

# *Modeling and analysis of deviant behavior of minors*

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**Abstract** — The method of obtaining the integral indicator of the deviant behavior of minors, which allows to numerically evaluate and characterize its indicator, in order to perform further detailed preventive work, depending on the nature and extent of deviation is examined in the article. The research is conducted for the purpose of forming the universal approach to obtaining the numerical characteristic describing the hardly formalizable phenomenon (deviant behavior) using characteristic vector of weight coefficients of criteria for the personality evaluation.

**Methodology.** The study is based on analysis and generalization of scientific and theoretical sources, as well as the conducted quantitative experiment. For forming of indistinct and multiple indicator of deviant behavior of minors the modified method of the analysis of hierarchies of T. Saati is used.

**Results.** To form the target level of the juvenile deviant behavior evaluation the methods, based on cluster-hierarchical methods for obtaining generalized indicator, are preferable. The indistinct and multiple indicator is more sensitive to distinction of characteristics of the compared objects, than determined and also considers extent of influence of criterion and group on indicator of the general level of deviation that positively affects the accuracy of calculation of required indicator.

**Conclusions.** Use of the generalized indicator of deviance of minors will allow to estimate well and visually degree and the nature of deviation in behavior that will allow to reveal timely deviations in behavior at early stages for the purpose of carrying out effective scheduled maintenance and also to strengthen control of the teenagers who are registered in divisions for minors that, undoubtedly, will raise possibilities of law-enforcement bodies on prevention of crimes among young people.

**Keywords** — *multi-criteria analysis; ranging; deviation patterns; minors; MCDM; AHP; examination procedure, deviation estimation algorithm; deviant behavior.*

## I. INTRODUCTION

Use of modern scientific achievements should benefit and be performed for the benefit of society, to improve the quality of life. It pushed on the idea of collecting and assessment of information of more capacious contents characterizing the person namely assessment of deviant behavior [9,14]. In all countries there is fact of presence of problems of crime and the committed offenses with which for all the time of existence of society people dealt in various ways and by methods. Due to the development of the legislation and scientific and technical

progress, the methods regarding the technique of search of criminals steadily change, as well as the nature of the committed offenses changes [8,3].

The system of law enforcement agencies requires considerable modernization in part of prevention and elimination of offense commission. With some teenagers more pointed and deep work on prevention of crimes is necessary, but not always teachers manage to reveal such teenagers timely to draw to it the attention of the relevant services.

The problem of deviation (deviant behavior) has cross-disciplinary character which in turn led to emergence of large number of the theories and concepts proving the phenomenon of deviation, integrated into uniform science – deviantology [4,6,13].

The symptoms characterizing deviant behavior of the teenager are provided in the International qualifier of diseases (ICD-10), - the normative document used as the standard leading statistical and classification basis developed by World Health Organization, consisting of classes (sections) each of which contains headings with codes of diseases and states. Since 2012 in connection with progress in the field of medical sciences and emergence of new forms of disease, work on review of the qualifier by experts of World Health Organization will be entered. So, in the new version of the qualifier of ICD- 11 which will become effective since January 1, 2022 in the participating countries, in particular, there was new addictive frustration — the game frustration describing dependence on computer games [19,20]. This fact, certainly, reflects emergence of new forms of possible deviations (deviations) in behavior of teenagers, both in connection with scientific and technical progress, and with justification of what is considered "norm" in behavior [20,28].

Today we have set of the typology and classifications of deviant behavior constructed with emphasis on preferences of the author and his belonging to certain school of sciences with emphasis or on the main most widespread types, or on clinical forms. International Classification of Diseases (ICD-10) provides for a list of diseases; Russian Federation Criminal Code - the code of criminal offenses etc. Due to the scientific isolationism, valuable achievement of one discipline are not available to the other one.

It is obvious that psychological and medical classifications mutually supplement each other [22] that once again proves lack of the detailed unified, standard classification of deviant behavior and way of its assessment that was repeatedly noted by such scientists as Ya.I. Gilinsky, E.V. Zmanovskaya, N.V. Maysak [21,23].

The most detailed and structured classification of deviations at the moment is provided in work N.V. Maysak [21,24], where the behavior is classified by type and the nature of orientation, by the nature of manifestations and by degree of social approval.

Some of the most often used models of the identity of the person, applied to assessment abroad are BIG5 he OCEAN[10,18] and HEXACO — 6-factor model of the personality [1], to a lesser extent the personal Hogan test. So, Mikhail Kosinski, the leading scientist in the field of computing psychology in the works [12,14] came to the following conclusion that 70 likes on Facebook are enough to know the person better, than close friends.[7,13]

Herewith, the studies, aimed at assessing the psycho-type and building portraits of users of social networks for the purpose of more segmented advertising targeting, see the rapid growth and support. As a rule, results of scientific achievements of scientists are supported and used in most cases for their commercialization and extraction of benefit in business, passing such important direction as crime prevention. We observed this example relatively recently with the Cambridge Analytica company which is accused of participation in the electoral companies of various countries.

