

COGNITIVE MODELS DURING THE GLOBAL CRISES PERIODS: FINAL RESULTS OF THE STUDY

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***Abstract:** The research has yielded data of wide theoretical and practical significance. The study materials identified a quantitative correlation between typical behavior patterns and “cognitive models” in the global crisis situation of the recent SARS-CoV-2 pandemic and ongoing international conflict, and specific neurofunctional and cognitive properties of individuals. The models and properties of limitations perception are described and classified, along with the statistical parameters of their carriers. Gradations and group relations of results and base indicators have been derived based on various cognitive prerequisites. The dynamics of crisis behavior model formation have been examined from new perspectives under “reduced” and “increased” media influence, including the “conformist type” of adaptation, in comparative and prospective aspects depending on types of cognitive prerequisites of psychoemotional impact.*

***Keywords:** mass media loyalty, political crises threat estimation, crisis behavior model, propensity to cognitive distortions, tendency to superstition, COVID-19 consequences.*

Collected data from the sample demonstrated quite diverse distribution with the various types of attitudes and reactions to the stressing changes in the environment. Only 44% fraction of our sample showed tolerance to the crisis restrictions and reported their consent to regulations and standards implemented during the peaks of COVID-19 morbidity. By responding to our questionnaire this fraction reported their solidarity with the crisis agenda. Other 56% appeared to be either indifferent or skeptical and intrust to the information campaigns of the mass media aimed at informing the society and forming a unified public opinion on these issues.

Such data is based on the scale counting results and the positions of the respondents of our sample on the scale of “Global crises threat assessment”, also named the “Mass media loyalty” scale [12, 13, 14, 17, 19]. Performed validation of this questionnaire sector, developed specially for the research, showed the Cronbach’s Alpha coefficient = 0,9304, and the Guttman’s coefficient (after collecting the whole sample) = 0,9427. Thus, the results and its indicators are considered reliable and statistically accorded. The full table of validation is shown below:

| Scale | Alpha Cronbach Value | Standardized Alpha Cronbach's | Guttman's |
|------------------------------------|----------------------|-------------------------------|-----------|
| Mass media loyalty | 0,9304 | 0,9320 | 0,9427 |
| Vaccination | 0,8224 | 0,8286 | - |
| Self-isolation | 0,8030 | 0,8032 | - |
| Use of the Means of protection | 0,7329 | 0,7396 | 0,7856 |
| Political crises threat estimation | 0,7435 | 0,7033 | 0,8399 |

In the group of people who didn't suffer from COVID-19, respondents in the lower span of "Mass media loyalty", <50% of the scale, are spread >3 times more numerous than the upper span >51% — in the ratio of 76,3% vs 23,7%. Probably, such a proportion can be explained by the fact that not every man who personally suffered from the disease takes the COVID test and knows that he would be diagnosed with COVID itself without being affected by media. Additionally, some other people recognize respiratory symptoms of other syndromes as COVID-19 signs, not appealing to the hospital and being affected by the mass media [2, 3, 6, 11, 15]. In the group of respondents who suffered COVID-19, there are the majority of people, 54,9%, in the upper span of the scale: >51% of "Mass media loyalty".

Among the group of vaccinated respondents 78,2% of people reported that they have suffered from COVID-19. Thus, we can conclude that the general tendency is: people get vaccinated after suffering the disease (but not in all cases). The group of respondents who have had COVID infection contains 33% more vaccinated respondents than the group who didn't suffer the disease. The total amount of vaccinated respondents as of March 2022 makes up 67% of our sample.

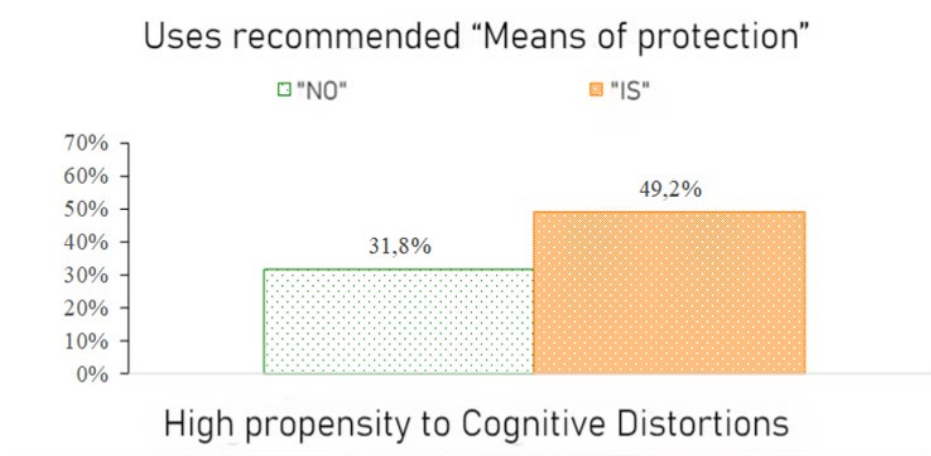
Vaccination, in a row with the rest means of epidemical self-protection, is most frequently taken by the youngest and the oldest respondents: 41,5% and 37,6% more respondents in these groups than in the middle age groups (26-35 and 36-50 years old). Also expectable that the participants of the oldest group are 29,7% more frequently (than middle age groups) ready to observe a self-isolation regime — as they are under more dangerous threat of the infection and have the opportunity of not going to work if they are already on retirement — and 34,2% more frequently used "self-protection means" on the peaks of the COVID-morbidity. The same proportion is noticeable in the youngest group (18-25 y.o.): 63% of respondents used "self-protection means", recommended through the mass media, during the peaks of COVID-morbidity. Thus, can be made an observation, that the youngest and the oldest age groups are the sections where the majority use these means, while among the middle groups (36-50, 26-35 years old) majority are non-using, using people are in the minority. Both groups, the youngest and the oldest,

are equally more inclined to take COVID measures than the middle groups. The full table of age groups related distribution of this factor is shown below:

