

Research article

UDC 159.923.35

<https://doi.org/10.21702/rpj.2022.1.9>

Impact of the Covid-19 Pandemic on the Metacognition and Emotional Intelligence of Natural Science Students

Ekaterina I. Perikova¹✉, Valentina M. Byzova²

^{1,2} Saint Petersburg State University, Saint Petersburg, Russian Federation

✉ chikurovaEI@gmail.com

Abstract

Introduction. This paper presents the results of an empirical study that compares the parameters of the metacognitive components and emotional intelligence (EI) of young people using cross-sectional surveys before and during the COVID-19 pandemic. This study explores, for the first time, the effects of remote learning during the COVID-19 pandemic using samples of natural science students. **Methods.** The sample was comprised of 551 second-year students at St. Petersburg State University, 260 of whom took part in the study in 2018–2019; 98 respondents took part in the study in May 2020; 114 respondents took part in the study in January 2021; 79 respondents took part in the study in May 2021. The study used the following diagnostic tools: (a) the Emotional Intelligence Questionnaire developed by D. V. Lyusin, (b) a short version of the Metacognitive Awareness Inventory modified by E. I. Perikova and V. M. Byzova, (c) the Differential Test of Reflectivity developed by D. A. Leontiev and E. N. Osin, and (d) the Self-organization of Activity Questionnaire developed by E. Yu. Mandrikova. **Results.** The study showed an increase in the scores of metacognitive awareness and metacognitive regulation, as well as a reduction in interpersonal EI in students during the COVID-19 pandemic, compared to the pre-pandemic group. Students' scores of purposefulness and intrapersonal EI increased significantly during the pandemic. However, the differences were only significant in some pandemic subgroups. The predictors contributing to the level of intrapersonal EI differed in the pre-pandemic and pandemic groups. Systemic reflection and purposefulness were significant predictors of the level of intrapersonal EI for the pre-pandemic group (explained 11 % of the variance). Systemic reflection, metacognitive knowledge, and perseverance were significant predictors of the level of intrapersonal EI for the pandemic group (explained 28 % of the variance). **Discussion.** The emerging transition from the classical form of learning to remote learning, in the context of the Coronavirus pandemic, seems to lead to an improvement in metacognitive regulation and a decline in interpersonal EI in students of natural sciences.

Keywords

emotional intelligence, metacognition, metacognitive regulation, reflection, self-organization, purposefulness, perseverance, pandemic, higher education, remote learning

Highlights

- ▶ Compared to the pre-pandemic sample, students of the pandemic group showed an increase in scores of metacognitive awareness, as well as a decrease in interpersonal emotional intelligence.
- ▶ Purposefulness and intrapersonal emotional intelligence increased in some student samples during the pandemic compared to the pre-pandemic sample.
- ▶ The predictors that contribute to interpersonal emotional intelligence in young people during the COVID-19 pandemic are systemic reflection, metacognitive knowledge, and persistence.

Funding

This study was supported by the RF Presidential Grant for Young Scientists (project No. MK-2021.2021.2).

For citation

Perikova, E. I., & Byzova, V. M. (2022). Impact of the Covid-19 pandemic on the metacognition and emotional intelligence of natural science students. *Russian Psychological Journal*, 19(1), 112–126. <https://doi.org/10.21702/rpj.2022.1.9>

Introduction

The COVID-19 pandemic has led to dramatic changes in the organization of the educational process in global higher education systems. In spring 2020, many educational institutions were forced to move to remote learning and maintain remote learning for the next two years to comply with restrictions implemented by governments. Although several Russian universities have used online courses or programs before (Bekova et al., 2020), most of the major educational programs suggested full-time education, which included training practice and internship, as well as non-clinical laboratory studies.

The transition to remote learning brought to life the challenges widely described in the literature, including the problem of social inequality in higher education (Williamson, Eynon, & Potter, 2020; Soria & Horgos, 2020), as well as technical problems of remote learning (Bekova, Terentiev, & Maloshonok, 2021); lack of motivation (Soria, Chirikov, & Jones-White, 2020) and lack of communication with classmates and teachers (Soria, et al., 2020; Bekova, et al., 2021). These obstacles had a profound effect on learning efficiency and caused a significant increase in stress levels in students (Aleshkovskii, Gasparishvili, Krukhmaleva, Narbut, Savina, 2020; Chirikov, Soria, Horgos, & Jones-White, 2020; Soria et al., 2020).