Scientists emphasize [23,29] that the deviant behavior always has such zones which mix up and can be carried both to normal, and to painful manifestations as norms in society change over time; various segments of the population can express the different points of view concerning normativity or deviance of some types of behavior in view of what there are difficulties with assessment and interpretation of behavior [24].

**II. METHODOLOGY**

For receiving the generalized integrated indicator we have to proceed from goal-setting, accurately define the purpose and problem of examination. As if to consider the deviant, his behavior can be rather various and have the reflection in great number of groups, but the importance for the researcher will be had by certain set of the criteria characterizing the personality from certain point of view. The behavior of the studied person can be considered in terms of social approval; dangers to people around; development of the state and society in general; in terms of respect for precepts of law and legality. If to consider such deviation (according to matrix of social deviations of N.V. Maysak) as sexual deviations (masochism) - this behavior, most likely, is deviation from normal, is social not approved, but it does not bear any danger to people around, hardly considerably influences development of society in general and does not carry any legal regulation, therefore, is not pursued by the law, despite this such behavior you should not lose sight and it has to make the contribution to the generalized indicator of deviation [11]. Any phenomenon has to make various contribution to the generalized indicator characterizing

behavior of the person depending on the first-priority purpose which induced this research - studying of tendency to commission of illegal acts or allocation of pupils of the general education organizations for carrying out scheduled maintenance by the juvenile officer. Globally, for the generalized indicator characterizing behavior as deviation from normal, it is undoubted, important to consider in behavior social approval, existence of harm for people around or itself, legality, etc., but formalization of this task is very resource-intensive. In generalized view the indicator of deviant behavior can be considered in the following look, it is provided in Table 1.

For the full analysis of level of deviance of the minor tools the covering all range of the indicators characterizing deviance level are necessary. Such indicators can be received during detailed studying of the minor, poll of parents, neighbors, teaching staff of the educational organization where the teenager, etc. studies.

Let us investigate application of the offered method on the example of comparison of manifestation of social activity on each of categories of deviations in behavior. According to the chosen examination technique - matrixes of social deviations of N.V. Maysak [24], classifications of deviance of the minor – deviant behavior of the teenager is divided into 3 global categories: constructive (non-standard behavior which can have the form of the actions which are beyond social stereotypes of behavior), external destructive (directed to violation of social norms: legal, moral and ethical, cultural) and auto-destructive (directed to disintegration of own personality, its regress, for example various dependences, addictions, suicide manifestations).

TABLE I. THE STRUCTURE OF A MULTIVARIATE INDICATOR OF DEVIANT BEHAVIOR

Generalized deviant behavior indicator $K_{dev} = \sum_{i=1}^n J_i$				
<i>The integrated indicator of the presence of mental illnesses</i>	<i>integral indicator of deviation of social approval</i>	<i>Integral indicator of the behavior, dangerous to others</i>	<i>Integral indicator of the behavior, dangerous to oneself</i>	<i>Integral indicator of unlawful behavior</i>
$J_i = \sum_{l=1}^b v_l x_l$	$J_{i+1} = \sum_{l=1}^c v_l x_l$	$J_{i+2} = \sum_{l=1}^z v_l x_l$	$J_{i+3} = \sum_{l=1}^p v_l x_l$	$J_n = \sum_{l=1}^f v_l x_l$
$v_1 \dots v_b$ - weight coefficients of criteria $x_1 \dots x_b$ - numerical indicators of criteria	$v_1 \dots v_c$ - weight coefficients of criteria $x_1 \dots x_c$ - numerical indicators of criteria	$v_1 \dots v_z$ - weight coefficients of criteria $x_1 \dots x_z$ - numerical indicators of criteria	$v_1 \dots v_p$ - weight coefficients of criteria $x_1 \dots x_p$ - numerical indicators of criteria	$v_1 \dots v_f$ - weight coefficients of criteria $x_1 \dots x_f$ - numerical indicators of criteria

The following types of manifestation belong to constructive type of behavior: graffiti, body art, caricatures, invention in the mercenary purposes, creation of asocial communities, belonging to subculture, discrepancy of circle of contacts I will increase, the Internet of crime (for example, hacking), etc.

Subtypes belong to auto-destructive type of behavior. Addictive: tobacco smoking, alcoholism, use of narcotic substances, addiction to toxic substances, vagrancy (begging),

narcissism, Internet dependence, gadget-dependence, sexual concern, gambling. Suicidal behavior: tattoo, piercing, scarification, extreme hobbies, suicide attempts [2,5,8].

