia	19,05	22,44	22,77	22,97	17,85	18,36	14,36	12,51	17,25	20,67	17,08
Finland	51,15	39,41	44,55	58,77	59,87	55,06	51,82	50,66	58,10	55,49	64,16
Switzerland	38,79	38,79	32,00	35,78	32,44	33,54	33,75	32,90	32,93	30,82	33,39
England and Wales	64,65	67,78	70,52	68,47	69,06	82,57	137,79	184,81	210,19	258,05	274,81
Scotland	86,98	92,97	99,72	118,02	126,91	152,52	160,26	173,76	186,92	214,75	233,68
Northern Ireland	100,37	99,04	103,83	101,68	102,20	117,87	140,53	157,62	171,35	179,79	193,02
Montenegro	6,50	7,62	7,11	3,87	3,87	4,03	4,99	4,18	3,54	3,70	3,70
Serbia	5,43	5,62	6,20	6,30	5,47	3,65	4,03	3,53	4,00	4,45	6,58

Sources: developed by the author.

The level of sexual violence is the highest in Scotland, England, Wales, and Northern Ireland, and the lowest – in Greece, Cyprus, Montenegro, Lithuania, and Serbia in 2018. Rape data are presented in Table 7.

Table 7. Rape (per hundred thousand inhabitants)

Countries	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	2	3	4	5	6	7	8	9	10	11	12
Belgium	30,29	29,31	30,52	30,88	30,69	29,97	28,51	28,75	30,09	31,11	29,25
Bulgaria	3,48	3,29	2,84	2,13	2,55	2,25	2,04	1,65	1,78	2	1,6
Czechia	5,11	4,6	5,6	6,44	6,37	5,6	6,36	5,67	6,15	5,65	6,14
Germany	8,87	8,92	9,44	9,4	10	9,2	9,09	8,65	9,64	10,07	10,91
Estonia	11,95	9,28	6,08	6,84	10,79	10,23	11,17	12,24	11,55	11,4	16,07
Ireland	7,42	8,05	10,28	9,75	9,97	8,52	10,35	14,24	14,73	17,47	20,45
Greece	2,07	1,92	1,93	1,55	1,51	1,35	1,23	1,12	1,44	1,45	1,46
Spain	5,34	4,44	3,39	3,24	2,73	2,78	2,66	2,65	2,69	2,98	3,64
France	16,06	15,29	15,63	16,01	16,68	17,03	18,44	19,28	22,22	25,03	29,38
Croatia	4,36	2,99	3,28	2,84	2,95	6,43	7,89	6,11	7,59	5,92	7,23
Cyprus	4,38	3,39	4,39	5,36	3,6	2,66	1,98	2,48	2,59	2,22	3,24
Lithuania	5,1	4,68	6,62	6,26	5,93	4,48	5,37	5,31	3,81	4,35	4,13
Malta	4,66	2,92	2,66	4,34	3,11	3,56	2,59	5,36	5,99	4,13	3,78
Netherlands	11,86	11,65	9,89	9,4	8,64	7,42	7,25	7,48	9,04	10,3	11,06
Austria	8,34	9,35	14,62	15,69	14,94	15,32	13,68	13,18	14,17	13,28	14,93
Portugal	2,98	3,57	4,01	3,54	3,56	3,29	3,59	3,61	3,24	3,96	4,09

Continued Table 7

1	2	3	4	5	6	7	8	9	10	11	12
Romania	4,92	4,93	4,18	3,64	4,45	4,89	4,39	5,11	4,76	7,05	7,49
Slovenia	2,84	3,89	3,08	2,68	2,82	2,57	2,13	2,04	1,6	2,03	2,03
Finland	17,26	12,39	15,29	19,33	18,68	17,97	18,51	19,06	21,14	22,62	25,27
Switzerland	8,06	8,65	6,97	7,01	7,15	7,1	6,83	6,46	7,06	7,35	7,38
England and Wales	23,98	27,39	28,65	28,67	29,05	36,56	51,4	62,28	71,59	92,29	99,48
Scotland	15,83	16,94	19	22,4	25,86	31,77	33,67	31,59	32,64	39,45	42,17
Northern Ireland	20,79	23,63	27,68	30,28	27,65	29,73	37,39	40,79	44,6	51	58,1
Montenegro	2,76	1,46	0,81	0,48	0,48	0,64	0,8	0,8	0,32	1,61	1,29
Serbia	1,67	1,51	0,99	1,09	1,18	1,95	1,86	1,6	1,48	1,58	1,76

Sources: developed by the author.

The highest value of rape indicator is in Scotland, England, Wales, and Northern Ireland, and the lowest – in Bulgaria, Greece, Montenegro, Serbia, and Slovenia in 2018. Sexual assault data are presented in Table 8.

