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Impulsivity in sexual offenders. New ideas or back to basics?

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Summary

Despite the fact that the group of sexual offenders remains a population which is still difficult to study, the results of current research are considered novel and interesting. Surprisingly, the very old descriptions applying to paraphilia, which is considered to be one of the reasons of sexual offences, appear to be accurate, especially in the context of similarities between impulsivity and pathologic sexual behaviors. Notably, the nomenclature concerning impulsivity enables a specific and reasonable description of behaviors associated with sexual offences. Moreover, the results of research studies show that it is the lack of inhibition, not pathologic arousal, which is the most important factor in the pathogenesis of forbidden sexual behaviors. In addition, it has been shown that behavioral manifestations of impulsivity (substance abuse, suicide attempts) appear commonly in sexual offenders. Mutual relationships between alcohol drinking, suicide attempts, history of child sexual abuse and sexual offences, both in symptomatologic and etiologic aspect, raise a suggestion that all these phenomena may share a common background of poor inhibitory control.

Key words: impulsivity, alcohol dependence, sexual offenders

Decision-making – definitions

Impulse control deficits and impulsivity are considered to be important symptoms of many psychiatric disorders. Raising interest and recent studies have allowed to create a better, more comprehensive definition of this feature and description of its different determinants and dimensions.

Impulsivity is defined as "a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions" [1]. Daruna and Barnes [2] point for behaviors that are premature, risky, unplanned and inadequate to situation. Other definitions underlie the significance of specific inability to postpone gratification and choosing immediate, albeit smaller reward [3]. Whiteside and Lynam [4] in the 4-factor "UPPS" Impulsive Behavior Scale distinguish 4 domains of impulsivity: U – *urgency*, P – lack of *premeditation*, P – lack of *perseverance* and S – *sensation seeking*. Moeller et al. emphasize that impulsive action is too quick

for proper evaluation of its consequences and is somehow „out of conscience" [1]. According to more poetic definition of Loewenstein, impulsivity may be described as a *„lost chain between knowledge and action"* [5].

In recent studies at least two types of impulsivity have been distinguished: *behavioral* and *cognitive*. Behavioral impulsivity is associated with inability to stop reaction that has already been started; cognitive impulsivity - with inability to predict consequences of someone's behavior [6]. Behavioral impulsivity is thought to be associated with impulsive action, whereas cognitive impulsivity – with impulsive decisions. Importantly, these two are suggested to be independent and differently determinated phenomena, but use of this distinction has not been fully adopted in research studies.

In addition influence of attention („*attentional impulsivity*" - lack of ability to evaluate the circumstances of the situation) [7] and emotions („*emotional impulsivity*" underlining the significance of emotional states in decision making) on impulsive decision making has been described

Recently, more and more attention is paid to the necessity to distinguish not only behavioral and cognitive components of impulsivity, but also impulsivity as a state-related and trait-related phenomenon [8]. It has been shown that impulsivity may be a permanent characteristic of personality, but may also change in reaction to different external stimuli. Among these stimuli a significance of stress and alcohol abuse have been accentuated [9]. The mechanism of impulsive behavior in this, dynamic understanding, would be a temporary imbalance of neurotransmitters responsible for nerve cell stability and analysis of external stimuli. Particularly, the inhibition of frontal lobes by noradrenergic activation (stress, alcohol, substances) may reveal behaviors, which are considered to be of instinctive nature [9].

Surprisingly, also in non-medical understanding of "impulsivity" some, possibly unconscious, references to instinctive behaviors can be found. In dictionary definitions, "impulse" is defined as "drive". "Impulse" is also a synonym of a vector measure called "drive".

Decision making in sexual offenders

Sexual offenders – epidemiology

According to the data of Polish police <www.policja.pl> over the last 5 years (2007-2011) almost 47 thousand of people have been harmed as a result of crimes against sexual freedom (art. 197 – 204 of penal code). Most of the group comprised juveniles (over 40 thousand), mostly before 15 years of age. Basing on the data from 2008 a statistical portrait of a person suspected of a sexual crime was proposed. It has been observed that these are usually accountable men, known by a victim, (even 80% of crimes against children), unemployed. In 7% of cases, the perpetrators were previously convicted because of a similar crime.