Subtypes belong to external destructive behavior. Unlawful deviations: hooliganism, theft, robbery, vandalism, sadism (cruelty, aggression). Communicative deviations: strong language, violation of etiquette, falsity, cunningness, enviousness etc.

### III. EXAMINATION PROCEDURE

#### A. Determination of the general summation.

For production of assessment of level of deviance of minors in connection with complexity of the phenomenon of deviation it is necessary to create accurately the purpose and problem of examination, proceeding from the volume of data on population and goal of research known to us. The structure of general population depends on the research objectives.

In the case considered by us it can be the minor teenagers age of 8-18 years or 14-18 years (if to analyze data from social networks, for example, VKontakte, according to instructions for use of service age of the user has to be more than 14 years) living in certain region, pupils of certain average educational institution. Generally, the term "deviant behavior" can be applied to the children not younger than 5 years old. Therefore practically any age group, thus, in work of V.A. Popov "Psychological assessment of tendency to deviant behavior at teenage age" [30] were investigated teenagers - young men and girls aged from 13 till 17 years, from socially dysfunctional, incomplete families, got into difficult life situation.

#### B. Formation of selective summation.

The sampling set is used for a more detailed study of the deviation in the initial stages. The formation of the size of the sampled population is performed by choosing from the general population  $N$  the quantity of minors, equal to  $k$ , according to the Sturges formula (1) – the empirical rule for determining the optimum number of intervals, into which the observed range of variation of a random variable is divided, when building a histogram of the density of its distribution, we use a given sample size.

$$k=1+\log_2 N=1+3.222\lg N \quad (1)$$

Often, in order to form a sample, there is a need to collect primary information. Depending on the quality of the selected objects at each stage, the number of iterations in the algorithm can either increase or decrease.

Thus, in the absence of primary information of sufficient volume or when it is impossible to determine it, it is proposed to select  $k$ -objects in a random way.

If the necessary primary information is available, it is proposed to split the general population  $N$  on  $k$  groups by the deviation level and select from each group the objects, having the maximum power of non-zero criteria from each interval  $h_k$  of the general population  $N$ , divided on  $k$ -intervals, where width of interval-  $h$  (2), which is defined as:

$$h=(J_{max}-J_{min})/k \quad (2)$$

#### C. Examination procedure.

*a. Goal setting and problem assessment.* The purpose and objectives of the examination are determined in the non-formalized form. Depending on the goal-setting of the problem being solved or the task set, it becomes necessary to form a homogeneous class of compared objects. The uniformity of the used alternatives is the key property of any method of the multi-criteria analysis. As the objects and phenomena under study can be poorly studied and have no clear classification, structure, properties and characteristics, it is necessary to prepare the studied data on the basis of the research goal, namely to form a set of alternatives with the same characteristics uniformly occurring in this sample. For example, when considering the task of assessing the deviation of minors, it is necessary to take into account a set of evaluation criteria based on the goal and the objects of study themselves.

*b. Selection of the expert group.* The selection of a group of experts is the next important step in determining the effectiveness of the examination. A circle of qualified specialists, from whom this group can be formed, is determined. The following stage is the optimization of the expert group: exclusion of undesirable experts, determination of the most competent expert, identification of experts with the "expert power" etc. If necessary, adaptation also implies the choice of a different quality indicator, revision of clusters of signs, etc.

*c. Selection of an assessment scale.* Depending on the required accuracy of assessment, convenience of assessment, sensitivity of the degree of comparison, one of the proposed assessment scales is selected. As a rule, the five-point and nine-point scales are selected. It is natural that these scales are itself discrete. The scale becomes continuous when standardizing the quantitative attributes for the corresponding basic values.

*d. Feature extraction.* A formed group of experts should collectively discuss and identify the most significant signs by which the objects of expertise will be compared. To select or clarify the presence of such types of features as: quantitative, qualitative, presence. Within one matrix of paired comparisons, a comparison should be made for a small number of signs (usually not more than 10). Selection of features depends on the purpose and objectives of the study. The consideration of qualitative characteristics (place of residence, level of wealth of the family, etc.) is particularly difficult. If such signs will be taken into account, special attention should be paid to the selection of the weight coefficients  $\hat{V}_{qual}, V_{j,qual}, j=1,2,\dots$ . It should be noted that allocation of signs (criteria) of assessment directly depends on the goal of the object studying and their uniformity, namely, the existence of certain set of criteria, which corresponds to homogeneous group of teenagers of the corresponding certain degree of deviance. In this case, it is recommended to use three sets of criteria that are manifested in adolescents with low, medium and high deviance.

*e. Formation of the deviation index.* The generalized deviation index is formed on the basis of the sum of the weighting factors of the criteria for each type of behavior according to the nature of the behavior directivity (constructive, auto destructive, external destructive), included in the sum by three degrees of deviance. The choice of coefficients is carried

out by the created group of experts, proceeding from the purpose and problems of examination.