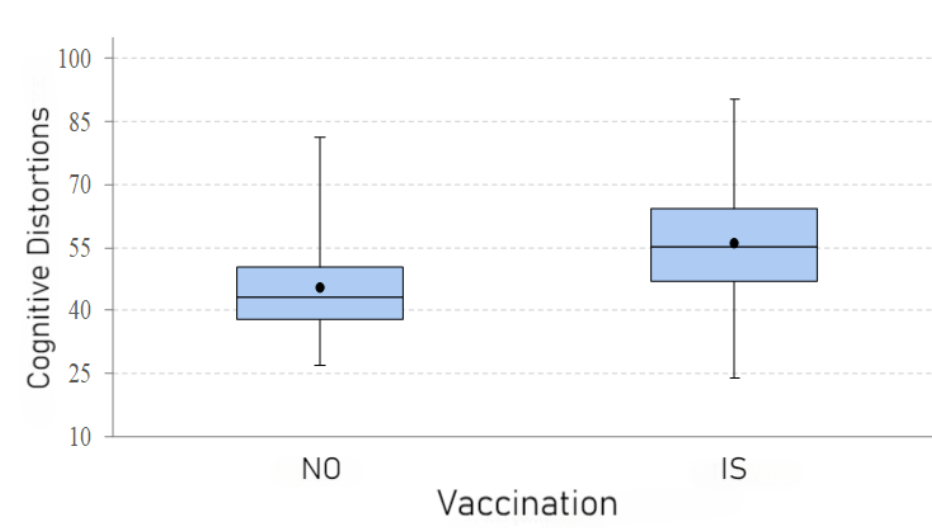
| Indicator | Age intervals | | | | Total | P-Value (df=3) |
|--|-----------------|-----------------|-----------------|----------------|-------|-------------------|
| | 18-25 (N=54) | 26-35 (N=55) | 36-50 (N=55) | 51+ (N=68) | | |
| Personal data | | | | | | |
| Official sources of information about the pandemic | 25 (46,30%) | 37 (67,27%) | 40 (72,73%) | 42 (61,76%) | 144 | 0,0294 |
| Alternative sources of information about the SWO | 45 (83,33%) | 49 (89,09%) | 44 (80,00%) | 47 (69,12%) | 185 | 0,0428 |
| Vaccination | 45 (83,33%) | 23 (41,82%) | 33 (60,00%) | 54 (79,41%) | 155 | <0,0001 |
| Mass media loyalty | | | | | | |
| Use of recommended “Means of protection” | 34 (62,96%) | 20 (36,36%) | 24 (43,64%) | 48 (70,59%) | 126 | 0,0003 |
| Self-isolation | 24 (44,44%) | 18 (32,73%) | 16 (29,09%) | 40 (58,82%) | 98 | 0,0033 |
| High political normativeness | 10 (18,52%) | 13 (23,64%) | 30 (54,55%) | 53 (77,94%) | 106 | <0,0001 |
| Cognitive Distortions | | | | | | |
| High propensity to Cognitive Distortions | 35 (64,81%) | 19 (34,55%) | 13 (23,64%) | 29 (42,65%) | 96 | 0,0001 |
| Tendency to superstition | | | | | | |
| High tendency to superstition | 13 (24,07%) | 9 (16,36%) | 20 (36,36%) | 36 (52,94%) | 78 | 0,0001 |

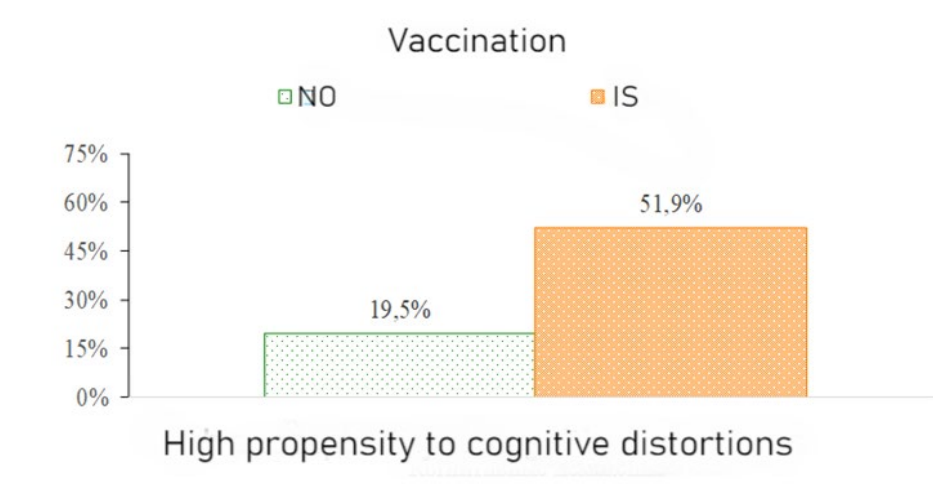
Correlation analysis shows the coefficient of correlation between the Age and the “Self-protection means usage” (sub-scale counting one’s accuracy of using it: manner of placing a mask on a face, number of measures that are combined at once) on the level $R_s=0,60$, ($p \leq 0,01$); and between the Age and the Vaccination (sub-scale counting one’s readiness to take it) on the level $R_s=0,31$ ($p \leq 0,01$) of correlations between these countable parameters.