The data from the police report from 2009 indicate that in the group of 950 individuals accused of a rape, 31% were acting under the influence of alcohol. Even 43% of all accused were previously convicted (124 persons because of sexual crimes, 281

because of other offences). In 2011 the most frequent legal proceedings concerned pedophilic child molesting (art. 200 of penal code); the number of harmed children was 5086. Rapes were the second most common sexual offence (art. 197 of penal code) with over 1200 victims.

In conclusion, pedophilic child molesting and rapes are most frequent sexual crimes, affecting the highest number of victims. Therefore, the further part of the paper will concern these two groups of sexual offenders.

Sexual offenders – general characteristics

According to the type of motivation of forbidden action, sexual offenders may be classified as preferential (having a diagnose of disorder of sexual preference - paraphilia, for example pedophilia) and non-preferential, who commit sexual crimes as a result of other psychiatric disorders, like alcohol dependence, personality disorders, or mental illness [10].

Epidemiologic data suggest that only 10-30% of sexual crimes are committed by individuals with paraphilia. This observation was emphasized by Hans Giese, who wrote that "*there are many pathologic sexual behaviors, but only few sexual deviations*" [11]. Hans Giese described primary symptoms of paraphilia: overwhelming by erotic sensations, an increase of frequency of sexual behaviors with concurrent decrease in satisfaction, promiscuity and anonymity in sexual relationships, extended fantasies, variety and subtlety of sexual behaviors and sexual anxiety [10]. In addition, paraphilic behaviors exceed the standard of partnership, because by focusing on deviant needs, they lead to objectification of the partner.

Disorders of sexual preference are diagnosed according to the criteria of ICD-10 (*International Classification of Diseases*) or DSM-IV (*Diagnostic and Statistical Manual*). In classification accepted by WHO (World Health Organization) which is used in Poland, the diagnostic criteria include recurrent sexual urges and fantasies involving unusual objects or activities lasting for at least 6 months. An individual suffering from paraphilia acts on the urges or is markedly distressed by them.

Pedophilic child molesters – general characteristics, diagnostics criteria.

The division into preferential and non-preferential sexual offenders overlaps with dichotomic regressive-fixative classification of pedophilia, proposed by Groth and Birnbaum in 1978. The fixated offender prefers as a sexual object individuals without tertiary sex characters, usually commits crimes against non-related children and is characterized by high risk of recidivism. As for regressive offender, the sexual behaviors are the result of difficulties in initializing sexual contacts with mature individuals. The victims in this case are often members of the family, also in incestuous relation. In comparison to fixative offenders, the regressive offenders more often experienced the sexual relation with mature partners [12].

Pedophilia is one of the types of disorders of sexual preference. Its specific diagnostic criteria include "a persistent or a predominant preference for sexual activity with

a prepubescent child or children". In addition the person has to be at least 16 years old and at least five years older than the child or children.

Rapists – general characteristics

The sexual offence in the form of rape may be motivated by sexual desire (sexual motivation), or other deficits (non-sexual motivation). Two motivations can be also present at the same time.

The sexual motivation may result from deviant needs, including raptophilia. In raptophilia sexual arousal is dependent on the surprise attack and continued violent assault on a non-consenting stranger. Raptophilia is associated with intensive denial of sexual needs. Therefore, at the moment of initiation of the act, extreme lack of control, lack of the ability of foreseeing the consequences of the behavior and lack of ability to delay gratification may appear. The raptophilic act usually lasts not long and is associated with using violence, which is adequate just to overcome the defense of the victim. The harms of the body of the victim are therefore not deliberate and rather benign.

Usually rapes are not planned. It is suggested that some behaviors may increase the probability of such offence. Alcohol drinking and being in isolated places are considered risk factors. However, considering lack of planning, rapes may happen also in public place, although the risk for the perpetrator for being caught is high.