Previous research suggests that students at the first level of higher education – those who obtained a bachelor's degree (Chirikov et al., 2020), especially first-year students (Soria et al., 2020) had the greatest difficulty. Natural science, engineering, and art students (Soria et al., 2020) have faced the greatest challenges, as the content of some of their courses was not appropriate for online learning at all.

Russia's researchers also reported that young people were among the most affected groups by the pandemic (Baranova, Dubovskaya, & Savina, 2021). Nevertheless, the unique experience acquired by a young person in the current extreme situation can have a positive impact on behaviour and personal qualities in general (Magomed-Eminov, 2008). Thus, the success of remote learning during a pandemic is linked with the willingness to maintain the working capacity necessary for learning. Such behaviour could impact the development of metacognitive abilities and emotional intelligence (EI).

Studies of remote learning formats such as massive open online courses (MOOCs) have shown that their students need specific knowledge and skills for successful completion of MOOCs, including motivation (Milligan, & Littlejohn, 2014); self-regulatory learning and reflection skills (Littlejohn, Hood, Milligan, & Mustain, 2016; Kizilcec, Saltarelli, Reich, & Cohen, 2017); previous experience of taking such courses (Lim & Morris, 2009); and socio-demographic characteristics of students (Bazanov & Sokolova, 2017; Watson, Watson, Yu, Alamri, & Mueller, 2017). Bekova and colleagues (2020) described the results of a series of empirical studies conducted using student samples at Russian universities in 2017–2018. They showed that in order to successfully complete MOOCs students needed the following skills: the ability to organize their workspace and time-management skills, as well as metacognitive control of their own learning process and goal setting. In accordance with the described results, we may hypothesize that the increased number of remote learning courses could influence students' metacognitive processes, which are necessary to achieve successful learning outcomes. Jia (2021) showed the implications of remote learning for students' self-regulated learning (SRL) in higher education during the COVID-19 pandemic. In-depth interviews with graduates revealed that remote learning influences SRL framework in a specific way at different phases – goal setting and self-efficacy (in forethought phase), task strategies and metacognitive monitoring (in the performance phase), and self-evaluation and self-satisfaction (in self-reflection phase).

Emotion regulation ability and resilience have been identified as characteristics associated with maintaining mental health and reducing anxiety during the pandemic (Barzilay et al., 2020; Li, Yang, Dou, & Cheung, 2020; Taylor, Thomas-Gregory, Hofmeyer, 2020). The ability to recognize, understand and regulate individual and others' emotions is related to reduced burnout and the use of positive coping strategies in response to stressful situations (Moreno-Fernandez et al., 2020). In a study by Vargas et al. (Vargas Valencia, Vega-Hernández, Aguila Sánchez, Vázquez Espinoza, & Hilerio López, 2022), second-year medical students showed low levels of EI and fourth-year students showed normal levels of EI just one year after the start of the pandemic. The authors explained these results with the fact that second-year medical students had only remote learning experience, while fourth-year students spent many hours in hospitals due to the emergency situations in public health and medical care system. In another study researchers compared the level of EI in two groups of students of a leadership skills development program – from the class of 2021 and the class of 2017–2019. During the COVID-19 pandemic, students of the program experienced greater increases in EI than did the pre-pandemic cohorts (Goodlet et al., 2022). Therefore, the results of research on changes in EI level during the pandemic are contradictory and can be explained by a number of factors with multi-directional effects.

Many researchers have noted a significant relationship between EI and metacognitive components (Perikova & Byzova, 2021; Sergienko, 2014; Karpov & Petrovskaya, 2008). Metacognitive skills are a basis for reflection aimed at understanding individual and others' emotions, as well

as implementing the relationship between emotion and cognition. According to Melnichuk & Belogash (2021), EI manifests itself in metacognitive abilities and predicts academic success and the level of expertise. It also contributes to the development of effective communication strategies in educational and professional environments. We have previously shown the high explanatory potential of systemic reflection and metacognitive knowledge in relation to intra-personal EI (Bysova & Perikova, 2020). Emotional and cognitive systems influence each other, both in usual circumstances and in the situation of a pandemic (Allodola, Buccolo, & Mongili, 2020; Lahiri, Dubey, & Ardila, 2020).