In the fraction of our sample, in which respondents reported that they were using recommended “means of protection” regularly and stably during the peaks of the pandemic, also detected the prevalence in the Cognitive Distortion scores: on average it amounts to 6,6 more points in the group, who tend to use the “means of protection” stably. Elevated results of this scale occur 17,4% more often in the group of respondents who use these means combined and regularly (during the peaks of pandemical morbidity). In comparison with the control group, which is not sustainable in usage, there are 1,2 more points of Catastrophizing on average and 1 more point of Hypernormativeness.

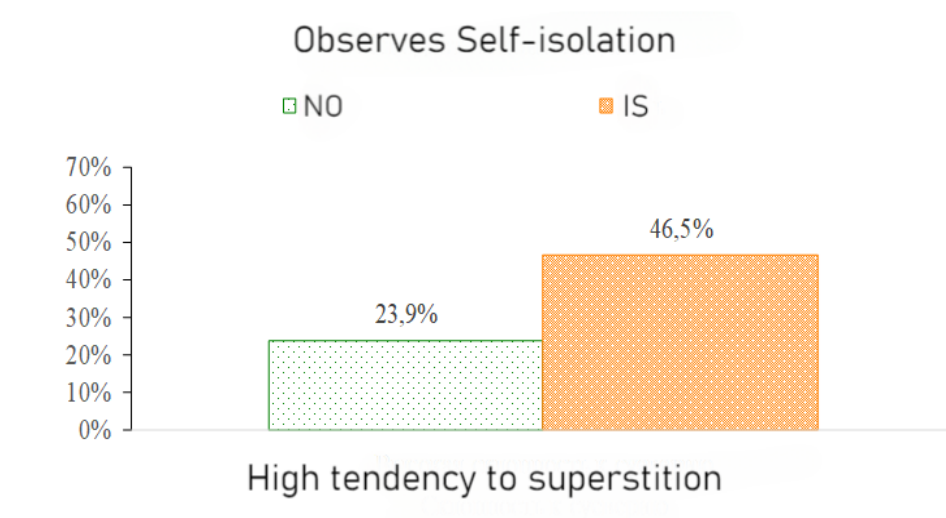


The vaccinated fraction of the sample, composing 67% of respondents as of March 2022, takes on average 10,5 more Cognitive Distortion points than the unvaccinated respondents. This difference is fully statistically reliable according to the P-Value <0,0001. Among them (vaccinated), the general propensity to Cognitive Distortions is 32,4% more common than among unvaccinated. Particular distortions which they have in prevalence are 1,9 more points on the subscale of Catastrophizing, 1,2 more points of the Exaggeration of danger, 1,4 more points of Hypernormativeness.





Among the fraction of respondents who reported that they chose to regularly observe the “self-isolation regime“ during the peaks of pandemic morbidity, was noticed 2 times more people with an increased tendency to superstition: 22,6% more cases in comparison with the control group — the opposite group who didn’t observe it stably. The visual histogram and full table of these proportions are placed below:



| Indicator | Self-isolation | | Total | P-Value (df=1) |
|--|---------------------|--------------------|-------|-------------------|
| | Negative (N=134) | Positive (N=99) | | |
| Personal data | | | | |
| Suffered COVID infection | 75 (55,97%) | 82 (82,83%) | 157 | <0,0001 |
| Vaccination | 69 (51,49%) | 87 (87,88%) | 156 | <0,0001 |
| Mass media loyalty | | | | |
| Use of recommended “Means of protection” | 41 (30,60%) | 85 (85,86%) | 126 | <0,0001 |
| High political normativeness | 47 (35,07%) | 59 (59,60%) | 106 | 0,0002 |
| Tendency to superstition | | | | |
| High tendency to superstition | 32 (23,88%) | 46 (46,46%) | 78 | 0,0003 |

Women are 14,4% more frequently than men observe self-isolation and 16,1% more frequently use recommended means of protection. Also, females are on average 6,2 points more inclined to Cognitive Distortions, in particular to Catastrophizing. Among the female group, there are also and 25,6% more respondents have elevated markers of Tendency to superstition scale in comparison with the male group — 5,8 more average points. Males are more frequently taking elevated markers on the Conspiracy Scale (the third in our order of sections).

Respondents who are ready to observe the self-isolation regime also appeared to be more frequently vaccinated, and more frequently using means of protection and according to our initial presumption, their political normativeness rate is 3,4 points higher, on average, than in the control group. So, these traits are interdependent, homogeneous and compiled in a cluster. Also, these respondents show more points of the “Hypernormality” subscale from the section of Cognitive Distortions – in comparison with the control group.

Based on the analyzed data of the groups of education directions, representatives of the group of people who got humanitarian education, are 14,5% more often than the “natural sciences group” agreed to observe “self-isolation regime” during the pandemic. Despite the natural specifics of the issue itself. Also, “humanitarians” are 24,8% more often have high scores on the Political normativeness scale (as a component of the 1st section of our questionnaire). This is

considered as a confirmation of our hypothesis about a variation between the directions of education in the “Mass media loyalty” parameter and the more dramatic estimation of the global crisis events among the people who studied humanities [16, 18, 20, 21, 23].

People with natural science education are more frequently than those with education in the humanities show more restrained and even skeptic attitudes to the COVID-issues and have lower scores on the “Mass media loyalty” scale (and its inner components). 63,2%, the most amount of them are in the <50% span of this scale. Natural science-educated people make up the most of the “<50%” group: 66,2% of its number. 53,9% of people educated in the humanities are in the span of >51% level of the Mass media loyalty scale. They also have an average of 6,6 more scores than those educated in natural sciences in the scale of “Mass media loyalty” and also 3,8 more average scores in the “Superstition scale”. Differences in propensity to Cognitive Distortions were not discovered between education groups.

