

The use of informational technology for sustainable development: implications for students with different levels of life meaningfulness

Anastasia Grishina^{1*}, Elena Dyakova², Evgeny Pronenko¹, and Ismail Ismailov¹

¹Don State Technical University, Sq.Gagarina 1, Rostov-on-Don, 344000, Russia

²Rostov State Transport University, Rostov Rifle Regiment of the People's Militia Sq., 2, Rostov-on-Don, 344038, Russia

Abstract. The article is devoted to the study of the relationship between the fact of violation of psychological boundaries, as a consequence of active using of informational technologies in everyday life, the level of meaningfulness of life and coping strategies of students. The authors indicated the relevance of the study, analyzed theoretical approaches to the phenomenon of violation of psychological boundaries, as a consequence of the active use of informational technologies in the context of meaningful life and coping strategies. The article describes the procedure of empirical research. It has been shown that students with medium and high levels of meaningfulness of life have a tendency to expand the boundaries in the process of communication in the informational space. It was revealed that the leading behavioral strategy of students who are prone to psychological dependence on informational technologies, expressed in the impossibility of refusing them, as well as in their subjective significance, are the strategies of escape and avoidance of problem situations in real life. The study of the relationship between coping strategies and violation of psychological boundaries has shown that non-adaptive strategies of behavior and response, expressed in ignoring real problems, have a strong positive relationship with the active escape of students into the informational space, as well as an average positive relationship with expanding the boundaries of communication on the Internet.

1 Introduction

1.1 Relevance

Informational technologies in recent decades have significantly changed the life of almost every person and society as a whole. These changes are justified by a number of factors, the most important of which is the ability of technologies to provide each individual with a

* Corresponding author: avgrishina.donstu@gmail.com

wide range of opportunities to meet a variety of needs. No less significant factors are the relative ease of handling technologies, as well as a huge set of products of the information environment, where each individual is able to find something for himself- means for fulfilling a need that he especially needs.

Against the background of the positive aspects of the active use of information technologies, there are also negative aspects that especially attract the attention of researchers in various fields of scientific knowledge. From the psychological point of view, the factor of the development of Internet addiction among users is considered as one of the products of violation of psychological boundaries [1]. In turn, it is of our interest to have clear relationships between users' understanding of the processes and phenomena occurring in their lives, as well as the most permanent strategies for responding to difficult life situations.

The influence of information technologies on the psyche of individuals is actively studied by Russian and foreign researchers. Based on the theoretical position of the authors of the methodology for diagnosing the psychological consequences of the influence of information technologies on a person, the change in psychological boundaries acts as a system-forming link in a whole series of changes. It becomes a kind of basis for attitudes towards technology or technical means, as well as an emotional component in the process of their use, thereby facilitating formation of technological dependencies [1].

The phenomenon of dependence on informational technologies is raised by many authors, but the predominance is mainly observed in considering the processes that accompany the development of Internet addiction, and because of this, they are its kind of “markers”. For example, M. Griffiths says in his writings that the presence addiction in general (not only about Internet addiction, since the author considers the term Internet addiction to be rather vague in view of the fact that technology can only act as an object for the implementation of already formed addictions) is evidenced by a number of factors, such as: the importance of the addiction object, increased tolerance to its functionality during use, mood changes, withdrawal symptoms when the object of dependence is abandoned, conflicts following the restriction in the use of technology and, lastly, a high probability of relapse [2]. Many authors also pay special attention to the personal characteristics of users who have been diagnosed with dependence on information technology, for example, A.A. Kolmogortsev and E.A. Rylskaya found that Internet addicts have a number of maladaptive features, such as low self-control, increased anxiety, emotional tension and instability [3]. The authors also argue that there is difficulty in determining whether the above traits are the basis for an increased risk of developing an addiction or whether these traits are the result of an already formed addiction [3, 2].