Several questions remain at present. 1. Did the pandemic itself affect the metacognition and EI of students? 2. How lasting are the identified changes of psychological parameters? The *aim* of our study was to compare the metacognitive components and EI scores in second-year students of natural sciences at Saint Petersburg State University (SPbU) before and during the COVID-19 pandemic. We hypothesised a persistent increase in metacognitive components and EI happened during the pandemic. And we expected that the predictors of EI in both groups would be metacognitive components, but their contribution to the explanatory potential would be different.

Methods

Participants and procedure

We collected data over four years (2018–2021). Our sample included 551 students of natural sciences (psychology and biology departments) at SPbU in the second year of their undergraduate program. The 'pre-pandemic group' for control consisted of 260 students aged 18 to 24 years (45 males; mean age ($M \pm SD$) – 19.54 ± 1.15 years), who took part in the study during 2018 and 2019. The 'pandemic group' included 291 students aged 18 to 24 years (67 males, 19.33 ± 1.1 years), who participated in the study after May 2020. The groups did not differ statistically in neither gender ($\chi^2(1) = 2.8, p = 0.096$), nor age ($\chi^2(6) = 12.2, p = 0.058$).

Data of the 'pandemic group' were collected in three stages – May 2020 (98 respondents, 29 males), January 2021 (114 respondents, 14 males), and May 2021 (79 respondents, 29 males). According to the decrees of the Ministry of Education and Science of the Russian Federation students transitioned from ordinary full-time to remote learning in spring 2020; The so-called 'mixed' learning format (in classroom and remote learning) was used in September – October 2020. Learning was mostly remote in November – December 2020, as well as in spring 2021. Thus, the 'pandemic group' of this study included students studying remotely for one, two and/or three semesters. All students had experience of a transition from normal full-time learning to remote learning.

Instruments

In order to examine EI and metacognitive components of the participants we asked them to fill out several questionnaires.

EI was assessed with Emotional Intelligence Questionnaire (Emln-Q) by Lyusin (Lyusin, 2009). Emln-Q consists of 47-items, which are estimated with a 4-point response scale. In our study we used three subscales – Interpersonal EI (Cronbach's alphas indicated here and further are for the whole sample ($n = 551$) = 0.85), Intrapersonal EI (Cronbach's alpha = 0.81), and General EI (Cronbach's alpha = 0.70).

The Self-organisation of Activity Questionnaire was developed by Mandrikova (Mandrikova, 2010) to evaluate the maturity of tactical planning and strategic goal-setting skills. The Self-organization

of Activity Questionnaire consists of 25 items. The items are evaluated with a 7-point Likert-like scale ranging from “completely disagree” to “completely agree”. The instrument consists of the following seven subscales: Purposefulness (Cronbach’s alpha = 0.83), Perseverance (Cronbach’s alpha = 0.73), Planning (Cronbach’s alpha = 0.87), Fixation (Cronbach’s alpha = 0.49), Orientation to the Present (Cronbach’s alpha = 0.30), Self-organization (Cronbach’s alpha = 0.33), and General Index of Self-organisation of Activity (Cronbach’s alpha = 0.82). The scales Fixation, Orientation to the Present, and Self-organization were excluded from the analysis due to low internal consistency coefficients.

The Differential Test of Reflexivity (DTR) by Leontiev and Osin (2014) is a 30-item questionnaire using a 4-point response scale, which operationalises Leontiev’s 3-component model of reflexive processes. The DTR estimates three subscales – Systemic Reflection (Cronbach’s alpha = 0.85), Introspection (Cronbach’s alpha = 0.87), and Quasi-reflection (Cronbach’s alpha = 0.86).