The rapes that are a manifestation of sadism have a different course. Sadism is a kind of paraphilia, in which the sexual satisfaction is associated with the feeling of power and control over the victim, also with the act of harming and humiliation. The sadistic behaviors are elongated in time, the harms are deliberate and the force which is used is inadequate in comparison to the defense of the victim. Therefore, the injuries of the body of the victim are serious.

Rapes "in the service of other deviances" can differ between each other, depending on individual personality features of the perpetrator and behaviors preferred by him. The rapes with non-sexual motivation are aimed at realization of non-sexual needs. For example, this may be a revenge on women for experienced pain, the feeling of power or reaction on severe stress [13].

Impulsivity in sexual offenders

The notion "impulsivity" is widely used in literature concerning sexual preferences. However, the term is generally used in colloquial meaning, without defining it and without taking into consideration the division into behavioral and cognitive domains. The factors potentially contributing to the level of impulsivity are not analyzed either.

Clinical observations show that in sexual offenders behaviors perfectly matching the definitions of impulsivity may be observed: behaviors without weighing its consequences (for the offender, but also for the victim!), acting without analyzing the information from the surrounding (without choosing the place), acting to reach

immediate reward, despite inevitable punishment in future. Finally these behaviors are of drive nature.

Kazimierz Imieliński presenting the theory of Schorsch in 1975 distinguished two types of sexual deviations: "impulsive" and "progressive". In progressive type three main elements may be observed: "*disintegration of sexuality and personality*", "*lack of satisfaction in deviant acts*" and "*the need of punishment*" after the deviant act. The basic of progressive type is an intrapsychic conflicts, causing permanent distress and "isolation" of sexuality, which starts to live its own life.

In an impulsive type, the deviant needs remain hidden and denied, until sudden loss of control in certain propitious circumstances (alcohol intoxication, stressful situation, strong emotions). In this type, contrary to progressive one, no intrapsychic struggling appears. Such behaviors are characterized by lack of planning, they are rapid and are afterwards considered alien, impossible to understand and to accept.

This old description is surprisingly similar to most recent definitions of impulsive behaviors. Particularly, a clear discrepancy between intentions and results (observed especially in rapists) is emphasized in literature concerning impulsivity. Discrepancy, which is associated with lack of planning or foreseeing the consequences of the behavior. Importantly, in sexual offenders all crime situations often appear in the same way, which is also in agreement with another characteristic of impulsivity - lack of sensitivity to punishment [6], manifested by repeating behaviors which have been punished, or at least were not rewarded [6, 10].

Similarly to impulsivity, risk factors of recidivism in sexual offenders may be divided into static and dynamic predictors [14]. The factors mentioned before which trigger impulsive behaviors (stressful situations, alcohol drinking) are also considered to be dynamic risk factors of recidivism in sexual offenders. Among static predictors alcohol dependence and antisocial personality (associated with high levels of impulsivity) are specified.

These clinical observations, concerning the significance of impulsivity in rapists and pedophilic child molesters have been proved by results of studies applying to anatomic and neurobiological background of behavior in sexual offenders.

Anatomic background of decision-making in sexual offenders

In a recent German study by Schiffer and Vonlaufen (2011), sexual offenders (child molesters) appeared to be significantly more impulsive in Go/No-go test (evaluating behavioral impulsivity) not only in comparison to healthy controls, but also to perpetrators of non-sexual crimes. Interestingly, there were no significant difference between non-sexual offenders and healthy controls. These results underlie the significance of impulsivity and lack of inhibitory control in sexual offences [15]. They also demonstrate the previously described association between impulsive and instinctive (sexual) behaviors. The mechanism which cannot be seen in other types of crimes.

Interestingly, the only significant difference between the group of pedophilic child molesters and the perpetrators of non-sexual crimes was observed in inhibitory control tests in which the ability to stop reaction was evaluated. The authors conclude

that these results confirm the significance of frontal lobe dysfunction (especially the orbitofrontal cortex) in the pathogenesis of sexual crimes. These dysfunctions were also reported in neuroimaging studies [15].