Table 8. Sexual assault (per hundred thousand inhabitants)

Countires	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	70,76	69,35	70,25	71,84	66,08	34,16	33,17	32,54	38,50	41,86	39,14
Bulgaria	6,48	6,43	6,53	6,68	6,81	6,42	6,38	6,72	6,72	6,72	6,72
Czechia	11,13	11,99	7,18	7,45	7,05	7,86	7,23	7,79	6,91	7,59	7,40
Germany	60,20	50,94	35,26	35,92	35,16	34,68	34,19	33,55	35,59	32,12	38,11
Estonia	8,07	9,73	7,28	6,69	7,92	7,95	3,95	9,35	9,04	8,28	6,37
Ireland	19,49	23,93	36,59	29,77	30,06	30,21	29,84	30,02	32,48	35,47	37,04
Greece	4,02	6,41	1,68	1,61	1,83	1,70	1,75	2,39	2,44	2,08	1,69
Spain	18,50	16,59	18,02	17,95	16,51	16,32	17,69	13,49	16,10	17,36	21,24
France	21,49	20,84	19,88	20,72	24,35	25,32	28,51	30,78	34,03	37,22	44,44
Croatia	13,38	12,41	5,95	5,97	5,07	7,09	6,33	8,21	8,54	5,54	5,94
Cyprus	8,12	6,40	5,25	0,24	0,23	0,12	0,23	0,00	0,24	0,12	0,12
Lithuania	6,35	6,69	9,74	11,07	8,76	4,11	5,40	3,70	3,39	3,58	3,67
Malta	14,96	17,03	19,32	12,29	16,53	18,75	15,52	18,87	13,54	12,82	15,77
Netherlands	52,12	50,50	14,96	13,06	12,37	11,62	10,78	10,12	13,05	12,88	13,74
Austria	42,03	36,68	27,24	31,56	33,11	25,47	24,91	23,43	32,46	31,28	31,43
Portugal	18,35	20,63	16,85	17,10	16,69	17,08	18,77	19,95	20,67	20,66	19,84
Romania	2,67	2,93	2,74	2,55	3,21	3,72	3,21	0,40	0,50	0,73	1,47
Slovenia	16,22	18,55	19,69	20,29	15,03	2,38	2,33	1,45	2,08	2,08	1,60
Finland	33,88	27,02	29,26	39,44	41,19	37,09	33,31	31,60	36,96	32,87	38,89
Switzerland	30,14	30,14	25,03	28,76	25,29	26,43	26,92	26,44	25,87	23,47	26,01
England and Wales	40,67	40,39	41,87	39,80	40,01	46,01	61,07	71,82	79,39	95,29	100,17
Scotland	71,15	76,02	80,72	95,61	101,05	66,22	71,78	76,17	81,91	91,33	96,67
Northern Ireland	79,59	75,41	76,15	71,40	74,55	54,03	62,86	70,52	73,50	75,80	77,99
Montenegro	3,74	6,16	6,30	3,39	3,39	3,06	4,18	3,38	2,57	1,12	2,09
Serbia	3,76	4,10	5,21	5,21	4,30	1,68	2,17	1,88	2,52	2,87	4,83

Sources: developed by the author.

As for the sexual assaults, there is the same situation in the pantiliners of 2018 (Scotland, England, Wales, and Northern Ireland). The negative situation is in France, Finland, Ireland, and Germany. And the best (the lowest) results are in Cyprus, Slovenia, Romania, Montenegro, etc. It is appropriate to determine the relationship nature and strength of the indicators of unlawful acts involving controlled drugs or precursors and crime offenses causing health damage in selected countries and calculate the correlation coefficients with time lags from 0 to 3 years. Before that, it was checked whether the unlawful acts involving

controlled drugs or precursors indicator are subject to the normal distribution through the Shapiro-Wilk test (Table 9).

Table 9. The Shapiro-Wilk test results for the indicator of unlawful acts involving controlled drugs or precursors (checking the normal distribution)