*D. Application of the hierarchy analysis method.*

We use method of the analysis of hierarchies of T. AHP for forming of vector of weight coefficients of signs. This stage presumes forming the space of attributes of the objects under consideration. Sampled population from  $K_i$  of minors provides for the limited set of non-zero criteria. Initially, the number of  $K_i$  sampled population criteria will be considerably limited. For definition of vector of weight coefficients in group of criteria  $\leq 9$  classical AHP is used. When the amount of criteria exceeds 9, the method of sewing together of object base of examination when using AHP [26] is applied.

Check of matrix of pair comparisons on coherence to achieve the most adequate weight coefficients of the marked-out criteria has to be indispensable condition. When receiving vector of weight coefficients it is necessary to normalize and exclude it criteria, which can change too strongly contribution to final indicator of deviation. Verification of existence of such criteria is performed under the following condition. If,  $1 - \hat{V}_{1max} \leq 0.1$  this criterion is deleted and experts return to the stage of defining the criteria.

Numerical and statistical analysis of estimates is performed by means of the special software. In case of use of complex indicator of deviance or rating assessment of all signs in total, the main complexity of the created programs is the share of assessment of coherence of members of expert group as the second part of work — actually calculation of complex indicator of deviance or the generalized rating assessment — is rather simple.

*E. Formation of the targeted distribution.*

After forming of vector of weight coefficients  $\vec{V}_i$  it needs to be used for deviation level assessment for sample research. The obtained distribution  $J(x)$  will demonstrate the efficiency of the obtained criteria obtained for finding the target values, indicated at the initial stage of the study. To obtain the distribution  $J(x)$ , the deviation values are standardized and then ranged from the biggest to the smallest value. Then, the standardizing of the sampled population on the basis of  $k$  is performed, after which the points of the sought distribution with step  $\Delta = 1/k$  are built.

After building the distribution  $J_i(x)$  (3), it is required to compare it with the previously obtained targeted distribution. During the researches criterion function of look, which in general can characterize the level of distribution of deviant behavior of teenagers, was received.

$$J(x) = -0.15 \ln(x) + 0.05, \quad \text{where } x \in (0; 1] \quad (3)$$

Comparison of samples  $J_i(x)$  with the targeted sample  $J(x)$  may be performed by means of various statistical criteria.

When reaching the minimum value of criterion  $E_{min}$ , minimum sample variance, we will assume that the resulting distribution  $J_i$  is the sought one, and the resulting homogeneous groups can be used to form a contrast AHP sample, otherwise,

it is required to return to the sampled population formation stage.

At the previous stage, the distribution  $J_1$  (being not the sought  $J_i$ ) is obtained, which can be interpreted in two ways - in the first case, the criteria formed a distribution, in which the "strong" criteria or "weak" criteria are clearly expressed. Sampling  $k_2$ , obtained after the repetitive formation of sample, will allow to form a vector of weight coefficients  $\vec{V}_2$  and the formation of distribution  $J_2(x)$  is required to be compared with the target distribution  $J(x)$  as well. The last two stages need to be repeated as many times as necessary until we get  $J_i$ , satisfying condition  $E < E_{min}$ .

*F. Examination conclusion.*

The obtained sample  $k_i$ , vector of weighting coefficients  $\vec{V}_2$ , distribution  $J_i(x)$  will provide information on homogeneous groups related to the level of deviation of minors. This contrast sample can be used for forming of vector of weight coefficients  $\vec{V}_i$ , and final research by means of AHP of the entire general population. The expertise report should specify: 1) distribution of level of deviation of the studied teenagers; 2) assessment of probability of right choice (or mistake probabilities); 3) segmentation of teenagers on category with low average and high deviation;

According to the additive model of the generalized deviation indicator  $J$  (4) corresponds to sum of products of weight coefficients of  $v$  with three indicators: constructive behavior  $J_1$ , auto-destructive  $J_2$ , external destructive  $J_3$ . The choice of group weight coefficients allows to establish required ratio between deposits of estimates of indicators of deviation to complex indicator of deviance Let us present the complex-valued deviation indicator  $J_{gen}$  as follows:

$$J_{gen} = v_1 J_1 + v_2 J_2 + v_3 J_3 \quad (4)$$

Generalized deviation value  $J_{gen}$ , (5) obtained on the basis of the cluster-hierarchical approach, if there are signs of the type: quantitative  $V_{j,quan}$ , qualitative  $V_{l,qual}$ , binary  $V_{i,bin}$  are presented as

$$J_{gen} = \left[ \hat{V}_{quan} \frac{\sum_j V_{j,quan} \hat{x}_{j,quan}}{\sum_j V_{j,quan}} + \hat{V}_{bin} \frac{\sum_i V_{i,bin} \hat{x}_{i,bin}}{\sum_i V_{i,bin}} + \hat{V}_{qual} \frac{\sum_l V_{l,qual} \hat{x}_{l,qual}}{\sum_l V_{l,qual}} \right]$$