It has been observed that the CNS (central nervous system) activation after exposition to preferred sexual visual stimuli is similar in healthy individuals (when exposed to heterosexual stimuli) and in pedophilic patients (when exposed to pedophilic stimuli). These reactions present a hypothetic model of reaction, manifesting a sexual arousal in reaction to presented stimuli [16, 17]. For several years different studies were aimed at identifying specific characteristic of central nervous system associated with paraphilia. Identification of such specific features would be of great importance in explaining the pathogenesis of the disorder. In 2007 Schiffer et al., using functional magnetic resonance studied 18 pedophilic patients and 24 healthy volunteers. In pedophilic individuals the decreased volume of grey matter in ventral part of the striatum (to *nucleus accumbens*), orbitofrontal cortex and cerebellum was observed [18].

Moreover, other study of Schiffer et al. from 2008 revealed that in healthy, heterosexual individuals similar activation was observed when exposed to pedophilic or heterosexual stimuli as in the group of pedophilic child molesters. The only difference concerned activation in orbitofrontal cortex, which appeared in the healthy controls but did not show up in the group of patients with the diagnosis of pedophilia. The activation of orbitofrontal cortex is not associated with sexual arousal, but confirms the process of information processing and analysis of stimuli. This data confirms that in pedophilic child molesters' brain regions responsible for weighing the consequences of someone's behavior (cognitive impulsivity), sensitivity to punishment and behavioral inhibition are inactive, therefore the instinctive and impulsive behavior may appear [16].

These results present an important perspective that not lack of activation but lack of inhibition is the clue to understand pathogenesis of pedophilia.

The theoretical basis and the general practical model was described by Logan and Cowan (1984), who claimed that the processes of activation and inhibition are independent. In this model the process of inhibition has to be started early enough to "catch" the activating impulse.

Sexual offences, substance dependence and suicide attempts as manifestations of impulsivity, the concept of Hans Giese

Although authors more and more frequently reach for objective tools of direct evaluation of impulsivity, most of the studies investigates the behavioral manifestations of impulsivity. In case of sexual offenders only a few studies were based on direct measures of impulsivity.

The group of sexual offenders, probably because of its specificity and difficult accessibility remains practically unstudied. Significantly, conceptual similarities between paraphilia and addictions in the context of deficits in impulse control were described already in 1976. Hans Giese wrote that perversion is associated with "*limitation and deficiency*" in functioning, independent on the variety of sexual desires and fantasies. Giese wrote that in individuals with sexual preference disorder may be characterized

by "*lack of freedom similar as in drug dependence*". Moreover, Giese emphasized that perverse behaviors "*evolve into compulsory, stereotypical and automatic acts*", exceeding successive limits, becoming more and more destructive, because of "*full of tension internal struggling, associated with the feeling of guilt and remorse*" or "*hostile attitudes leading to the conclusive suicide*" [11].

These theses need to be translated into modern terminology and verified by critical evaluation and evidence based science.

1. "lack of freedom similar as in drug dependence"

It has been showed that psychiatric disorders associated with high levels of impulsivity (antisocial personality, borderline personality, bipolar disorder, attention deficit hyperactivity disorder) are considered as risk factors of developing alcohol dependence as well as its severe course [19]. Interestingly, the same disorders are suggested to be predictors of recidivism in sexual offenders [14, 20].

Substance use is more often associated with rapes than pedophilia. According to different studies 40-90% of rapists were alcohol intoxicated at the moment of crime, and 30-40% of pedophilic child molesters were intoxicated [21].

These results may be explained by the fact that ethanol increases the level of impulsivity. Several studies reported increased impulsivity during intoxication or withdrawal from alcohol, with observed decrease during abstinence [22]. In alcohol intoxication the inactivation of frontal lobes may lead to loss of control over action, and in withdrawal impulsive behaviors may result from hyper activation of sympathetic (noradrenergic) system. In the study by Finn et al. [23] the increase of impulsivity level was observed after alcohol drinking, however only in individuals with poor working memory [23]. According to Dougherty et al. [22], alcohol intoxication leads to revelation of impulsive behaviors, which are hidden in the state of sobriety.