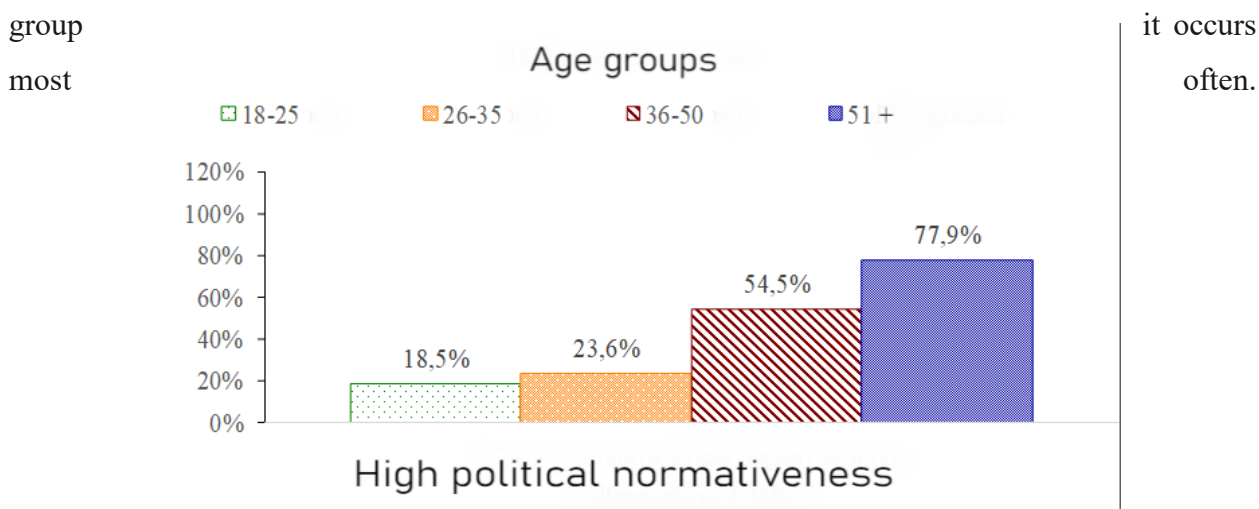
| Indicator | Education | | P-Value |
|------------------------------------|-----------------------------|------------------------|---------|
| | Natural sciences (N=136) | Humanitarian (N=91) | |
| Mass media loyalty | | | |
| Political crises threat estimation | 13,37 ± 4,95 | 15,75 ± 6,24 | 0,0009 |
| Mass media loyalty | 49,92 ± 18,81 | 56,56 ± 20,56 | 0,0118 |
| Tendency to superstition | | | |
| Superstition scale | 17,37 ± 10,33 | 21,14 ± 10,08 | 0,0037 |

People, who have an education in natural sciences, despite the external scientific specifics of the problem, tend to adhere less frequently and less consistently to epidemiological measures. For example, among them, there were 14,5% fewer individuals who observed the "self-isolation regime" during the peaks of the infection. They more frequently tend to question the effectiveness of official anti-infection measures.

This approach manifests itself in significantly lower overall trust scores in the official agenda compared to the "humanitarian" group. In the "scientific" group, the proportion of respondents with a "<50%" score on the main scale is 63,2%, while the ">51%" category accounts for only 36,8%. In contrast, in the "humanitarian" group, the opposite is true: respondents with a ">51%" rating on the "Mass media Loyalty" scale prevail, accounting for 53,9%. The "humanitarian" group, on the other hand, tends to dramatize events more and have a higher level of trust in the mass media as a source of support.

Both official (TV, press, etc.) and alternative (web channels) informational sources on the pandemic topic broadcast the same set of prevention measures and strategies and the same attitude to the issue, equal assessment of what is happening in terms of danger and psychological tension: uncertainty and anxiety [6, 8, 10]. This conclusion derives from the equal distribution in 2 groups using these 2 types of sources in the levels of the “danger assessment” (one of the scales) and compliance with the recommended anti-COVID measures.

“High political normativeness” that includes the “Political crises threat estimation” subscale is directly proportional to age: in the youngest group, this factor is rarest, in the oldest group

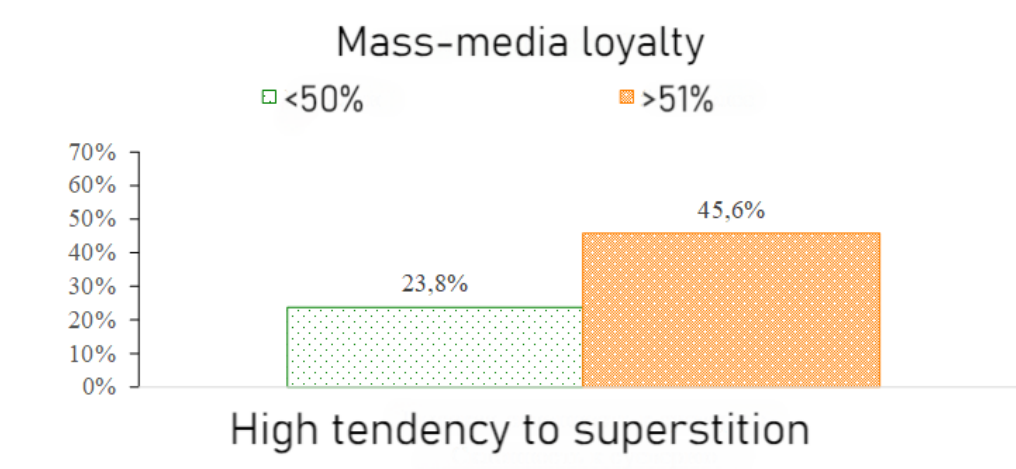


Sequentially between them are 2 groups with medium levels of frequency, the older the more often with a large gap of more than 2 times between medium groups:

The prevalence of respondents who use (in Russia) alternative sources of information (web rather than TV) in the field of the ongoing armed conflict is 79,8% on 20,2%. Young respondents use it more frequently than older [4], natural sciences-educated people more frequently (in the amount of cases) than humanitarian, men use it 18,1% more than women. In the opposite fraction of the sample, not using it, there are also larger tendencies in observing pandemic rules: the self-isolation regime (20% more cases), using the “means of protection” (16% more frequently).