The short version of the Metacognitive Awareness Inventory modified by Perikova and Byzova (Perikova & Byzova, in press) consists of three subscales – Metacognitive Knowledge (Cronbach’s alpha = 0.79), Metacognitive Regulation (Cronbach’s alpha = 0.83), and Metacognitive Awareness (Cronbach’s alpha = 0.88). In this inventory, 32 items are scored on a 5-point Likert scale.

The data collected were analysed using SPSS Statistics version 26.0. The first stage of analysis included the calculation of descriptive statistics ($M \pm SD$), assessment of the normality of the data distribution using the Kolmogorov-Smirnov test and computation of r-Pearson’s correlation coefficient. The assumption of normality was largely fulfilled. Therefore, in the second stage of analysis Student’s t-test for independent samples was used to find any significant differences in EI and metacognitive components between the two groups of youth. A Kruskal–Wallis H test was conducted to define the specific differences in the scores between different groups of students – those who took part in the study before 2020 (‘pre-pandemic group’), May 2020 students, January 2021 students, May 2021 students (‘pandemic sub-groups’). The non-parametric test was used because the assumption of normality was violated in three small samples of students of 2020–2021. Dunn’s post hoc test was used to determine differences between the ‘pre-pandemic’ group and each ‘pandemic’ sub-group. Cohen’s d was used to estimate effect sizes between groups after Student’s t-test and Kruskal–Wallis H test.

Finally, we tested the hypothesis about the predictive ability of the metacognitive components for EI using multiple linear regression analysis (the enter method). A regression analysis was carried out for Interpersonal EI and eight independent variables, including Systemic Reflection, Introspection, Quasi-reflection, Metacognitive Knowledge, Metacognitive Regulation, Planning, Purposefulness, and Perseverance. Regression analysis was carried out separately for each sample (‘pre-pandemic’ and ‘pandemic’ groups).

Results

Table 1 shows the means, standard deviations, and coefficients of correlation between EI and the metacognitive components for the total sample ($n = 551$). The EI indicators Interpersonal EI, Intrapersonal EI, General EI were found to have significant correlations with Systemic Reflection, Metacognitive Awareness, Metacognitive Knowledge, Metacognitive Regulation, Planning, Purposefulness, Perseverance, and General Index of Self-organisation of Activity (all $p \leq 0.01$).

Table 1

Descriptive statistics (M ± SD) and coefficients of correlation between EI and the metacognitive components (for the whole sample)

Parameters	<u>M±SD</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
	(n = 551)												
1. Interpersonal EI	43.5 ± 9.5	0.40**	0.83**	0.29**	-0.15	-0.04	0.20**	0.24**	0.15**	0.16**	0.27**	0.18**	0.24**
2. Intrapersonal EI	40.6 ± 9.8	1	0.84**	0.22**	-0.43	-0.02	0.26**	0.28**	0.22**	0.12*	0.33**	0.32**	0.23**
3. General EI	84.1 ± 16		1	0.31**	-0.35	-0.14	0.28**	0.31**	0.22**	0.17**	0.36**	0.23**	0.28**
4. Systemic reflection	39.7 ± 5.8			1	0.11*	0.19*	0.20**	0.16**	0.21**	0.18**	0.13*	0.1	0.13*
5. Introspection	24.2 ± 6				1	0.45**	-0.13	-0.17	-0.09	-0.06	-0.28	-0.31	-0.19
6. Quasi-reflection	25.9 ± 6					1	-0.07	-0.09	-0.05	-0.14	-0.14	-0.25	-0.21
7. Metacognitive awareness	118 ± 18.4						1	0.9**	0.96**	0.20**	0.24**	0.14*	0.24**
8. Metacognitive knowledge	44.1 ± 7.6							1	0.73**	0.13*	0.21*	0.18*	0.20**
9. Metacognitive regulation	73.7 ± 12								1	0.23**	0.24**	0.1	0.23**
10. Planning	17.7 ± 6.1									1	0.39**	0.31**	0.7**
11. Purposefulness	31.5 ± 7.3										1	0.28**	0.65**
12. Perseverance	18.9 ± 6.5											1	0.59**
13. GISOA	105 ± 18.9												1

Note: GISOA – General index of self-organisation of activity; * – $p \leq 0.01$; ** – $p \leq 0.001$.