W	V	z	Prob > z	W	V	z	Prob > z
Belgium				**Bulgaria**			
0.71894	4.551	3.148	0.00082 *	0.88945	1.790	1.094	0.13689
Czechia				**Germany**			
0.79618	3.300	2.392	0.00838 *	0.87820	1.972	1.289	0.09872
Estonia				**Ireland**			
0.93611	1.034	0.060	0.47593	0.85747	2.308	1.613	0.05339
Greece				**Spain**			
0.94149	0.947	-0.096	0.53818	0.91656	1.351	0.550	0.29100
France				**Croatia**			
0.57949	6.809	4.187	0.00001 *	0.73114	4.353	3.040	0.00118 *
Cyprus				**Lithuania**			
0.98417	0.256	-2.167	0.98490	0.98172	0.296	-1.959	0.97496
Malta				**Netherlands**			
0.80279	3.193	2.318	0.01024 *	0.93830	0.999	-0.002	0.50078
Austria				**Portugal**			
0.78317	3.511	2.533	0.00565 *	0.90521	1.535	0.793	0.21380
Romania				**Slovenia**			
0.84002	2.590	1.858	0.03160 *	0.88958	1.788	1.092	0.13739
Finland				**Switzerland**			
0.97217	0.451	-1.326	0.90755	0.87567	2.013	1.331	0.09163
England and Wales				**Scotland**			
0.96352	0.591	-0.895	0.81471	0.76667	3.778	2.703	0.00343 *
Northern Ireland				**Montenegro**			
0.79983	3.241	2.351	0.00936 *	0.85648	2.324	1.627	0.05183
Serbia							
0.81621	2.976	2.160	0.01537 *				

Note: * – outside the normal distribution

Sources: developed by the author.

Accordingly, if this factor indicator obeys the normal distribution ((Prob > z) > 0.05), the Pearson correlation coefficient is calculated. Instead, if this indicator is not subject to the normal distribution ((Prob > z) <0.05), the Spearman correlation coefficient is determined. The program STATA is used for calculations. Table 10 shows the corresponding results.

Table 10. The finding of the relationship's nature and strength of indicators of unlawful acts involving controlled drugs or precursors and crimes causing health damage with time lags for the period 2008-2018

Indicator	Time lag, years				Time lag, years			
	0	1	2	3	0	1	2	3
	Belgium				**Bulgaria**			
Intentional homicide	-0.4048	-0.1905	-0.7857	-0.3095	-0.7031	-0.6648	-0.3831	-0.1879
Assault	-0.7381	-0.6905	-0.3571	-0.1905	0.0235	0.1130	-0.0107	0.0483
Kidnapping	-0.7350	-0.1446	0.2410	-0.0964	-0.2963	-0.3118	-0.4346	-0.2836
Sexual violence	-0.5000	-0.4762	0.2381	0.4762	-0.5117	-0.3765	-0.0864	0.0851
Rape	-0.0714	0.0238	0.5476	0.6190	-0.5896	-0.5730	-0.4349	0.0364
Sexual assault	-0.1429	0.0238	0.5238	0.7381	0.4555	0.4872	0.6131	0.1405
	Czechia				**Germany**			
Intentional homicide	-0.5952	-0.5000	-0.7857	-0.7857	0.0028	-0.0495	0.2095	0.2604
Assault	-0.6905	-0.6667	-0.7857	-0.9524	-0.2948	-0.3410	-0.0497	0.2010