where  $\hat{V}_{quan}, \hat{V}_{qual}, \hat{V}_{bin}, V_{j,quan}, V_{l,qual}, V_{i,bin}$  – group weight coefficients that determine the preference of quality attributes (score), presence attributes (existence), and weight coefficients related to groups of criteria,  $\hat{x}_{ij} / 2$  – standardized value,  $J_{gen}$  – generalized deviation function. Sets  $\{V_j, V_i, V_l\}$  define relative contribution of separate signs (private criteria).

In articles [25-27] the additive model of the generalized deviation indicator  $J$  with the weight coefficients corresponding to them  $v$  in the form of the sum of three indicators was considered: deviation  $J_1$ , victim  $J_2$ , risk group  $J_3$ .

On the example of signs of existence of group of criteria "Deviation" we will construct matrix of pair comparisons  $S$ . Following linguistic scale is used: 1 — full compliance, 3 — superiority of attribute, 5 — absolute superiority, 2 and 4 — intermediate signs (6).

$$\sigma = \begin{pmatrix} 1 & 3 & 4 & 5 \\ 1/3 & 1 & 3 & 3 \\ 1/4 & 1/2 & 1 & 1 \\ 1/5 & 1/3 & 1 & 1 \end{pmatrix} \quad (6)$$

The rated vector of weight coefficients of signs of existence  $\bar{k}$ , reflecting extent of influence of this or that sign on the general indicator of deviation in subgroup of signs of existence (7) is received:

$$\bar{k} = (0.329 \ 0.316 \ 0.182 \ 0.108 \ 0.064) \quad (7)$$

The weighting coefficients of all other criteria and values for each group are obtained in the same way - deviation  $J_1$ , victim  $J_2$ , risk group  $J_3$ . In table 2 distribution of criteria of deviation to subgroups quantitative and qualitative and also the level of influence of criteria of deviance, expressed in weight coefficients of signs and groups is provided.

The example of calculation of indicator "Deviation" is given below, by analogy, indicators for "Risk group", "Victim", the Sum of these indicators are calculated and is the generalized indicator (8-11).

IV. RESEARCH RESULTS

For assessment of level of deviant behavior of selection of pupils of 7-9 classes of high comprehensive schools of Voronezh the matrix of social deviations of was used N.V. Maysak [24], where the behavior is classified by behavior type, the nature of orientation and by degree of social approval. At the constructed model of deviant behavior there are more than 30 criteria classified according to the nature of orientation and making various contribution to the generalized indicator of deviant behavior. (fig. 1)

TABLE II. TABLE II. WEIGHT COEFFICIENTS OF DEVIANCE CRITERIA FOR THE ADOPTION OF THE GENERALIZED DEVIATION INDEX

	The name of the criteria	Type cr.	The weight of the sign	Numerical score	Weight groups
Deviation	Alcohol, tobacco smoking	$k_{n11}$	0.235	$x_{n11}$	/ $p_1$
	Drugs, intoxicants	ex. / $k_{n12}$	0.549	$x_{n12}$	
	Criminal subculture	ex. / $k_{n13}$	0.1	$x_{n13}$	
	Perversion sexual relations	ex. / $k_{n14}$	0.116	$x_{n14}$	
	Pornography	score / $k_{m11}$	0.108	$x_{m11}$	
	Gambling (for money)	score / $k_{m12}$	0.064	$x_{m12}$	
	Violence against peers	score / $k_{m13}$	0.329	$x_{m13}$	
	Cruelty to animals	score / $k_{m14}$	0.182	$x_{m14}$	
	Extremism (discrimination)	score / $k_{m15}$	0.316	$x_{m15}$	

Risk group	The game is not age-appropriate	ex. / $k_{n21}$	0.196	$x_{n21}$	0.163 / $p_2$
	The video is not age-appropriate	ex. / $k_{n22}$	0.493	$x_{n22}$	
	Audio does not match age	ex. / $k_{n23}$	0.311	$x_{n23}$	
	Foul language	score / $k_{m21}$	0.277	$x_{m21}$	
	«Trolling» peers	score / $k_{m22}$	0.095	$x_{m22}$	
	"Trolling" adults	score / $k_{m23}$	0.16	$x_{m23}$	
	Pornographic content	score / $k_{m24}$	0.467	$x_{m24}$	
Victim	Suicide, harm to health	ex. / $k_{n31}$	0.559	$x_{n31}$	0.297 / $p_3$
	Personal information	ex. / $k_{n32}$	0.089	$x_{n32}$	
	Dangerous «hobby»	ex. / $k_{n33}$	0.352	$x_{n33}$	
	Chat with strangers	score / $k_{m31}$	0.16	$x_{m31}$	
	Demonstration of personal values	score / $k_{m32}$	0.095	$x_{m32}$	
	Participation in lotteries	score / $k_{m33}$	0.277	$x_{m33}$	
	Violation / disregard of traffic rules	score / $k_{m34}$	0.467	$x_{m34}$	