A number of parameters revealed significant differences between 'pre-pandemic' and 'pandemic' student samples (Table 2). In the 'pre-pandemic' group, students had higher scores of Metacognitive Regulation ($t = 10.09$; $p \leq 0.001$), Metacognitive Awareness ($t = 6.624$; $p \leq 0.001$), at the level of medium effect sizes, Intrapersonal EI ($t = 3.410$; $p \leq 0.001$), and Purposefulness ($t = 2.793$; $p \leq 0.01$), at the level of small effect sizes. Interpersonal EI of the 'pandemic' group was found to be significantly lower than in the 'pre-pandemic group', at the level of small effect sizes ($t = -3.690$; $p \leq 0.001$).

A detailed comparative analysis was conducted for scores that showed significant differences between the pre-pandemic (2018–2019) and pandemic samples (2020–2021). We used a Kruskal-Wallis H test to compare the scores in students who took part in our study in May 2020, January 2021, and May 2021 with those of students surveyed before 2020. The following results were obtained: Interpersonal EI ($H = 9.84$; $p \leq 0.05$; $d = 0.23$), Intrapersonal EI ($H = 12.50$; $p \leq 0.006$; $d = 0.27$), Metacognitive Awareness ($H = 40.42$, $p \leq 0.001$, $d = 0.54$), Metacognitive Regulation ($H = 81.63$; $p \leq 0.001$, $d = 0.82$), and Purposefulness ($H = 17.209$, $p \leq 0.001$, $d = 0.327$). Post hoc test showed that in the 'pre-pandemic' group Interpersonal EI, Metacognitive Awareness, and Metacognitive Regulation significantly differed from those in all 'pandemic' sub-groups (all $p \leq 0.05$).

Table 2

Descriptive statistics ($M \pm SD$) of EI and the metacognitive components in young people in the 'pre-pandemic' and 'pandemic' groups

	'Pre-pandemic' group ($n = 260$)		'Pandemic' group ($n = 291$)		t	p	d
	M	SD	M	SD			
Interpersonal EI	45.03	9.99	42.11	8.86	-3.690	0.0002	0.32
Intrapersonal EI	39.14	9.23	41.91	10.09	3.410	0.0006	0.29
General EI	84.17	15.87	84.02	16.41	-0.105	0.916	0.01
Systemic reflection	39.57	5.95	39.77	5.73	0.353	0.723	0.06
Introspection	24.60	6.20	23.80	5.82	-1.556	0.120	0.13

Table 2

Descriptive statistics (M ± SD) of EI and the metacognitive components in young people in the 'pre-pandemic' and 'pandemic' groups

	'Pre-pandemic' group (n = 260)		'Pandemic' group (n = 291)		t	p	d
	M	SD	M	SD			
	Quasi-reflection	26.05	6.15	25.89			
Metacognitive awareness	112.5	20.29	122.6	15.10	6.624	< 0.0001	0.57
Metacognitive knowledge	43.87	8.73	44.36	6.51	0.743	0.457	0.04
Metacognitive regulation	68.60	12.20	78.28	10.01	10.09	< 0.0001	0.86
Planning	17.70	5.39	17.70	6.71	-0.063	0.949	0.01
Purposefulness	30.59	6.92	32.33	7.46	2.793	0.005	0.24
Perseverance	18.82	6.39	18.92	6.62	0.117	0.906	0.01
GISOA	104.4	17.70	106.3	20.04	1.068	0.281	0.09

Note: GISOA – General index of self-organisation of activity.

We examined the results of the comparison of the “pre-pandemic” and “pandemic” groups and decided to conduct a regression analysis of a single dependent variable – Interpersonal EI. We used parameters showing significant correlations with Interpersonal EI as a dependent variable (Table 3).

For young people who took part in our study before 2020, linear regression analysis revealed that the participants’ Systemic Reflection and Purposefulness made significant contributions as predictors of Intrapersonal EI ($R^2 = 0.13$; adjusted $R^2 = 0.11$; $F(6, 251) = 6.41$; $p \leq 0.0001$). For young people who took part in our study after 2020 three variables (Systemic Reflection, Metacognitive Knowledge, and Perseverance) were found to be significant predictors of intrapersonal EI ($R^2 = 0.30$; corrected $R^2 = 0.28$; $F(6, 283) = 20.12$; $p \leq 0.0001$).