The meaningfulness of life is understood by many authors as the innate desire of any individual to search for the meaning of his existence [4, 5], the failure of which, according to V. Frankl's ideas, may threaten the formation of noogenic neuroses that differ from the classical basis, consisting of two complementary phenomena - existential frustration and the existential vacuum that follows it [4-8]. Based on the views described above and the methodology of “goal in life” (authors D.Ch. Crumbo, L.T. Maholik), D.A. Leontiev developed a theoretical model of the meaningfulness of life, which served as the basis for the further development of the methodology of life-meaningful orientations. In the theoretical model of D.A. Leontiev included the following components, which later became the scales of the methodology: “goals in life” is the orientation of the individual to the future, the presence or absence of plans for the implementation of the chosen life scenario; “life process”, which shows the perception of the processes of one's own life in terms of their saturation and subjective interest (this component evaluates the present of the individual); “life performance” indicates satisfaction with the results of past events, as well as “locus of control Self or Life”, indicating the individual's confidence that the main

system-forming factors of his life position and experience are his own abilities and character traits or external circumstances [4].

The idea of coping behavior (coping strategies) is also different for many authors. For example, Z. Freud considered coping behavior from the dispositional approach, wondering if there are certain personal characteristics and qualities that contribute to a more successful overcoming of life's difficulties [6]. From the situational approach (R. Lazarus, S. Folkman, etc.), overcoming life's difficulties with the resulting stress involves the choice of an appropriate specific strategy of behavior and response; important is the fact that the strategy changes depending on the situation [9]. Representatives of the latter integrative approach (R. Moos, J. Schaeffer) consider both the current situation and the personal characteristics of the individual from the point of view of predictors of the choosing one or another coping strategy [7].

1.2 Aim and objective of study

The aim of the study: the relationship between the fact of changing psychological boundaries when using the Internet by adolescents, their level of meaningfulness in their own lives, as well as strategies for coping behavior in a crisis situation.

The object of the study was 57 students-psychologists of 2-4 courses of Don state technical university, Rostov-on-Don, Russia.

Based on the purpose of the study, the following hypotheses were put forward:

- Changes in psychological boundaries when using the Internet may differ among students with different levels of meaningfulness of life;
- Changes in psychological boundaries when using the Internet may differ among students with a choice of different coping strategies.

Choosing students as the object of research, the fact that most of the Internet users are young people was taken into account. Since the Internet space is a receptacle for content replenished for the most part by the users themselves (with different preferences and views on life), it is not uncommon to observe marginal materials in the virtual space, oriented primarily to the younger generation, whose views on life, morally value orientations, as well as character, are not yet fully formed.

2 Methods

An empirical study was conducted on the basis of the Don State Technical University with full-time students of the "Psychology, pedagogy and defectology" faculty. The study involved 57 students, aged 18 to 46 years, the average age was 20 years.

The following research methods were used:

- "Methodology for diagnosing changes in psychological boundaries when using technical means" MIG-TS-2 (Rasskazova E.I., Emelin V.A., Tkhostov A.Sh.).
- "Ways of Coping Questionnaire" WCQ (Lazarus R., Folkman S.).
- "Test of life-meaning orientations" LMO (Leontiev D.A.).

Since the distribution of data according to the definition of the Kolmogorov-Smirnov criterion turned out to be normal, Pearson's correlation coefficient was used as a criterion for mathematical statistics. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 22.0.

At the first stage of the empirical study, we made an analysis of the violation of psychological boundaries due to the use of the Internet using the MIG-TS-2 methodology. The methodology is divided into 2 objects of research: mobile phone and the Internet. The technique includes 9 scales; each of which contains a number of statements (the total number of statements for the "mobile phone" object is 31, for the "Internet" object - 36).

The scales “the impossibility of abandoning technology” and “subjective significance” at high scores collectively illustrate the presence of Internet addiction (at low scores, its absence), the scales “expanding the boundaries in communication”, “reflection of breaking boundaries”, “preference for technology - simplicity” and “technology preference - opportunities” together with high scores indicate the phenomenon of changing psychological boundaries, the scales “functionality”, “convenience” and “creating an image” together with high scores indicate changes in the area of individual needs. For each question, the methodology involves 4 response options (“disagree”, “rather disagree”, “rather agree”, “strongly agree”).