In this fraction, “Political crises threat estimation” is on average 3 points higher; general Mass media loyalty is 12 points higher; Cognitive Distortion tendency is ~5 points higher; and Tendency to superstition is 8,5 points higher on average.

The sub-scale which measures “Political crises threat estimation” indicates the correlation coefficient with the “Tendency to superstition” at the level of $R_s=0,39$ ($p \leq 0,01$). Higher points of this factor are observable in the groups of humanitarian education direction (in comparison with the “natural sciences”), among the fraction which tend to use self-protection means (3 points on average) and to observe self-isolation regime (3,4 points on average). These indicators allow us to conclude that people tend to estimate political, and also epidemical threats, as will be shown down below, quite spontaneously and affectively — in a measure of their steadiness they «keep calm» or get



stressed, get overtension. They usually don't reflect on these issues so much and take it primarily as an emotional trigger, directly affecting them psychologically. Mechanisms of superstition tendency have an impact on the way individual accept the threats that are being discussed in mass media, and define would they get scared and take as many emergency actions as possible or stay emotionally resistant to a stressor [1, 5].

Respondents from the group who got more than 51% scores on our first and the main scale, “Mass media loyalty”, also have 5,2 more points on average on the scale of Tendency to superstition — in comparison with the group on the lower span of our first scale. Elevated markers of superstition occur there 21,8% more frequently than in the group from the lower interval. It confirms the interdependence between these 2 factors and the impact of superstition on the way people decide to perceive global threats.

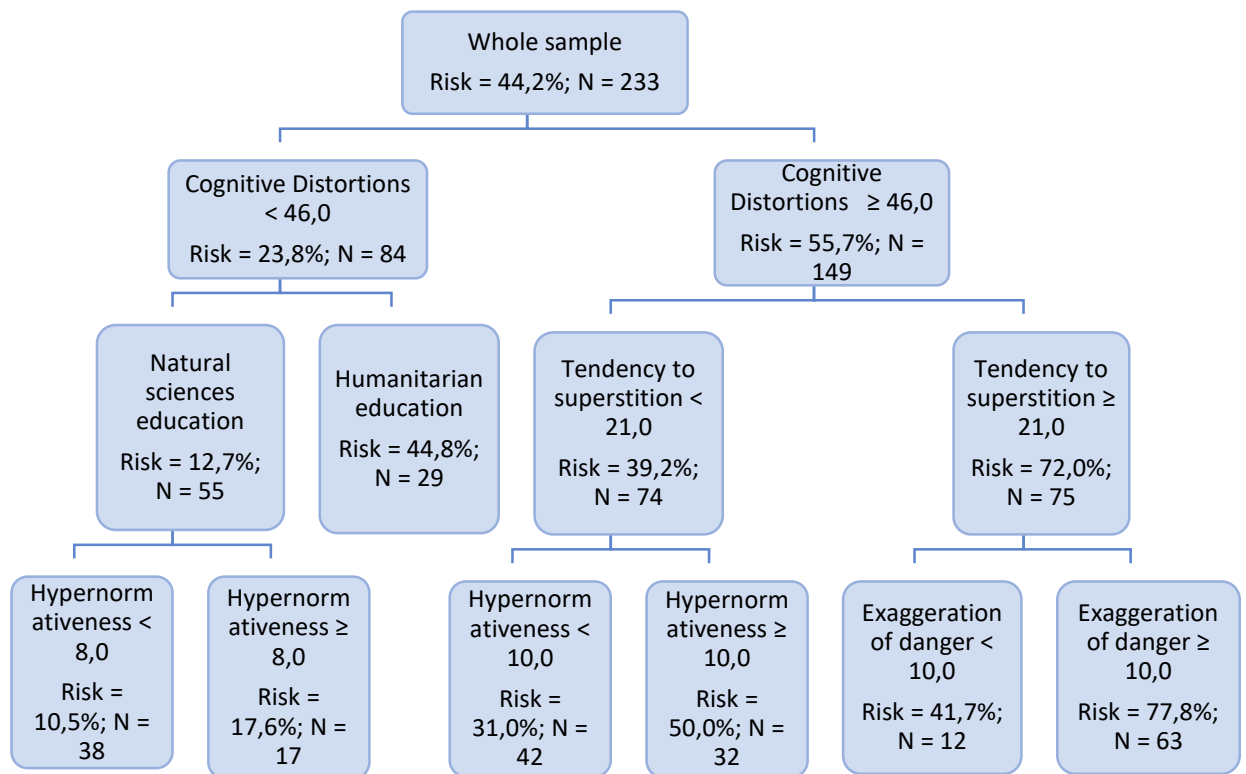
Superstition tendency has an expression also in intrusive actions bordering with obsessive-compulsive symptomatic forcing an individual to fixate on precautionary measures basically to cope with anxiety and to recover the lost sense of security [7, 9, 22].