Table 3				
<i>Estimates of regression parameters (with Interpersonal EI as a dependent variable)</i>				
Predictors	Unstandardized coefficients		Standardized coefficients	p
	b	SE	β (Beta)	
'Pre-pandemic' group (n = 260)				
Systemic reflection	0.322	0.099	0.192	0.001
Metacognitive knowledge	-0.024	0.143	-0.021	0.866
Metacognitive regulation	0.105	0.102	0.127	0.305
Planning	0.047	0.119	0.025	0.695
Purposefulness	0.373	0.093	0.258	0.000
Perseverance	0.082	0.094	0.053	0.381
Constant	12.385	5.822		0.034
'Pandemic' group (n = 291)				
Systemic reflection	0.403	0.086	0.261	0.0001
Metacognitive knowledge	0.350	0.096	0.257	0.0001
Metacognitive regulation	0.074	0.068	0.083	0.277
Planning	-0.096	0.083	-0.072	0.249
Purposefulness	0.113	0.073	0.095	0.122
Perseverance	0.167	0.081	0.124	0.041
Constant	-0.358	4.089		0.930

Discussion

The aim of this study was to compare the metacognitive components and EI scores in natural science students at SPbU using cross-sectional surveys conducted before and during the COVID-19 pandemic. We found significant differences in Interpersonal EI, Intrapersonal EI, Metacognitive

Awareness, Metacognitive Regulation, and Purposefulness between two samples. A detailed analysis showed that only Interpersonal EI, Metacognitive Awareness and Metacognitive Regulation parameters were found to have a lasting effect. We found an increase in Metacognitive Regulation and a decrease in Interpersonal EI in students studying during the COVID-19 pandemic.

The described results partially confirm our assumptions and are consistent with the data on metacognitive components and EI scores obtained earlier. Existing data show that metacognitive regulation is crucial for success in many types of online learning (Serdyukov & Hill, 2013; Zheng, Liang, Li, & Tsai, 2018). Remote learning 'requires' students to regulate and control their own learning processes more actively, than in classic format of learning (Harris, Dargusch, Ames, & Bloomfield, 2020; Zimmerman, 2008). Students who use a variety of self-regulatory modalities in difficult situations often reported learning success and overall well-being (Carter, Rice, Yang, & Jackson, 2020; Pelikan, Lüftenegger, Holzer, Korlat, Spiel, & Schober, 2021). Our results show that metacognitive scores are higher in students studying via remote learning compared to those learning in classrooms. These differences are associated with an increase in the metacognitive regulation score, but not in the metacognitive knowledge score. The well-being of students in both groups did not differ significantly (The Satisfaction with Life Scale (SWLS), developed by Diener, Emmons, Larsen and Griffin, $t = -1.87$; $p = 0.061$, 'pre-pandemic' group ($n = 93$) and 'pandemic' group ($n = 291$)).

The decrease of Interpersonal EI scores could be associated with the format of remote learning. Social awareness and relationship skills are developed in the process of observing other people and communicating with them. The pandemic has reduced opportunities for such interaction. Carbon (2020) showed in her study that people have difficulty in reading emotions of others wearing face masks. Khalimova, Bogomaz (2021) also found a decline in Interpersonal EI scores during the pandemic, but their results suggest that the decline started much earlier and the effects we observed may not be directly related to the pandemic.

In contrast, our study showed an increase in Intrapersonal EI in the 'pandemic' group compared to the 'pre-pandemic' group. This fact is consistent with our assumptions. However, the post hoc test showed that the increase in these scores was observed only in students who participated in the study in 2021 and was not typical for the 2020 youth sample. Our results are partially consistent with Goodlet et al. research (2022). The data reflect the impermanent change of the Intrapersonal EI parameter over the past years. Khalimova & Bogomaz (2021) found no significant changes in this indicator in cross-sectional data in students who were examined between 2012 and 2020. Thus, our data may indicate a new trend among young people that has emerged only in 2021.