$$J_{dev.} = p_1 \left( \sum_{i=11}^{23} k_{ni} x_{ni} + \sum_{i=11}^{15} k_{mi} x_{mi} \right) \quad (8)$$

$$J_{g.r.} = p_2 \left( \sum_{i=21}^{33} k_{ni} x_{ni} + \sum_{i=21}^{24} k_{mi} x_{mi} \right) \quad (9)$$

$$J_{vic.} = p_3 \left( \sum_{i=31}^{33} k_{ni} x_{ni} + \sum_{i=31}^{34} k_{mi} x_{mi} \right) \quad (10)$$

$$J_{gen.} = J_{dev.} + J_{g.r.} + J_{vic.} \quad (11)$$

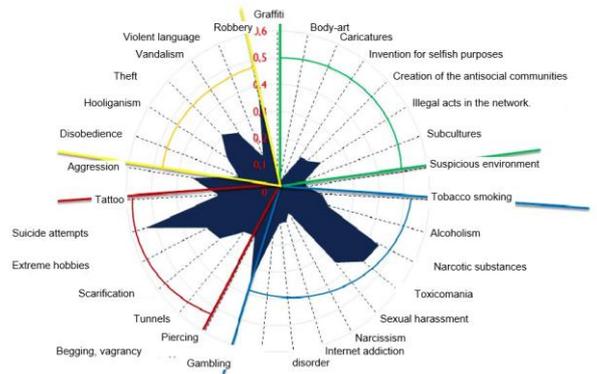


Fig.1 Classified criteria for assessing deviant behavior

The expression consisting of the sum of the group values (constructive  $J_1$ , auto-destructive  $J_2$ , external destructive  $J_3$ ) and the corresponding criteria is used to calculate the generalized deviancy value.

On the basis of indistinct and multiple indicator of deviant behavior and its multiplicative character, considered in work of Borisov A.V. and applications of method of sewing together of AHP for evaluation of deviance of minors among 409 studied profiles, it was revealed:

- high level of deviancy of 3% school students, where  $\hat{J}_{gen} \in [0.6;1]$ ;
- the average level at 19.2% of school students, where  $\hat{J}_{gen} \in [0.2;0.6]$ ;
- high level of 77.8% school students, where  $\hat{J}_{gen} \in [0;0.2)$  (fig. 2).

Use of method of sewing together of object base of examination allowed when using AHP, to reduce more than 30 criteria for evaluation of level of deviation, considering contribution of each criterion to the generalized indicator, to uniform scale [25]. This does prove the success of the used method, which satisfies the requirements of the task, applied by us.

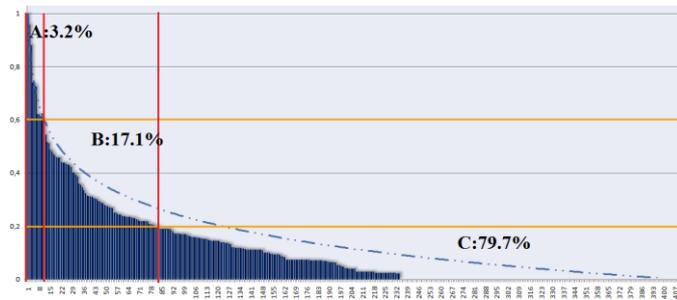


Fig.2 Distribution of the level of deviant behavior among 409 students in grades 7–9 of secondary schools in Voronezh

## V. CONCLUSION

In the real work the technique of allocation of the determinants allowing to estimate and characterize in number indicator of deviant behavior of teenagers was offered. The numerical indicator characterizing deviant behavior of the teenager allows to apply more effective measures of educational influence directed to decrease in delinquent behavior. This approach is universal and effective for receiving the exact numerical assessment characterizing the hardly formalizable phenomenon. Results of characteristic vector of weight coefficients of criteria for evaluation of the personality inclined to deviant behavior, approbation of the procedure of examination and numerical methods on control group of teenagers are received.