Continued Table 10

	0	1	2	3	0	1	2	3
Kidnapping	0.2036	-0.1198	0.1317	0.1078	0.0616	-0.8803	-0.9308	-0.8872
Sexual violence	-0.3571	-0.1429	-0.3095	-0.4048	-0.3563	-0.1506	0.3331	0.3568
Rape	-0.3333	-0.5714	-0.4048	-0.4286	0.6235	0.6033	0.6102	0.7470
Sexual assault	-0.1429	0.1905	-0.1667	-0.1429	-0.3950	-0.2236	0.1743	0.1511
	Estonia				**Ireland**			
Intentional homicide	0.0154	-0.2298	0.0313	0.2978	0.5995	0.5902	0.5904	0.5108
Assault	0.4232	-0.1512	-0.0136	0.3994	0.4621	0.1365	-0.1975	-0.5375
Kidnapping	0.1755	-0.5244	-0.2385	0.7070	-0.1345	0.4382	0.1414	-0.0781
Sexual violence	0.6171	0.4688	-0.2587	-0.3603	-0.6012	-0.5904	-0.5811	-0.8157
Rape	0.5050	0.3434	-0.2029	-0.3865	-0.5213	-0.6063	-0.6826	-0.8126
Sexual assault	0.3394	0.3187	-0.1715	-0.0770	-0.6147	-0.3872	-0.0601	-0.6910
	Greece				**Spain**			
Intentional homicide	-0.5685	-0.1491	0.4143	0.7057	0.7102	0.7213	0.5113	0.5146
Assault	-0.2226	-0.4411	-0.6384	0.0538	0.3173	0.3255	0.1863	0.0328
Kidnapping	-0.6513	-0.1819	0.6112	0.8478	0.5567	0.7405	0.9193	0.6439
Sexual violence	0.2756	0.2760	-0.2716	-0.4022	0.6326	0.0060	-0.3853	-0.6372
Rape	0.1475	0.4979	0.6836	0.8027	0.5528	0.2454	-0.3018	-0.7350
Sexual assault	0.3704	0.2793	-0.2559	-0.3558	0.5461	-0.0657	-0.3897	-0.6081
	France				**Croatia**			
Intentional homicide	-0.3374	-0.2651	0.0120	-0.3615	0.8144	0.7785	0.3333	0.0952
Assault	0.8051	0.7563	0.6831	0.1708	0.6946	0.7904	0.4286	0.2857
Kidnapping	0.8295	0.7319	0.6587	0.0976	0.6084	0.5704	0.6047	0.4536
Sexual violence	0.9762	0.9286	0.7857	0.5476	-0.4431	-0.8264	-0.5000	-0.2143
Rape	0.9762	0.9286	0.7857	0.5476	-0.6946	-0.7545	-0.0952	-0.2143
Sexual assault	0.9762	0.9286	0.7857	0.5476	-0.2395	-0.5868	-0.3810	0.0238
	Cyprus				**Lithuania**			
Intentional homicide	-0.1103	0.1597	0.0902	-0.6344	-0.8310	-0.6309	-0.5389	-0.5151
Assault	-0.8284	-0.6059	-0.5465	-0.2065	-0.6988	0.0767	-0.1638	0.2350
Kidnapping	-0.5948	-0.8319	-0.5254	-0.1786	-0.5215	-0.5222	-0.8300	-0.7391
Sexual violence	-0.6516	-0.7753	-0.6078	-0.6349	-0.3378	-0.6496	-0.6609	-0.7339
Rape	-0.2611	-0.5657	-0.8746	-0.6152	-0.2608	-0.5000	-0.6012	-0.4902
Sexual assault	-0.6907	-0.6967	-0.2850	-0.5139	-0.3517	-0.6766	-0.6636	-0.7849
	Malta				**Netherlands**			
Intentional homicide	0.6190	0.1429	-0.6429	-0.1190	0.6480	0.6153	0.5577	0.5885
Assault	-0.2143	-0.5476	-0.3333	0.4762	0.7440	0.5484	0.9485	0.9739
Kidnapping	-	-	-	-	0.9183	0.8624	0.8353	0.8994
Sexual violence	-0.0238	0.0476	0.1905	0.1905	0.7478	0.5567	0.3674	0.2288
Rape	-0.3095	-0.5238	0.0952	0.6429	0.2952	-0.0019	-0.2853	-0.3580
Sexual assault	-0.0476	0.1905	0.2619	0.0476	0.7262	0.5205	0.1328	-0.1000
	Austria				**Portugal**			
Intentional homicide	-0.4762	-0.2857	-0.0714	0.0238	-0.7888	-0.7453	-0.7168	-0.4504
Assault	-0.2857	0.0238	0.0952	-0.0952	-0.6089	-0.4764	-0.5405	-0.5837
Kidnapping	-0.4579	-0.2410	0.0482	-0.1928	-0.9203	-0.8807	-0.8940	-0.8652
Sexual violence	0.4286	0.5476	0.6190	0.7143	0.6831	0.5062	0.7801	0.6904
Rape	-0.6429	-0.6190	-0.3333	-0.1429	0.5714	0.4184	0.3714	0.5249
Sexual assault	-0.2619	0.0000	0.0714	0.1667	0.5958	0.4502	0.7441	0.6504
	Romania				**Slovenia**			
Intentional homicide	-0.6667	-0.5238	0.1429	0.4762	0.1505	-0.3348	0.6257	-0.2740
Assault	-0.8571	-0.4524	-0.1905	0.2381	0.4327	0.3129	0.0870	0.2711
Kidnapping	0.2619	0.4524	0.2857	-0.4048	-0.3588	0.3466	-0.5826	0.1903
Sexual violence	0.5476	0.3810	-0.1905	-0.1190	0.2116	0.1593	0.1732	-0.2059
Rape	0.7619	0.3333	0.4524	-0.0476	0.7287	0.0205	0.0563	0.2923
Sexual assault	-0.7425	-0.2156	0.2994	0.5868	0.3161	0.2519	0.3791	0.0637
	Finland				**Switzerland**			
Intentional homicide	-0.8148	-0.7457	-0.7912	-0.7713	-0.0251	-0.2502	-0.1784	0.1194
Assault	-0.8696	-0.8403	-0.8381	-0.8919	-0.8030	0.1120	0.6662	0.8106
Kidnapping	0.3914	0.0927	0.3258	0.0841	0.0735	-0.3593	0.4038	-0.1946