The same group who took points in the upper interval of the main scale, Mass media loyalty, have on average 5,5 more points on the scale of Cognitive Distortions as well — in comparison with the group from the lower span of the scale. Elevated markers of Cognitive Distortions are 13,2% more common than in the opposite group, which has a lower interval of “Mass media loyalty” points. They have on average 0,9 more points on the sub-scale of Catastrophizing, 1 more point on the sub-scale of Hypernormativeness and 0,8 more points on the Exaggeration of danger sub-scale. This data confirms our initial assumption and hypothesis (#2) about the interdependence between the elevated “Mass media loyalty”, including the danger assessment and crisis actions, and Cognitive Distortions in total as well as in particular.

The next method allows us to trace a possible course of development of cause-and-effect relationships by the cut-off points of the magnitude of any of the quantitative and binary indicators of the methodology. According to the conducted formation of risk classes, the “target event” of High Mass media loyalty with the separate threshold value of 57% points of the scale is predictable by the combination of key parameters which raises its probability from 44,2% to 77,8%:

- “Cognitive Distortions” $\geq 46,0$ »;
- “Exaggeration of danger” $\geq 10,0$ »;
- “Tendency to superstition” $\geq 21,0$ ».

The full visualization of risk classes in the form of a “tree of classification” is shown below:



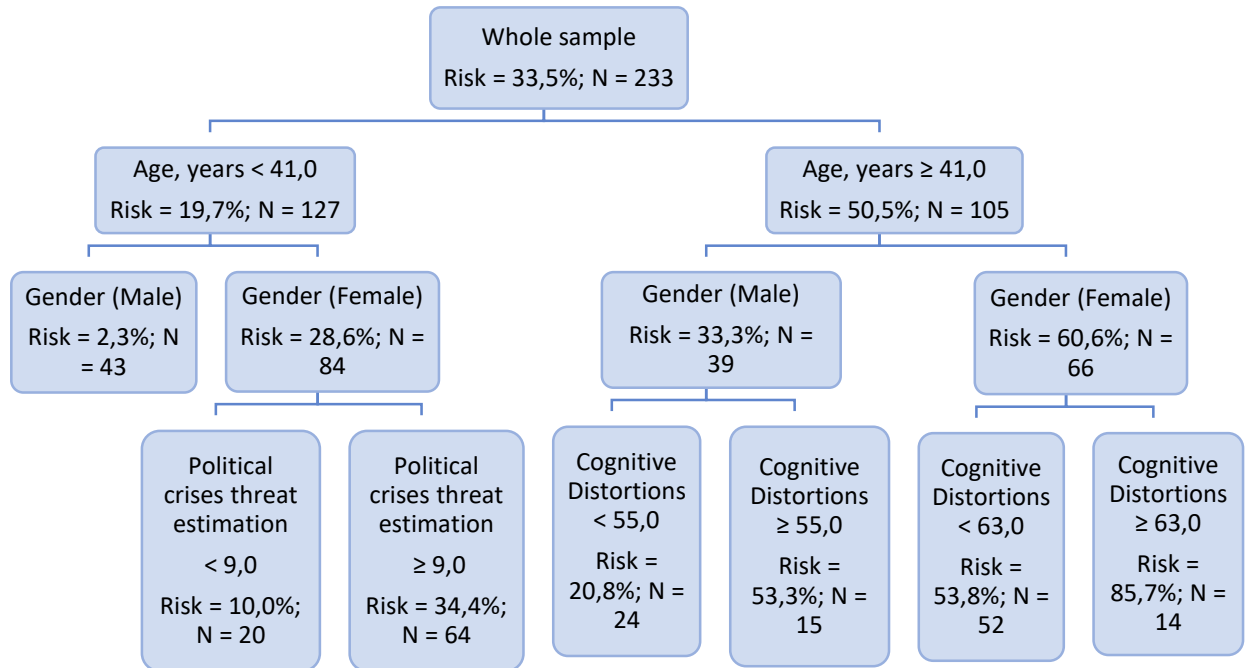
Thus, we see that the Tendency to superstition in case it reaches higher than 21 points on the scale, raises the probability of the target event of High Mass media loyalty from 55,7% to 72%. The results of the conducted one-factor forecasting of this parameter with the same cut-off point also demonstrate very close and similar data.

The combination of factors that raises its probability from 32,3% to 73,5% consists of the following list:

- Age from 45 years old;
- Education in humanities;
- “Cognitive Distortions $\geq 46,0$ ”;
- “Exaggeration of danger $\geq 12,0$ ”;
- “Tendency to superstition $\geq 20,0$ ”.

The obtained threshold values allow forecasting a high level of an individual's susceptibility to heightened anxiety during crisis periods, compulsions and intrusive adherence to safety measures, tolerance towards the social "order" of a pandemic, its restrictions, and the degree of trust in official agenda data. Additionally, it helps establish the prerequisites for this crisis behavior model.