Wormith (1988) using penile pletysmography (PPG) showed in the group of healthy controls that alcohol decreased the reaction to sadistic stimuli, but in the group of rapists such reaction was not observed. Notably, when rapists after alcohol drinking were asked to suppress genital reaction, the sexual arousal registered by PPG was stronger for sadistic stimuli in comparison to stimuli without violent scenes. Other analyses showed that rapists with lower IQ reacted stronger (regardless of kind of stimuli) under the influence of stimuli. In subjects with higher IQ alcohol did not influence the reaction [24]. These results are consistent with mentioned earlier results described by Finn et al. applying to working memory [23] and with results of Polish study in the group of alcoholics. In this study education has been shown to decrease the level of cognitive impulsivity as measured by Barratt Impulsiveness Scale [25].

The next issue concerns chronic use of alcohol by sexual offenders. In the study by Peugh and Belenko (2001) two thirds of sexual offenders had a diagnosis of harmful use or alcohol dependence, and were under the influence of alcohol while committing a crime [21].According to the results of different studies, 40-90% of rapists and 30-40% of pedophilic child molesters acted under the influence of different kind of substance [21]. Hill et al. showed that almost 50% of sexual murderers met the criteria of alcohol

use disorders according to DSM-IV, and 10% used other substances [26]. Recent review (2011) concerning substance dependence in sexual offenders shows that 9,4-85,4% of individuals used more than once drug. Among pedophilic child molesters 5,3% had a history of cocaine use, and 14% a history of at least two substances [27]. In the study of Galli et al. (1999) 36% of adolescent child molesters met criteria of harmful use or addiction to cannabinols [28].

According to Raymond et al. (1999) almost 40% of preferential pedophilic child molesters were diagnosed with a disorder associated with cannabinols use; 4,4% had a history of opioid use; 17,8% used cocaine; 2,2% - hallucinogens; 6,7% - other substances and about 9% - more than one substance [29]. Substance use is reported mostly in non-preferential sexual offenders [30].

2. „evolve into compulsory, stereotypical and automatic acts"

Addressing this thesis of Giese it is important to mention two diagnostic criteria of alcohol dependence according to ICD-10: "persisting with alcohol use despite clear evidence of overtly harmful consequences" and "difficulties in controlling alcohol - taking behavior".

In the literature concerning sexual preference disorders "lack of self control" is often underlined. In the group of pedophilic child molesters a tendency towards spontaneous, impulsive actions and decisions was observed. Similar factors were shown in rapists [31], for whom a clear discrepancy between intentions and results, typical for impulsive behaviors, has been described.

However, substance use is not the only trigger of impulsive behaviors. Stressful situations, in which the activity of noradrenergic system is observed, are the other, important factor. The patomechanism includes activation of noradrenergic *locus coeruleus*, and, as a result, the inactivation of control functions of the frontal cortex. This, physiological reaction in life – threatening situations (the necessity of immediate reaction), may therefore result in, sometimes pathologic, impulsive behaviors [9]. In psychological understanding of the described sequence of events the significance of anxiety is also emphasized. In the model of Kagan it is the anxiety and low self-esteem that mediates stressful situation and impulsive behavior [32].

In several studies the association between mood, stress and sexual activity was confirmed. Although the direct association between depression or anxiety disorders and recidivism in sexual offenders was not revealed [20], commonly the significance of sexual behaviors in reducing tension is underlined. The experience of tragedy, interpersonal conflict, anger or humiliation may lead to escalation of perverse sexual fantasies and therefore increase the risk of sexual offence [31].

3. „limitation and deficiency"

Also here, it is important to mention the ICD-10 criteria of alcohol dependence [33], saying about "progressive neglect of alternative pleasures or interests because of alcohol use, increased amount of time necessary to obtain or take alcohol". However,

the analysis has to be extended for emotional functioning of alcoholics and sexual offenders.

Lack of ability to recognize and identify own emotional states is the main part of one of the most important etiologic concepts of sexual offenses of Marshall and Barbaree [34]. The theory is based on underlining the empathy deficits, as manifested by lack of the ability to understand the perspective of the victim or neglecting (wrongly interpreting) his/her emotional states, associated with sexual abuse. The results of the studies addressing this issue show that the level of empathy is negatively correlated with antisocial structure of personality [34].