In order to study the meaningfulness of life we used LMO test. The technique consists of 20 pairs of opposite statements, among which the subject chooses the degree of agreement with one of the statements (or agreement with both statements at the same time). The methodology based on ascending and descending scales (each of the scales corresponds to certain questions) is divided into 5 subscales: “goals in life”, “life process”, “life performance”, “locus of control - self”, “locus of control - life”, the number of points for each subscale shows the severity of the phenomenon or property corresponding to them, the integral (total) indicator for all subscales illustrates the general level of meaningfulness of life, which can correspond to a high, medium or low level.

To study the choice of certain coping strategies by the subjects, we used the WCQ methodology, consisting of 50 statements. The following answers must be selected: “never”, “rarely”, “sometimes”, “often”. The methodology contains 8 scales, each of which corresponds to certain statements, each scale according to the results indicates the severity of a particular coping strategy, which can be at one of the levels: low severity, medium severity, high severity. WCQ scales: “confrontation”, “distancing”, “self-control”, “seeking social support”, “accepting responsibility”, “escape-avoidance”, “problem resolution planning” and “positive reappraisal”.

3 Results

According to the results obtained according to the “Methodology for diagnosing changes in psychological boundaries when using the Internet” (MIG-TS-2), this sample showed the following results (Fig. 1).

A high level of severity in the majority of respondents is observed on the entire scale of psychological dependence (the impossibility of abandoning informational technology (hereinafter referred to as IT) - 54.4%, the subjective significance of IT - 78.9%). Almost the same indicators are observed for the majority on the scales “preference for technologies - opportunities” (“scale of changing psychological boundaries”) - 56.1% and “functionality” (IT fulfillment of its main function - scale “change of needs”) - 66.6%.

A low level of severity on all scales is practically not observed in all respondents; the number of people with low scores did not rise above 14% of people on any scale and on the scales “subjective dependence”, “technology preference - opportunities”, “IT functionality” and “IT convenience” none of the respondents showed a low level.

Perhaps this is due to the fact that any technology has a specific range of tasks with which it works (functionality). Due to the embedded algorithms, the technology provides the user with new opportunities, and the interface of most hardware and software products is designed as clearly as possible for the average user, which explains the convenience of using a particular product.

The individual, recognizing the convenience of such tool in the process of using it, begins to resort to it more and more often when a specific need arises. Thus, gradually, technology becomes indispensable for a person, hence its subjective significance and the further impossibility of abandoning it.

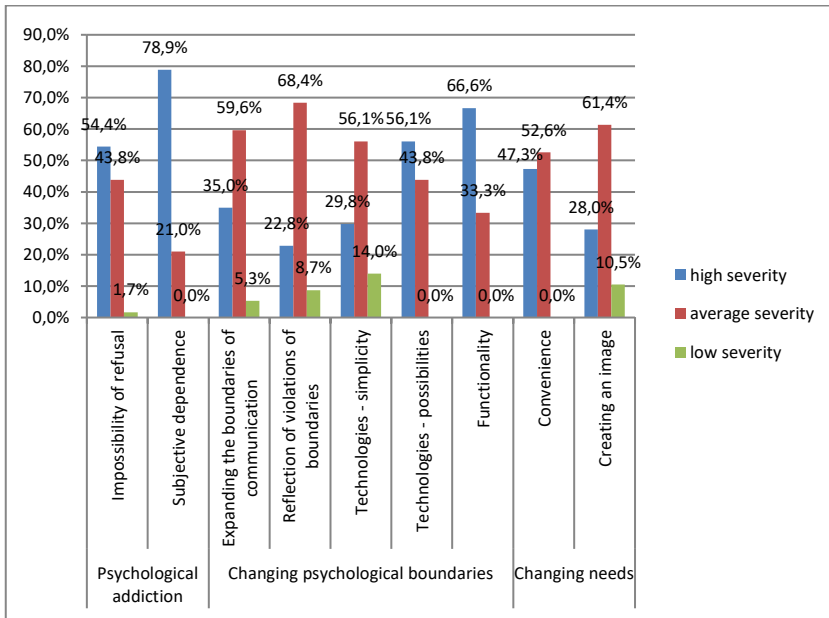


Fig. 1. The result of a survey of students according to the MIG-TS-2 methodology, (the percentage indicates number of students from the total number of sample).