## References

[1] Ashton M.C., Lee K., de Vries R.E. The HEXACO Honesty-Humility, Agreeableness, and Emotionality Factors: A Review of Research and Theory // *Personality and Social Psychology Review*. – 2014. – 18(2). – pp. 39–152. DOI: <https://doi.org/10.1177/1088868314523838>

[2] Cabriaes J. A., Cooper T. V., Hernandez N., Law J. Psychographic characteristics, tobacco, and alcohol use in a sample of young adults on the U.S. / Mexico border // *Addictive Behaviors*. – 2016. – Vol. 63. – pp. 12-18. DOI: <https://doi.org/10.1016/j.addbeh.2016.06.028>

[3] Casale S., Fioravanti G. Why narcissists are at risk for developing Facebook addiction: The need to be adnured and the need to belong // *Addictive Behaviors*. – 2018. – Vol. 76. – pp. 312-318. DOI: <https://doi.org/10.1016/j.addbeh.2017.08.038>

[4] Epskamp, S., Rhemtulla, M., & Borsboom, D. (2017). Generalized Network Psychometrics: Combining Network and Latent Variable Models // *Psychometrika*. – 2017. – 82(4). – pp. 904-927. DOI: [10.1007/s11336-017-9557-x](https://doi.org/10.1007/s11336-017-9557-x)

[5] Forster M., Grigsby T. J., Rogers C. J., Benjamin S. M. The relationship between family-based adverse childhood experiences and substance use behaviors among a diverse sample of college students // *Addictive*

*Behaviors*. – 2018. – Vol. 76. – pp. 298-304. DOI: <https://doi.org/10.1016/j.addbeh.2017.08.037>

[6] Gil-Lopez T., Shen C., Benefield G. A., Palomares N. A., Kosinski M., Stillwell D. One Size Fits All: Context Collapse, Self-Presentation Strategies and Language Styles on Facebook // *Journal of Computer-Mediated Communication*. – Vol. 23, Issue 3, 1 May 2018, pp. 127–145, DOI: <https://doi.org/10.1093/jcmc/zmy006>

[7] Golnoosh Farnadi, Geetha Sitaraman, Shanu Sushmita, Michal Kosinski, Fabio Celli, David Stillwell, Sergio Davalos, Marie-Francine Moens, Martine De Cock. Computational Personality Recognition in Social Media User Modeling and User-Adapted Interaction. June 2016/ – Vol. 26, Issue 2/ – pp. 109-142. DOI: <https://doi.org/10.1007/s11257-016-9171-0>

[8] Griffiths M. D. Behavioural addiction and substance addiction should be defined by their similarities not their dissimilarities // *Addiction*. – 2017. – Vol. 112, Issue 10. – pp. 1718-1720. DOI: <https://doi.org/10.1111/add.13828>

[9] Groth G. G., Longo L. M., Martin J. L. Social media and college student risk behaviors: A minireview // *Addictive Behaviors*. – 2017. – Vol. 65. – pp. 87-91. DOI: <https://doi.org/10.1016/j.addbeh.2016.10.003>

[10] Gullo I. J., Loxton N. J., Dawe S. Impulsivity: four ways five factors are not basic to addiction // *Addictive Behaviors*. – 2014. – Vol. 39, Issue 11. – pp. 1547-1556. DOI: <https://doi.org/10.1016/j.addbeh.2014.01.002>

[11] Kilwein T. M., Looby A. Predicting risky sexual behaviors among college student drinkers as a function of event-level drinking motives and alcohol use // *Addictive Behaviors*. – 2018. – Vol. 76. – pp. 100-105. DOI: <https://doi.org/10.1016/j.addbeh.2017.07.032>

[12] Kosinski M., Matz S.C., Nave G., Stillwell D. J. Psychological Targeting as an Effective Approach to Digital Mass Persuasion // *Proceedings of the National Academy of Sciences of the United States of America/* – 2017. – Vol. 114, Issue 48. – pp. 12714-12719. DOI: <https://doi.org/10.1073/pnas.1710966114>

[13] Kosinski, M., Youyou, W., Stillwell, D.J.: Computer-based personality judgements are more accurate than those made by humans // *Proceedings of the National Academy of Sciences* – 2015. – (PNAS) 112(4). – pp. 1036–1040. DOI: <https://doi.org/10.1073/pnas.1418680112>

[14] Kulkarni V, Kern ML, Stillwell D, Kosinski M, Matz S, Ungar L, et al. Latent human traits in the language of social media: An open-vocabulary approach // *PLoS ONE*. – 2018. – 13(11): e0201703. DOI: <https://doi.org/10.1371/journal.pone.0201703>

[15] Pearson M. R., Liese B. S., Dvorak R. D. College student marijuana involvement: Perceptions, use, and consequences across 11 college campuses // *Addictive Behaviors*. – 2017. – Vol. 66. – pp. 83-89. DOI: <https://doi.org/10.1016/j.addbeh.2016.10.019>

[16] Russell M. A., Almeida D. M., Maggs J. L. Stressor-related drinking and future alcohol problems among university students // *Psychology of Addictive Behaviors*. – 2017. – Vol. 31, Issue 6. – pp. 676-687. DOI: <http://dx.doi.org/10.1037/adb0000303>