On the other hand, it is suggested that the perpetrator's ability to adopt the victim's perspective without considering its emotional states may facilitate the act of sexual crime.

The mutual relationships between different components of empathy and sexual offenses remain an important and still unsolved issue in the discussion on the etiology of sexual offenses.

Also in alcohol dependent patients the ability to identify and constructively process own feelings is emphasized. The construct describing the deficit of such ability is alexithymia, which appears in 50-78% of alcoholics in comparison to 10-19% in general population. Also, a linear correlation between alcohol use and alexithymia was reported [35].

4. „leading to the conclusive suicide"

Suicide attempt remains the most important symptom of impulse control deficits [36]. According to Rzewuska suicide attempts results from two psychopathological states: impulsivity and suicidality. The association between impulsivity and frequency of suicide attempts was confirmed in several studies [37, 38]. In the Polish study in the group of alcohol dependent individuals, higher level of behavioral impulsivity was associated with the lifetime history of impulsive suicide attempts, in comparison to patients with the history of non-impulsive suicide attempt. Notably, even 62 % of all suicide attempts in the study were impulsive, and 68% were made under the influence of alcohol [39].

Moreover, among patients confirming at least one lifetime suicide attempt 14,6% were sexually abused before 18 years of age. Among patients denying a history of suicide attempt -5,6%. The difference was statistically significant (data not published).

It is hypothesized that it is the impulsivity which is a link between the experience of sexual abuse and suicide attempt [40]. In Polish studies a significant association between impulsivity and high level of impulsivity was also revealed [25].

In patients with sexual preference disorder the risk of suicide attempt has not been studied thoroughly. However, Pritchard and King (2005) observed that the index of completed suicides in individuals convicted only for sexual crimes against children was 183 (!) times higher than in general population and 15 times higher than in perpetrators, who, apart from sexual crimes were sentenced for other kinds of crimes.

In the study of Jeglic et al. from January 2013, 14% of all sexual offenders had a lifetime history of at least one suicide attempt. In this group no significant differences between pedophilic child molesters and rapists was observed [41]. The results of recent, large epidemiologic study in Danish population confirmed that suicide attempts were significantly more frequent in individuals with paraphilia than in general population [42].

Neurobiological aspects of sexual offences

In the group of patients with disorder of sexual preference no methodologically correct, neurobiological studies have been conducted so far. However, it is believed, that the same neurotransmitters which are associated with impulsivity are the most important ones in the pathogenesis of sexual offences. Current studies indicate that the serotonin system is the clue to understand the neurobiology of impulsive behaviors. Notably, it has been shown that serotonin may exert its effects on impulsivity through dopamine and glutamate, as well as GABA neurotransmission [43].

As far as the sexual activity and control of sexual behaviors are concerned, a lot of attention is paid to dopamine, which regulates the physiological course of sexual reaction, but also influences the feeling of desire and the frequency of sexual intercourses by affecting both: motivation and realization [34].

The feeling of pleasure and satisfaction from sexual intercourse has been associated with the activation of dopamine transmission in *nucleus accumbens.* Among patients with pedophilia both increased activity of *nucleus accumbes* and decreased dopamine activity was reported. In animal studies, the destruction of *nucleus accumbens* led to significant increase in the level of impulsivity [44]. Generally, low level of dopamine is believed to increase the occurrence of risk (impulsive) behaviors in order to supplement the "deficit of pleasure" [43]. This mechanism is often described as one of the most important in the etiology of substance dependence.

This, described heterogeneity in the influence of dopamine on pathologic sexual behaviors is consistent with observations applying to impulsive behaviors. Generally it is believed that it is low dopamine activity which predisposes to impulsive behaviors [44], However in patients with ADHD (Attention Deficit Hyperactivity Disorder) stimulating drugs (amphetamine), increasing dopamine activity help to decrease the level of impulsivity. On the other hand, in other studies on different groups of patients, amphetamine was shown to increase the level of impulsivity [45]. Therefore, it is suggested that anti – impulsive effect of amphetamine depends on the current activity of central nervous system and applies only to individuals (also animals) with baseline high level of impulsivity [45].