From a psychological point of view, the personal boundaries of an individual at the moment of a collision with technology expand, verifying it as a means to satisfy one or another information need. Over time, the fact of the presence of such an intermediary is taken for granted, and here we can say that the technology has successfully assimilated into the personal psychological boundaries of the individual.

According to the results of "Test of life-meaning orientations" (LMO), this sample showed the following results (Fig. 2).

The results show that a rather small number of students have a high level of meaningfulness of life, only 7% of respondents, the average level prevails - 54.3% and low - 38.5% of respondents.

The number of points corresponding to a low level of meaningfulness is observed in most of the respondents on the scale of "goals in life" - 43%, while only 17% of students showed high results. It can be concluded that the planning of one's life and goal setting causes the greatest difficulties in terms of their comprehension among our respondents.

Only 7% of the total number of respondents demonstrated high scores on statements regarding the level of emotional saturation of life (the "life process" scale), 33.3% of respondents demonstrated low scores, 59.6% showed average scores. In the sample, therefore, the representation of the emotional side of one's life as measured is more common, and a little less often - as meager.

A small scatter is observed between high and low values of meaningfulness level on the scale of "locus of control - self" (the difference is 5.3%). From this it can be assumed that the level of understanding oneself as the master of one's own life may be explained by the individual mental properties of the personality (temperament, character). According to the "locus of control - life" scale, only one respondent out of 57 has a low indicator, which indicates the almost complete absence of fatalistic ideas about life among students.

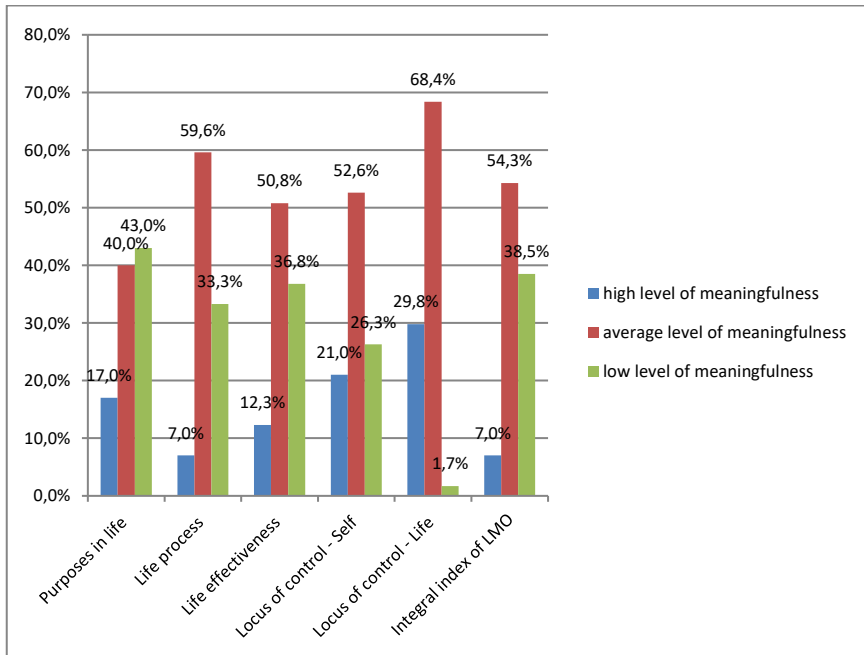


Fig. 2. The result of a survey of students using the LMO test (the percentage indicates the number of students from the total number of sample).

According to the results obtained on the questionnaire "Ways of Coping Questionnaire" WCQ, this sample showed the following results.

For the majority of respondents, coping strategies on all scales are expressed at an average level, which indicates a "borderline state of the adaptive potential of the individual."

According to the "positive reassessment" scale, the majority of students (50.8%) have a high level of coping tension, which indicates the tendency of the respondents to rethink their experiences and, in most negative situations, look for positive aspects, stimulating gradual personal growth; a low level on this scale is observed only in 5.2%.