[17] Whist N.V. Psychological and Pedagogical Conditions for the Prevention of Deviant Behavior among Adolescents // *International Journal of Environmental and Science Education*. – 2016. – VOL. 11, NO. 15, 8536-8551, DOI: <http://www.ijese.net/makale/1101>

[18] Zhang Ch., Brook J. S., Leukefeld C. G., Brook D. W. Longitudinal psychosocial factors related to symptoms of Internet addiction among adults in early midlife // *Addictive Behaviors*. – 2016. – Vol. 62. – pp. 65-72. DOI: <https://doi.org/10.1016/j.addbeh.2016.06.019>

[19] Angel M. S. The Problem of Clinical and Psychological Transformation of the Motivational and Need Sphere of Adolescents with Addictive Behavior in the Context of Socio-Cultural Changes in Modern Russia (1985-2015) // *International Scientific Research Journal*. – 2017. – №4-2 (58). – pp. 148-153. DOI: <https://doi.org/10.23670/IRJ.2017.58.001>

[20] Kaminskaya O. V. Characterization of dependence on online computer games // *Bulletin of Pedagogy and Psychology of Southern Siberia*. – 2013. – № 1-2. – pp. 169-171. URL: <https://www.sciencedirect.com/science/journal/03064603>

[21] Kiseleva L. T. T. Clinical and psychological aspects of heroin intoxication // *Scientific-methodical electronic journal Concept*. – 2017. – № 18. – P. 14-22. URL: <https://elibrary.ru/contents.asp?issueid=1884489>

- [22] Lebedev A.V., Anzman N.I., Subotyalov M.A., Gerasev A.D., Anzman R.I. Estimation of addictions to psychosocial addictions among students aged 17–18 years in Novosibirsk // *In  $\pi$  integration of education*. - 2017. - Vol. 21, No. 4 (89). - WITH. 695-708. DOI: <http://dx.doi.org/10.15507/1991-9468.089.021.201704.695-708>
- [23] Lomakina A.N. Socio-pedagogical features of addictiveness of young people as types of destructive behavior // *Scientific Opinion*. - 2014. - №10-2. - pp. 46-50. URL: <https://elibrary.ru/item.asp?id=23060096>
- [24] Maysak N.V. Matrix of social deviations: classification of types and types of deviant behavior // *Modern Problems of Science and Education*. - 2010. - No. 4. - pp. 27-59. URL: <http://www.science-education.ru/ru/article/view?id=4505>
- [25] Narushev I.R., Maltsev S.A., Melnikov A.V., Kubasov I.A. Clustering objects with weakly formalized features based on a neural network in the form of a Kohonen layer. *Vestnik VGUIT*. - 2018. - T. 80. No. 3. - pp. 86–91. DOI: <http://dx.doi.org/10.20914/2310-1202-2018-3-86-91>
- [26] Narushev I.R. Models of the generalized indicator of deviant behavior of minors / Melnikov AV, Denisenko V.V. - *Bulletin of the Voronezh Institute of the Ministry of Internal Affairs of Russia*. - 2018. - № 1. - pp. 44–50 URL: <https://elibrary.ru/item.asp?id=32694890>
- [27] Narushev, I. R. Numerical methods for analyzing the objects of the hierarchy of the behavior of minors using other methods of analyzing hierarchies / I.R. Narushev, S.A. Maltsev, I.A. Kubasov // *Bulletin of the Voronezh Institute of the Federal Penitentiary Service of Russia*. -2018. – № 4. - pp. 89-97.
- [28] Panteleeva TV. Features of the socio-psychological adaptation of Internet addicts in early youth // *Azimuth of scientific research: pedagogy and psychology*. - 2016. - Vol. 5, No. 1 (14). - pp. 185-188. URL: <https://elibrary.ru/contents.asp?Issueid=1559754>
- [29] Smirnov A.V. Sexual features of manifestations of the “addictive”, “borderline” and “non-addictive” types of individuality at the depth-psychological level of integral individuality // *European Social Science Journal*. - 2014. - № 6-3 (45). - pp. 329-337. URL: <https://elibrary.ru/contents.asp?issueid=1371058>
- [30] Smirnova M. V., Popov V. A. Psychological assessment of the propensity for deviant behavior in adolescence // *Scientific-methodical electronic journal "Concept"*. - 2016. - V. 11. - pp. 2896–2900. - URL: <http://e-koncept.ru/2016/86612.htm>.
- [31] Solonitsyna MA, Pitaykina A.A., Limonchenko R.A. Diagnostic informativeness of the methodology "Determination of the propensity for deviating behavior" (A.N. Orel): problems of practical application // *PEM: Psychology. Educology. Medicine*. - 2016. - № 2. - pp. 199-231. URL: <https://elibrary.ru/item.asp?id=289378240>