In addition, mutual relationships between dopamine, testosterone and estradiol have been investigated. Interestingly, no significant association between level of testosterone and aggressive sexual behaviors has been reported so far in the context of pedophilia or other types of disorders of sexual preference [34].

As for serotonin, a few studies reported association between this neurotransmitter and pedophilia. However, all conclusions concerning associations between neurotransmitters and sexual offences remain based mainly on theoretical inference [34].

Genetic aspects of sexual offences

To date, there have been no studies concerning heritability of paraphilia or its genetic background. However, according to the literature 40-93% of sexual offenders experienced some kind of sexual abuse [34]. Two hypotheses concerning the influence of child sexual abuse on aggressive acts and pathologic realization of needs in the period of adulthood are considered. The biological concept concentrates on neurobiological functional disturbances caused by traumatic childhood event. As a consequence, the cognitive and emotional deficits may appear. These kinds of deficits may be manifested later in life by impulse control disorders, by difficulties in predicting the consequences of the behavior and modify the pattern of sexual behavior.

Although this mechanism has not been explored in the context of sexual offenders, the epigenetic mechanism (described thoroughly for serotonin transporter gene) has to be mentioned. This mechanism is associated with the modulation of gene expression by environmental factors [46]. Particularly, for serotonin transporter gene (*slc64*) a significant association between phenotype of low activity of the transporter and the history of traumatic childhood events was described [46]. The phenotypic manifestation of low serotonin activity (depressive and anxiety disorder) [46, 47] was observed in individuals with specific genotype (s/s in promoter region) who experienced traumatic life events (sexual abuse for example) before 18 years of age. Moreover, this genetic variant was associated in other studies with impulsive behaviors [48, 49]. This issue, as well as the analysis of other polymorphisms associated with impulsive behaviors, should be possibly studied in the group of sexual offenders.

The psychodynamic concept points for sexual abuse of other individuals as a method of managing own trauma by harming others or identification with the aggressor. The cognitive-behavioral concept emphasizes that learned behavior may lead to conditioning and false interpretation of events as well as wishful thinking may be used for rationalization and explanation of behaviors [34]. In some cases, when the perpetrator is the parent of the child, the genetic factor may be taken into consideration. However, practically no studies exploring this issue were conducted. Hypothetically, impulsivity may be suggested a potential endophenotype (intermediate phenotype) [46] in the group of sexual offenders.

Interestingly, Polish study conducted in the group of alcohol dependent individuals revealed that about 30% of women from the study group (about 10% of the whole group) experienced sexual abuse during the lifetime, and 20% - in childhood. In addition, a significant association between the history of sexual abuse and high level of impulsivity was observed [25]. On the other hand, results of other study suggest that the history of sexual abuse may be considered an important risk factor of pedophilia, but not the risk of substance dependence [50]. Notably, this study was performed in the group of opioid dependent patients, who are a specific population of substance users.

Conclusions

Despite the fact that the group of sexual offenders remains a population which is still difficult to study, the results of current research are considered novel and

interesting. Surprisingly, the very old, coming from the 80's, descriptions applying to paraphilia, appear to be accurate, especially in the context of similarities between impulsivity and pathologic sexual behaviors. Notably, the nomenclature concerning impulsivity enables a specific and reasonable description of behaviors associated with sexual offences. Moreover, the results of research studies show that it is the lack of inhibition, not pathologic arousal, which is the most important factor in the pathogenesis of forbidden sexual behaviors.

Perhaps this observation could encourage a more direct and scientific description of disorders of sexual preferences, from the perspective of pathologic disinhibition. Moreover, these descriptions could possibly result in specific clinical implications, especially in the context of taking into consideration discussing the mechanisms of decision making, in the therapeutic process.

The analysis provided in the paper concerns pedophilic child molesting and rapes, which are the most common, but still specific sexual offences. Other kinds of sexual crimes were not taken into consideration. In addition, because of the extension of the subject, the psychological determinants of decision making (early childhood experiences, pathologic patterns of attachment) were not described in the article. These have to be considered limitations of the paper.

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