Despite the positive aspects of a high level of positive reassessment of the situation, sometimes this can also lead to negative consequences, for example, against the background of a constant search for positive aspects in a problem, one can miss the opportunity to find ways to solve it.

According to the "acceptance of responsibility" scale, a high level of this strategy is not observed in any of the respondents: a low level prevails in 50.8%, average – in 43.1%, which indicates a rather adaptive coping variant. Most of the respondents admit that they are responsible for the emergence of a negative situation, analyze their behavior, but do not resort to constant self-criticism and do not place excessive responsibility on themselves for the emergence of a problem (Fig. 3).

The study of the relationship between the change in psychological boundaries when using the Internet and the integral indicator of the meaningfulness of life showed that direct and inverse relationships were revealed between these indicators based on Pearson's correlation analysis. Direct noticeable relationships according to the Pearson criterion were found between the following scales:

- scale "expanding the boundaries of communication" and the average level of meaningfulness of life ($r = 0.59$, at $p \leq 0.01$);

– scale “expanding the boundaries of communication” and a high level of meaningfulness of life ($r = 0.61$, at $p \leq 0.01$).

A relatively moderate negative relationship is observed between the following scales:

- scale "technology preference - simplicity" and low meaningfulness of life ($r = - 0.49$, at $p \leq 0.05$);

- scale "impossibility of refusal" and high meaningfulness of life ($r = - 0.35$, at $p \leq 0.01$).

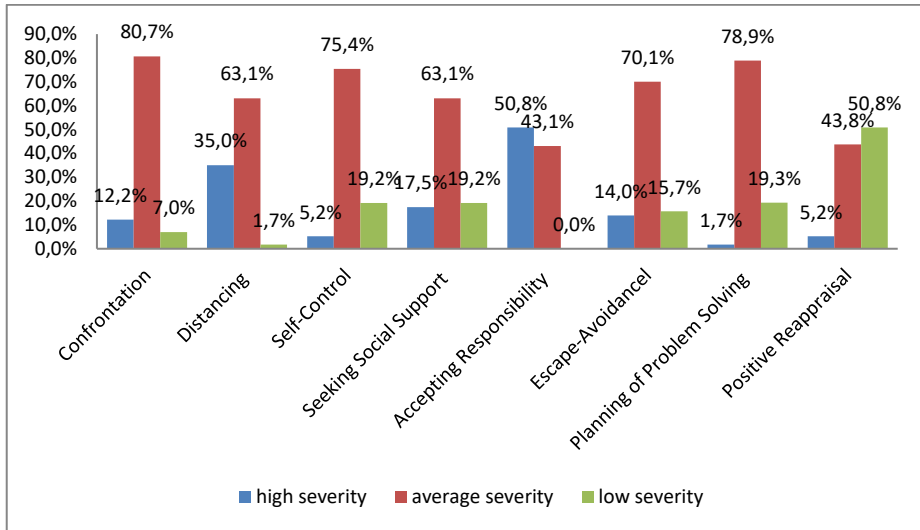


Fig. 3. The result of a survey of students according to the methods of coping behavior (the percentage indicates the number of students from the total number of sample).

The obtained results may indicate that students with high and medium levels of meaningfulness of their own life processes have a tendency to expand the boundaries of communication in the network, when physical distance between two or more individuals is not perceived as an obstacle to communication, moreover, the very fact of this distance can simply be ignored, giving the impression of real communication not mediated by distance. Perhaps this is due to the fact that in the process of dialogue between individuals exchanging information, people with an average and high level of meaningfulness of life shift the focus more to the effectiveness and essence of the dialogue, rather than to secondary physical contact in the communication process.

Also, based on the obtained results, we can conclude that the less students are inclined to comprehend their lives, the more they value informational technologies in terms of ease of use and vice versa. This trend can be explained by a total tendency to simplify life.

There is also a weak negative relationship between a high level of meaningfulness of life and the impossibility of giving up informational technology. Also, technologies give the opportunity to choose among millions of individuals an interlocutor with the most similar views and life positions, which in reality is not achieved very often.