It's quite visible that these groups of factors are nearly matching to each other. The predictive factor that is common for them, "Tendency to superstition", was also prognosed with these 2 methods. Let's take a look at the "tree of classification" forecasting the elevated extent of this tendency:



The combination of parameters, raising its probability from 33,5% to 85,7% consists of the following list:

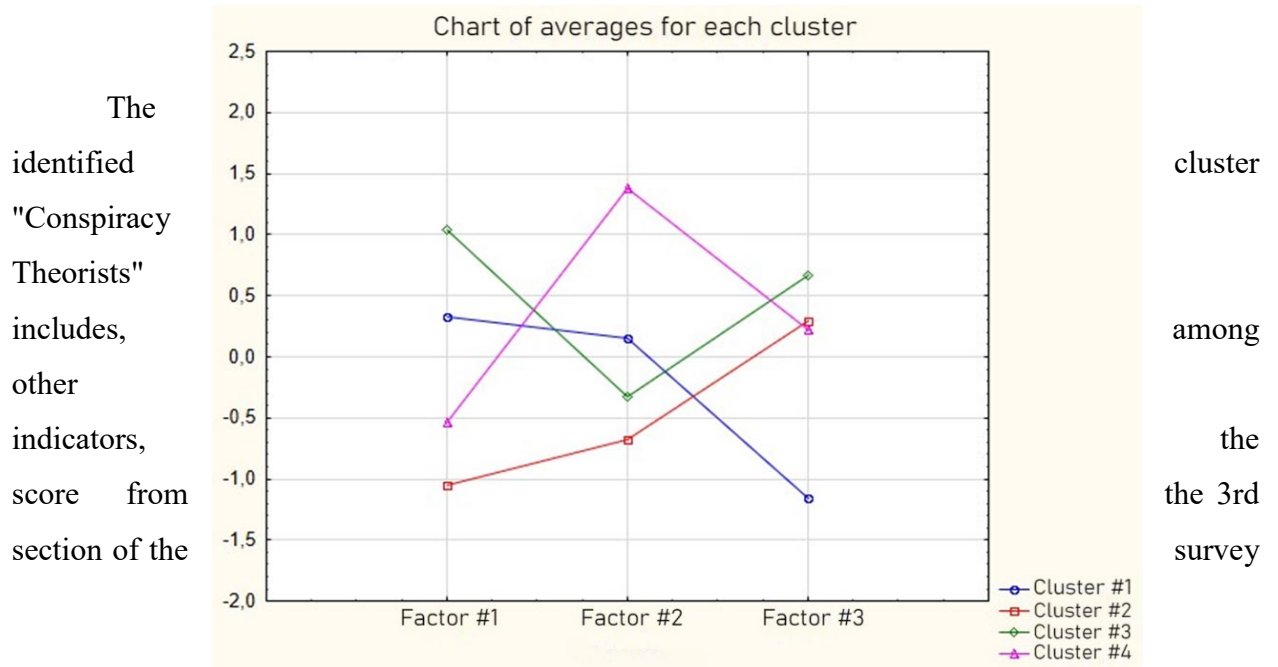
- Age from 41 years old;
- Female gender;
- "Cognitive Distortions $\geq 63,0$ ".

The method of forming risk classes demonstrated the ability to forecast, based on other questionnaire factors, such key indicators as "Tendency towards superstition" and "Propensity for conspiracy theories". Both of the factors were also forecasted by the method of one-factor forecasting. The combination of factors that are raising the probability of elevated extent of the "Tendency to superstition" parameter from 27,7% to 52,9% is the following:

- "Political crises threat estimation $\geq 17,0$ ";
- Age from 41 y/o and more;
- Female gender;

- “Mass media loyalty $\geq 63,0$ ”.

During the cluster analysis, the overall sample of respondents was divided into 4 groups of data or "clusters" with conditional labels: "Realists", "Conspiracy Theorists", "Obedient Citizens", and "Skeptical Pessimists".



methodology, dedicated to the conspiracy theories, which are popular across the internet and mass media. It has scores and parameter levels that align with the considerations of Hypothesis #3 of the study, in particular by showing significantly lower levels on epidemiological sub-scales compared to the other clusters. This cluster exhibits the lowest readiness to comply with preventive measures and the lowest tolerance for restrictions.

Within this group, there are significantly fewer respondents – 89,3% less, compared to the "Obedient Citizens" category – who regularly and consistently used "protective measures" during infection peaks, such as following the "mask and glove regime". There were also 77,1% fewer respondents who followed the "self-isolation regime", and 84,6% fewer vaccinated respondents.

Respondents from the "Conspiracy Theorists" cluster, based on all the compared features, correspond to the semantic field of the widely used colloquial concept of "COVID dissidents" during the pandemic period.

The cluster of respondents with the most adaptive crisis behavior model and indicators of crisis reactions and cognitive abilities in the "safe norm" domain (the task of research #2 was centered around defining this norm and the polar points) turned out to be the cluster designated as "Realists".

Participants of the "Skeptical Pessimists" cluster, identified during the cluster analysis, demonstrated the highest susceptibility to cognitive distortions. They scored an average of 28,3 points higher on this scale compared to participants in the "Conspiracy Theorists" category. They are 88,8% more prone to cognitive distortions and are only surpassed by the "Obedient Citizens" who rank second in this regard.

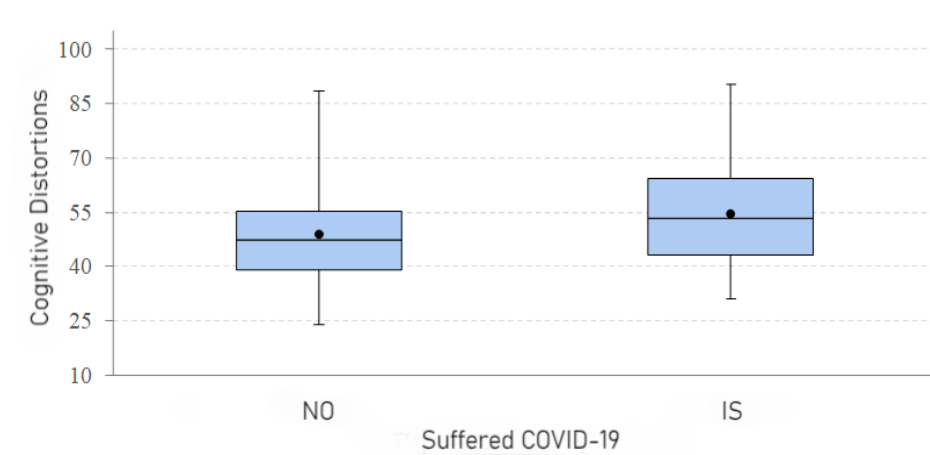
It is also found that cognitive distortions are most prevalent among the younger age group of 18-25 years old, accounting for 64,8% of the total number in that age group. In this age group, cognitive distortions are more widespread and average 12 points higher compared to the second middle age group of 36-50 years old.