Continued Table 10

	0	1	2	3	0	1	2	3
Sexual violence	0.5653	0.7505	0.6140	0.1318	-0.3390	-0.5899	0.3491	-0.5459
Rape	0.8230	0.9626	0.8855	0.6490	-0.3293	-0.8086	-0.2359	-0.2095
Sexual assault	0.2658	0.4556	0.2468	-0.3041	-0.2599	-0.4493	0.3729	-0.4652
	England and Wales				**Scotland**			
Intentional homicide	-0.0347	-0.4298	-0.6898	-0.7543	-0.2651	-0.3735	-0.5302	-0.2771
Assault	-0.4103	-0.7981	-0.9540	-0.9614	-0.5476	-0.0476	0.5952	0.6190
Kidnapping	-0.6341	-0.8967	-0.9647	-0.9435	0.5150	-0.2156	-0.3713	0.1078
Sexual violence	-0.7598	-0.9294	-0.9607	-0.9180	0.2381	0.4524	0.5476	0.4524
Rape	-0.7320	-0.9235	-0.9665	-0.9229	0.4048	0.2857	0.1190	0.4048
Sexual assault	-0.7461	-0.9268	-0.9695	-0.9172	-0.8333	-0.2857	0.1905	0.4762
	Northern Ireland				**Montenegro**			
Intentional homicide	0.1429	0.1429	0.1429	0.1429	0.1218	-0.3570	-0.2427	0.0530
Assault	-0.8810	-0.8810	-0.8810	-0.8810	0.7287	0.8338	0.8832	0.5567
Kidnapping	0.5238	0.5238	0.5238	0.5238	0.8084	0.6410	0.6460	0.4171
Sexual violence	1.0000	1.0000	1.0000	1.0000	0.7302	0.7880	0.5877	0.2479
Rape	0.9286	0.9286	0.9286	0.9286	0.7205	0.2179	-0.3267	-0.5121
Sexual assault	0.5476	0.5476	0.5476	0.5476	0.4530	0.7536	0.6684	0.5961
	Serbia							
Intentional homicide	-0.2619	-0.6190	-0.6190	-0.1429				
Assault	-0.2857	-0.5238	-0.6190	-0.6905				
Kidnapping	0.4097	0.6145	0.2169	-0.2771				
Sexual violence	0.1190	0.2143	0.2619	0.5952				
Rape	0.1190	0.2143	0.2619	0.5952				
Sexual assault	0.0238	0.2381	0.3571	0.6190				

Sources: developed by the author.

This research supposes that the effect is insignificant when a correlation coefficient is 0 to 0,3. The strength of the relationship could be high or very high (coefficient is from 0,5 to 0,7 and from 0,7 to 1) and average (coefficient is from 0,3 to 0,5). The character of the relationship is negative or converse if a correlation coefficient is less than zero. And the character of the relationship is positive or direct if a correlation coefficient is more than zero. The results of dynamic analysis of the impact of drug decriminalization on the dynamic of crime offenses causing health damage or death showed that transition from crime approach to innovation approach with drug decriminalization causes decreasing the level of unlawful acts involving controlled drugs or precursors and crime offenses causing health damage or death. Also, considering the results of the significance level of correlation coefficients with lags 0-3 years, the following empirically substantiated conclusions were made:

– the impact of the unlawful acts involving controlled drugs or precursors on intentional homicide indicators is statistically significant in 21 out of 25 studied European countries. In particular, it is very high in Bulgaria, Croatia, Lithuania, Portugal, Scotland, and Finland without a time lag; in Spain and Serbia with a time lag of 1 year; in Belgium and Czechia with a time lag of 2 years; in Greece and England and Wales with a time lag of 3 years. It is high in Ireland, Malta, Netherlands, and Romania without a time lag; in Slovenia with a time lag of 2 years; in Cyprus with a time lag of 3 years. It is average in Austria without a time lag; in Montenegro with a time lag of 1 year; in France with a time lag of 3 years. In other countries, it is weak (Germany, Estonia, Switzerland, and Northern Ireland – 4 countries from a sample of 25 European countries). The character of this relationship is positive (direct) in 11 countries, including 5 countries with drug decriminalization, and it is negative (converse) in 14 countries, including 3 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on assault indicators is statistically significant in 23 countries from a sample of 25 studied European countries. In particular, it is very high in Belgium, France, Cyprus, Lithuania, Romania, and Northern Ireland without a time lag; in

Croatia with a time lag of 1 year; in Montenegro with a time lag 2 years; in Czechia, Netherlands, Finland, Switzerland, England and Wales, and Serbia with a time lag of 3 years. It is high in Portugal and Slovenia without a time lag, in Malta with a time lag of 1 year; in Greece with a time lag of 2 years, and in Scotland with a time lag of 3 years. It is average in Estonia and Ireland without a time lag, in Spain with a time lag of 1 year, and in Germany with a time lag of 2 years. In other countries, it is weak (Bulgaria and Austria— 2 countries from a sample of 25 European countries). The character of this relationship is positive (direct) in 11 countries, including 5 countries with drug decriminalization. On the other hand, it is negative (converse) in 14 countries, including 3 countries with drug decriminalization;