The study of the relationship between changes in psychological boundaries when using the Internet and coping strategies of students showed that direct, different in strength, relationships were identified based on Pearson's correlation analysis. Relationships were found between the following scales:

- scales "impossibility of refusal" and "escape - avoidance" ($r = 0.72$, at $p \leq 0.01$);
- scales "subjective dependence" and "escape - avoidance" ($r = 0.70$, at $p \leq 0.01$);

- scales "expanding the boundaries of communication" and "escape - avoidance" ($r = 0.59$, with $p \leq 0.01$);
- scales "functionality" (technology) and "confrontation" ($r = 0.50$, at $p \leq 0.01$);
- scales "functionality" (technology) and "distance" ($r = 0.59$, at $p \leq 0.05$).

A high direct relationship between the maladaptive strategy of escaping from solving existing problems and psychological dependence on informational technologies (psychological dependence on informational technologies, according to the above-described MIG-TS-2 methodology, is a synthesis of high scores on the scales "impossibility to refuse IT" and "subjective significance IT") can be explained by the use of technical means by students solely for the purpose of distraction, avoiding existing problems; perhaps the respondents are inclined to escape to the Internet space in order to alleviate the existing experiences. Since this strategy can be used by individuals systematically, the frequency of using a technical means to overcome experiences can increase, hence the impossibility of abandoning it against the background of high subjective significance is observed, which indicates the emerging psychological dependence on technology.

A noticeable relationship is also observed between the escape-avoidance strategy and the expansion of the communication boundaries, which may indicate that respondents who, for certain reasons, choose such a strategy are looking for people with similar interests and similar problems to reduce the level of tension against the background of a "virtual community".

A noticeable relationship is also observed between the "functionality" scale of the technology and the confrontation and distancing coping scales. In the case of confrontation, such a relationship may possibly indicate the consideration of technology from the point of its functionality, because it (the functionality) involves the solution of a specific range of tasks; an individual with a confrontational strategy of behavior chooses a "tool" for solving a problem situation that strictly corresponds to the set problem tasks for their successful resolution. In the case of the distancing strategy, the relationship can be explained by the tendency of such individuals to choose polyfunctional technologies, which, due to a large number of virtual opportunities, can reduce the level of subjective significance of the problems that an individual has, by temporarily absorbing his attention.

Thus, we can make a general conclusion that the level of meaningfulness of life and the choice of certain coping strategies by individuals in some respects is reflected in the fact of changing psychological boundaries with the active use of information technology.

4 Discussion

The described results are in line with works of scientists studying the connection between Internet mediated communication and psychological boundaries in social interaction with parents and friends, subjective well-being (and meaningfulness of life as its component) and coping strategies.

The problem of blurring the psychological boundaries using the informational technologies is also widely studied abroad. A.M.Manago, G.Brown, et al., concern that computer-mediated communication (CMC) is displacing face-to-face (FtF) interactions and disrupting social development. We can suggest that this relates to psychological boundaries in communication (closeness and distance). It was found that CMC time with parents predicted greater volitional dependence (volition plus closeness) whereas texts with friends predicted greater independent decision-making (volition plus distance). According to this results authors discuss how CMC can facilitate, rather than stifle, adolescents' adjustment of autonomy-relatedness with parents and their construction of emotional closeness with friends [9, 10].

E.Viklund, A.K.Forsman studied the connection between subjective well-being (measured by perceived meaningfulness, happiness and life satisfaction) and internet use (distinguishing between internet users, non-users and users with support, and diverse internet activities). Statistically significant associations were found between perceived life meaningfulness and internet use [11].

Our results are in contrast with the study of Cauberghe, V., Van Wesenbeeck, I., et al., who has shown that social media can be used as a constructive coping strategy for adolescents to deal with anxious feelings and stress during the COVID-19 quarantine. In our work it was found that coping strategies “avoidance” and “escape” lead to psychological dependence from informational technologies. So, in our opinion escaping into virtual world can not be considered as a constructive one.