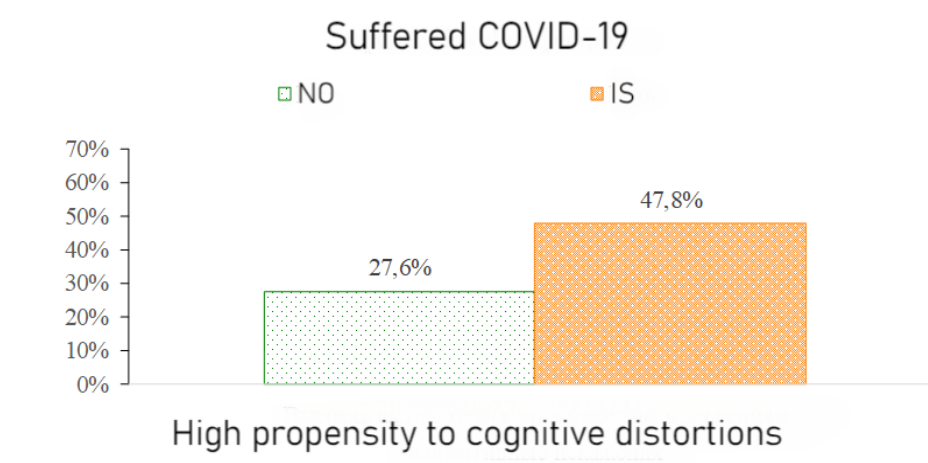
Furthermore, according to the conducted factor analysis on this indicator, a high inclination towards cognitive distortions increases the probability to 72% in case of a combination of several indicators is present. These indicators include "Tendency to superstition $\geq 27,0$ ", age younger than 28, and the youngest age group (18-25 years old). The level of inclination towards cognitive distortions is correlated with the level of superstitious thinking. The full table of the conducted factor analysis on high susceptibility to Cognitive Distortions, along with the increase in probabilities for each factor, is shown below:

| Factor | High propensity to cognitive distortions: frequency (risk, %) | | Risk change (95% CI) | Relative risk (95% CI) | P-Value |
|---|---|---------------|-----------------------|------------------------|---------|
| | Factor: NO | Factor: IS | | | |
| Tendency to superstition $\geq 27,0$ | 60 (32,8%) | 36 (72,0%) | 39,2 (25,0; 53,4)% | 2,2 (1,68; 2,88) | <0,0001 |
| Age, years < 28,0 | 55 (32,7%) | 41 (64,1%) | 31,3 (17,6; 45,1)% | 1,96 (1,47; 2,60) | <0,0001 |
| Age group 18-25 y/o | 61 (34,3%) | 35 (64,8%) | 30,5 (16,0; 45,1)% | 1,89 (1,43; 2,51) | <0,0001 |
| Propensity for conspiracy theories $\geq 10,0$ | 72 (36,4%) | 24 (68,6%) | 32,2 (15,4; 49,0)% | 1,89 (1,41; 2,52) | 0,0004 |
| Use of recommended "Means of protection" $\geq 5,0$ | 25 (27,2%) | 71 (50,4%) | 23,2 (10,9; 35,5)% | 1,85 (1,28; 2,69) | 0,0004 |

| | | | | | |
|---------------------------------------|---------------|---------------|-----------------------|----------------------|--------|
| Mass media loyalty $\geq 52,0$ | 34 (29,8%) | 62 (52,1%) | 22,3 (10,0; 34,6)% | 1,75 (1,26; 2,43) | 0,0006 |
| High tendency to superstition (IS) | 56 (36,1%) | 40 (51,3%) | 15,2 (1,7; 28,6)% | 1,42 (1,05; 1,92) | 0,0266 |

In light of the trend in research on the neurobiological consequences of SARS-CoV-2 infection and its impact on cognitive function, it is important to note the established differences in susceptibility to cognitive distortions among groups of people who have had COVID-19. Among the group that has experienced the infection, an increased number of high scores on this scale has been identified. The statistically significant difference is 20,1% in favor of the group that has had COVID-19. The ratio between these two groups is 47,7% vs 27,6%, and the comparison of scores shows an average difference of 5,6 points in favor of the group that has had COVID-19. Specifically, differences have been found in "Exaggeration of Danger" with an average difference of 0,7 points on the subscale, and in "Catastrophizing" with an average difference of 0,9 points. "Hypernormativeness" also differs between the groups, with an average difference of 1,2 points in plus of the group that has had COVID-19 ($P < 0.0001$, max).





The "epidemiological" parameters and "political" indicators of the methodology, when comparing values between groups, demonstrated homogeneity and a direct proportional relationship, as it was assumed at the hypothesis stage.

The obtained data groups have practical significance for predicting the social situation in the event of potential further social crises and epidemiological scenarios, as well as conducting accurate measurements in their conditions. This information can aid in the development of response strategies and decision-making based on scientific data to effectively manage and minimize various risks and consequences in such situations.

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