– the unlawful acts involving controlled drugs or precursors on kidnapping indicators is statistically significant in 23 out of 25 studied European countries. In particular, it is very high in Belgium, France, Netherlands, and Montenegro without a time lag; in Cyprus with a time lag of 1 year; in Germany, Spain, Lithuania and England and Wales with a time lag of 2 years; in Estonia and Greece with a time lag of 3 years. It is high in Croatia, Scotland, and Northern Ireland without a time lag; in Serbia with a time lag of 1 year; and in Slovenia with a time lag of 2 years. It is average in Austria and Finland without a time lag; in Romania and Ireland with a time lag of 1 year; in Switzerland and Bulgaria with a time lag of 2 years. In other countries, it is weak (Czechia), and the connection is not established in Malta (2 countries from a sample of 25 European countries). The character of this relationship is positive (direct) in 15 countries, including 6 countries with drug decriminalization. It is negative (converse) in 9 countries, including 2 countries with drug decriminalization;

– the unlawful acts involving controlled drugs or precursors on sexual violence indicators are statistically significant in 23 out of 25 studied European countries. In particular, it is very high in France, the Netherlands, and Northern Ireland without a time lag; in Croatia, Montenegro, Cyprus, and Finland with a time lag of 1 year; in Portugal, England, and Wales with a time lag of 2 years; in Ireland, Lithuania and Austria with a time lag of 3 years. It is high in Belgium, Bulgaria, Estonia, Spain, and Romania without a time lag, in Switzerland with a time lag of 1 year; in Scotland with a time lag of 2 years, and in Serbia with a time lag of 3 years. It is average in Czechia, Germany, and Greece with a time lag of 3 years. In other countries, it is weak (Malta and Slovenia – 2 countries from a sample of 25 European countries). The character of this relationship is positive (direct) in 15 countries, including 5 countries with drug decriminalization. In turn, it is negative (converse) in 10 countries, including 3 countries with drug decriminalization;

– the unlawful acts involving controlled drugs or precursors on rape indicator is statistically significant in 25 out of 25 studied European countries. In particular, it is very high in Northern Ireland, Montenegro, France, Romania, and Slovenia without a time lag; in Finland, Switzerland, and Croatia with a time lag of 1 year; in Cyprus, England, and Wales with a time lag of 2 years; in Germany, Ireland and Greece with a time lag of 3 years. It is high in Bulgaria, Estonia, Spain, Austria, and Portugal without a time lag; in Czechia with a time lag of 1 year; in Lithuania with a time lag 2 years; in Belgium, Serbia, and Malta with a time lag of 3 years. It is average in Scotland with a zero time lag and in the Netherlands with a 3-year time lag. The character of this relationship is positive (direct) in 15 countries, including 4 countries with drug decriminalization, and it is negative (converse) in 10 countries, including 4 countries with drug decriminalization;

– the unlawful acts involving controlled drugs or precursors on sexual assault indicator is statistically significant in 22 countries from a sample of 25 studied European countries. In particular, it is very high in France, Cyprus, Netherlands, Scotland, and Romania without a time lag; in Montenegro with a time lag of 1 year; in Portugal, England, and Wales with a time lag of 2 years; in Belgium, Ireland and Lithuania with a time lag of 3 years. It is high in Spain and Northern Ireland without a time lag, in Croatia with a time lag of 1 year; in Bulgaria with a time lag of 2 years; in Serbia with a time lag of 3 years. It is average in Germany, Estonia, and Greece without a time lag; in Finland with a time lag of 1 year; in Slovenia with a

time lag of 2 years; and in Switzerland with a time lag of 3 years. In other countries, it is weak (Czechia, Malta, and Austria – 3 countries from a sample of 25 European countries). The character of this relationship is positive (direct) in 15 countries, including 5 countries with drug decriminalization. It is negative (converse) in 10 countries, including 3 countries with drug decriminalization. The linear regression model was built to assess the influence of drug decriminalization on the dynamic of some criminal offenses causing health damage or death on the example of Croatia, where there was a transition to the model of drug decriminalization during the study period (2008–2018), in particular in 2013.

In addition to indicators of the dynamics of some criminal offenses causing health damage or death, the study introduced a dummy indicator (a dummy variable) of transition to the model of drug decriminalization. So, it is 1 point when drug decriminalization is established and 0 points when drug decriminalization is not applied. Based on the Croatia case, a value of dummy indicator on the level of 0 (2008–2012) and 1 point (2013–2018) was assessed. Figure 5 shows the linear regression model for Croatia to assess the impact of drug decriminalization (dummy) on the dynamic of intentional homicides (H).