Our study is multi-stage, we are faced with the task of further consideration and study of this problem in order to understand better the reasons for its existence and its features. All the data obtained in the course of the study were and will be further subjected to a comparative analysis with similar studies by domestic and foreign authors, since it is the conclusions of many other scientists that help us adjust the stages of our empirical research.

5 Conclusions

According to the results of the empirical study, the following conclusions can be drawn:

The level of meaningfulness of life among students noticeably positively and negatively correlates with the fact of violation of psychological boundaries due to the use of information technology: students with medium and high levels of meaningfulness of life, according to the results of the study, may experience expansion and “blurring” of psychological boundaries in the process of communication in the Internet environment.

Based on the results of comparing the scales of the questionnaire on coping behavior and the scales of the methodology for diagnosing changes in psychological boundaries, a weak relationship was revealed between the strategy of avoidance and confrontation and consideration of information technologies in terms of the opportunities they provide. A high correlation was found between the strategy of escape, avoidance of problems and psychological dependence on informational technology, which is expressed by the subjective significance of technology for the individual and the impossibility of refusing to use it.

In conclusion, we can say that in the age of technological progress, the process of perception is being transformed, the individual begins to regard himself, the people around him and objects no longer from the point of view of his real physical and mental capabilities, but from the point of view of technically dictated capabilities. The main example in our work is the perception of proximity, distance, accessibility and controllability of people and objects in real, physical distance is distorted. Thanks to informational technology, people who are in another corner of the earth can be psychologically more accessible to us than people who are in a neighboring city. Also, technical means provide individuals with some “shelter”, adjusting the virtual environment to the user’s requests, thus combining with maladaptive strategies of behavior in real life, which, when used permanently, can lead to negative consequences, for example, to the development of psychological dependence on information technology.

The research was supported by the Russian Science Foundation (Project No. 22-78-10107) (2022) «Transformation of constructive and destructive strategies of informational behavior of youth in the context of of geopolitical risks growth: psychological, psychophysiological and psychogenetic predictors».

References

1. E.I. Rasskazova, V.A. Emelin, A.Sh. Tkhostov, *Diagnostics of the psychological consequences of the influence of information technologies on a person: tutorial for students of psychological specialties* (Acropolis, Moscow, 2015).
2. M. Larkin, R.T. Wood, M.D. Griffiths, Toward addiction as a relationship. *Addiction Research and Theory*, **14**, 207-215 (2006)
3. A.A. Kolmogortseva, E.A. Rylskaya, Individual psychological characteristics of a person with Internet addiction. *Psychology. Psychophysiology*, **14**, 14-22 (2021)
4. D.A. Leontiev, *Test of life-meaning orientations (LMO)* (Meaning, Moscow, 2000)
5. V. Frankl, *The Will to Meaning* (Alpina non-fiction, Moscow, 2020).
6. T.L. Kryukova, *Psychology of coping behavior in different periods of life* (KSU, Kostroma, 2005)
7. I. Abakumova, G. Zvezdina, A. Grishina, *Features of Coping Behavior of Students in Connection with Models of Informational Behavior*. In: Beskopylny, A., Shamtsyan, M. (eds) XIV International Scientific Conference “INTERAGROMASH 2021”. *Lecture Notes in Networks and Systems*, Springer, **247** (2022).
https://doi.org/10.1007/978-3-030-80946-1_66 .
8. I. Yalom, *Existential Psychotherapy* (Klass, Moscow, 2019).
9. R.S. Lazarus, S. Folkman, *Stress, appraisal, and coping* (New York: Springer, 1984).
10. A.M. Manago, G. Brown, K.A. Lawley, G. Anderson, *Adolescents' daily face-to-face and computer-mediated communication: Associations with autonomy and closeness to parents and friends*. *Developmental psychology* **56(1)**, 153–164 (2020).
<https://doi.org/10.1037/dev0000851>.
11. E. Viklund, A.K. Forsman, *Exploring the Nuanced Links Between Internet Use and Subjective Well-Being Among Older Adults: A Nordic Population-Based Study*. *Frontiers in psychology* **12**, 797269, (2022).
<https://doi.org/10.3389/fpsyg.2021.79726>.