Source	SS	df	MS	Number of obs	=	11
				F(1, 9)	=	9.07
Model	.408460909	1	.408460909	Prob > F	=	0.0147
Residual	.40523	9	.045025556	R-squared	=	0.5020
				Adj R-squared	=	0.4467
Total	.813690909	10	.081369091	Root MSE	=	.21219

H	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy	-.387	.1284888	-3.01	0.015	-.6776618	-.0963382
_cons	1.312	.0948953	13.83	0.000	1.097332	1.526668

Figure 5. The linear regression model for Croatia to assess the impact of drug decriminalization on the dynamic of intentional homicides in 2008–2018

Sources: developed by the author using the STATA software package.

The values of Prob> F = 0.0147 and R-squared = 0.5020 characterize the model adequacy. The coefficient describing the influence of drug decriminalization on the dynamic of intentional homicides is statistically significant (P> | t |) <0.05). The regression of the effect of drug decriminalization on the dynamic of intentional homicides (dummy indicator – D) is as follows:

$$H = 1.31 – 0,39 \cdot D \quad (1)$$

Thus, with the transition to the model of drug decriminalization in Croatia, the value of the intentional homicide indicator decreased by an average of 0.39 %. Figure 6 demonstrates the linear regression model for Croatia to assess the impact of drug decriminalization (dummy) on the dynamic of assaults (A).

Source	SS	df	MS	Number of obs	=	11
				F(1, 9)	=	18.28
Model	50.6385845	1	50.6385845	Prob > F	=	0.0021
Residual	24.93127	9	2.77014111	R-squared	=	0.6701
				Adj R-squared	=	0.6334
Total	75.5698545	10	7.55698545	Root MSE	=	1.6644

A	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy	-4.309	1.007829	-4.28	0.002	-6.588867	-2.029133
_cons	23.024	.7443307	30.93	0.000	21.34021	24.70779

Figure 6. The linear regression model for Croatia to evaluate the impact of drug decriminalization on the dynamic of assaults in 2008-2018

Sources: developed by the author using the STATA software package.

The values of Prob> F = 0.0021 and R-squared = 0.6701 characterize the model adequacy. The coefficient describing the influence of drug decriminalization on the dynamic of assaults is significant (P> | t |) <0.05). The regression of the effect of drug decriminalization on the dynamic of assaults (dummy indicator – D) is as follows:

$$A = 23.02 – 4,31 \cdot D \quad (2)$$

Thus, with the transition to the model of drug decriminalization in Croatia, the value of the assault indicator decreased by an average of 4.31 %. Figure 7 visualizes the linear regression model for Croatia to assess the impact of drug decriminalization (dummy) on the dynamic of kidnapping (K).

Source	SS	df	MS	Number of obs	=	11
				F(1, 9)	=	32.15
Model	.151898182	1	.151898182	Prob > F	=	0.0003
Residual	.04252	9	.004724444	R-squared	=	0.7813
				Adj R-squared	=	0.7570
Total	.194418182	10	.019441818	Root MSE	=	.06873

K	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy	-.236	.0416209	-5.67	0.000	-.3301529	-.1418471
_cons	.246	.030739	8.00	0.000	.1764634	.3155366

Figure 7. The linear regression model for Croatia to assess the effect of drug decriminalization on the dynamic of kidnapping in 2008–2018

Sources: developed by the author using the STATA software package.

The values of Prob> F = 0.0003 and R-squared = 0.7813 show the model adequacy. The coefficient describing the effect of drug decriminalization on the dynamic of kidnapping is statistically significant (P> | t |) <0.05). The regression of the influence of drug decriminalization on the dynamic of kidnapping (dummy indicator – D) is as follows:

$$K = 0.25 – 0,24 \cdot D \quad (3)$$

Thus, with the transition to the model of drug decriminalization in Croatia, the value of the kidnapping indicator decreased by an average of 0.24 %.

Conclusions. The results of dynamic analysis of the impact of drug decriminalization on the dynamic of crime offenses causing health damage or death allow stating that transition from crime approach to innovation approach with drug decriminalization causes decreasing the level of unlawful acts involving controlled drugs or precursors and crime offenses causing health damage or death. Besides, taking into account the results of the statistical significance level of the calculated Spearman/Pearson coefficients of correlation with investigated time lags, we come to the following empirically substantiated conclusions:

– the impact of the unlawful acts involving controlled drugs or precursors on intentional homicide indicators is statistically significant in 21 countries out of 25 studied European countries with lags 0-3 years. The relationship's character is direct in 11 countries, including 5 countries with drug decriminalization; it is converse in 14 countries, including 3 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on assault indicators is statistically significant in 23 out of 25 studied European countries with a 0-3-year time lag. The relationship's character is direct in 11 countries, including 5 countries with drug decriminalization; it is converse in 14 countries, including 3 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on kidnapping indicators is statistically significant in 23 countries out of 25 studied European countries with a time lag from 0 to 3 years. The character of this relationship is direct in 15 countries, including 6 countries with drug decriminalization. It is converse in 9 countries, including 2 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on sexual violence indicators is statistically significant in 23 out of 25 studied European countries with a time lag from 0 to 3 years. The character of this relationship is direct in 15 countries, including 5 countries with drug decriminalization; it is converse in 10 countries, including 3 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on rape indicators is statistically significant in 25 out of 25 studied European countries with a time lag from 0 to 3 years. The character of this relationship is direct in 15 countries, including 4 countries with drug decriminalization; it is converse in 10 countries, including 4 countries with drug decriminalization;

– the impact of the unlawful acts involving controlled drugs or precursors on sexual assault indicators is statistically significant in 22 out of 25 studied European countries with a time lag from 0 to 3 years. The character of this relationship is direct in 15 countries, including 5 countries with drug decriminalization; it is converse in 10 countries, including 3 countries with drug decriminalization.

As a result of building linear regression models for Croatia, where there was a transition to the model of drug decriminalization during the study period, there is empirical confirmation and formalization of the impact of drug decriminalization on the dynamic of some criminal offenses causing health damage or death, on example, intentional homicide, assault, and kidnapping. It is empirically justified that with the transition to the model of drug decriminalization in Croatia, the value of the intentional homicide indicator declined by 0.39 % on average. The value of the assault indicator declined by 4.31 % on average. In turn, the value of the kidnapping indicator decreased by an average of 0.24 %. It is substantiated that drug decriminalization is an important factor in reducing the health damage from crime. Besides, drug decriminalization as an innovative approach would also deliver better economic and social outcomes.

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Інновації в менеджменті охорони здоров'я: декриміналізація наркотиків для зменшення шкоди здоров'ю від злочинності

У статті висвітлено особливості легалізації наркотиків як потенційний інноваційний підхід до попередження та запобігання злочинності та насильства, а також покращення системи охорони здоров'я. Автором наголошено, що сучасний підхід до кримінального правосуддя у сфері наркоманії є недостатньо ефективним, попри те, що криміналізація значно впливає на зменшення шкоди від незаконного обігу наркотиків. Вживання наркотичних засобів залишається широко розповсюдженим явищем, яке завдає значної шкоди суспільству та окремій особі. У рамках статті автором виділено низку короткострокових і довгострокових наслідків впливу злочинності та насильства на стан здоров'я. При цьому Всесвітня організація охорони здоров'я стверджує, що рівень вживання наркотиків не залежить від ефективності законодавства у сфері обігу наркотичних засобів. Таким чином, актуальним є пошук сучасних можливостей та розробка нових методів запобігання злочинності, зокрема, декриміналізації наркотиків. Метою статті є визначення впливу декриміналізації вживання наркотичних засобів на зменшення шкоди здоров'ю через учинення злочинів в контексті впровадження інноваційного менеджменту в секторі охорони здоров'я. Відповідно до мети дослідження автором проведено порівняльний аналіз низки політик у сфері легалізації наркотиків, зокрема: декриміналізація вживання та зберігання всіх незаконних наркотичних засобів (з контролем їх легального постачання), легалізація вживання та постачання канабісу тощо. Крім того, у роботі здійснено динамічний аналіз даних для різних видів злочинів, таких як незаконні дії, пов'язані з контрольованими наркотиками чи прекурсорами, умисне вбивство, напад, крадіжка, сексуальні домагання та інші насильницькі злочини у двох групах країн – із кримінально-правовим та інноваційним підходом до охорони здоров'я (включаючи декриміналізацію наркотиків). До країн другої групи, які декриміналізували вживання та зберігання наркотиків для особистого користування та інвестували в програми зменшення шкоди, входять Португалія, Швейцарія, Нідерланди, Чехія. Емпіричне дослідження проведено на основі панельних даних, сформованих для вибірки з 25 європейських країн за 2008-2018 рр. (термін, обмежений 2018 р., визначається наявними даними статистичної служби Європейського Союзу, Всесвітньої організації охорони здоров'я, Управління ООН з наркотиків, баз даних про злочинність тощо). За результатами кореляційно-регресійного аналізу доведено, що декриміналізація наркотиків є важливим фактором зменшення шкоди здоров'ю від злочинності.

Ключові слова: вплив злочинності на здоров'я, декриміналізація наркотиків, зниження злочинності, інноваційний підхід, кримінально-правовий підхід, легалізація наркотиків, менеджмент охорони здоров'я, насильство, підхід до охорони здоров'я, шкода здоров'ю від злочинів.