Regression analysis revealed that the predictors contributing to Intrapersonal EI differed in pre-pandemic and pandemic samples. Systemic reflection and Purposefulness variables only accounted for only 11 % of the variance of Intrapersonal EI in the sample of students, which took part in our study before 2020. In the sample surveyed in 2020–2021 Systemic Reflection, Metacognitive Knowledge, and Perseverance collectively explained 28 % of the variance. Thus, in all time periods, the most significant predictor of Intrapersonal EI is the ability to self-distance and look at oneself from the outside. At the same time, Purposefulness was a significant predictor of Interpersonal EI before the pandemic, but it was not significant after 2020. This may be due to the high level of uncertainty in communication during the COVID-19 pandemic: from technical difficulties in interacting with other people online to frequent changes in social circle in case of illness. The revealed significance of metacognitive knowledge and perseverance for

Intrapersonal EI is partially consistent with the results of a study by Rivers, Nakamura, & Vallance (2021). The authors revealed a significant relationship between online self-regulated learning and achievement when perseverance score was included in the model. Thus, during a pandemic, with a general decrease in Intrapersonal EI, the development of this skill is possible through working on individual Metacognitive skills, as well as developing the ability for self-reflection, acquiring knowledge of individual cognitive processes and the ability to exercise volitional efforts.

Conclusion

An empirical study revealed a persistent increase in metacognitive skills and a decrease in interpersonal EI during the COVID-19 pandemic in students of natural science at SPbU. The predictors contributing to interpersonal EI are systematic reflection, metacognitive knowledge, and perseverance of young people studied during the pandemic.

The study has several limitations that may affect the interpretation of the results. First, the sample of the study is limited to the second-year students of natural science at SPbU. Even though our data are consistent with the results obtained through surveying students from different departments and universities of Siberia (Khalimova & Bogomaz, 2021), this limitation should be considered while interpreting the results. Secondly, respondents who participated in the study before and after 2020 differed in the form of feedback from the study's main researcher. In both cases, the questionnaires were completed online. The first group received feedback via personal meetings with the study's main researcher. The second group received feedback through an e-mail report, with the possibility to discuss the results through correspondence. The online feedback format was chosen as the safest during the pandemic. Third, although the design of the study was improved by including a control group, the increase in metacognitive components and the decrease in EI in the 'pandemic' group may not be related to the pandemic.

Despite these limitations, the study enables us to describe a student's personal portrait during the COVID-19 pandemic. The consequences of the pandemic can impair understanding of emotions of other people. According to a report from the 2016 International Economic Forum in Davos, EI is a 'soft skill' that every employee needs. It is especially important that students of the psychological department were a part of the sample as EI is a key skill for the future professional activity of a psychologist.

Therefore, future research should include collecting more data on the parameters described and analyzing their changes, which will enable researchers to recommend adjustments for existing teaching programs. The main conclusion from our research is that extra classes aimed at developing EI of natural science students and deepening their metacognitive knowledge on themselves and others should be added to the curricula.

References

- Aleshkovskii, I. A., Gasparishvili, A. T., Krukhmaleva, O. V., Narbut, N. P., & Savina, N. E. (2020). Russian university students about distance learning: Assessments and opportunities. *Vysshie obrazovanie v Rossii (Higher Education in Russia)*, 29(10), 86–100. <https://doi.org/10.31992/0869-3617-2020-29-10-86-100> (in Russ.).
- Allodola, V. F., Buccolo, M., & Mongili, S. (2020). Representations and emotions on Covid-19 in Italy: An exploratory research. *International Journal of Psychoanalysis and Education*, 12(1), 15–30.
- Baranova, V. A., Dubovskaya, E. M., & Savina, O. O. (2021). Life experience and resources for

- overcoming the difficulties of social isolation in the first period of the COVID-19 pandemic among students. *Sotsial'naya psikhologiya i obshchestvo (Social Psychology and Society)*, 12(1), 10–25. <https://doi.org/10.17759/sps.2021120102> (in Russ.).
- Barzilay, R., Moore, T. M., Greenberg, D. M., DiDomenico, G. E., Brown, L. A., White, L. K., ... Gur, R. E. (2020). Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Translational Psychiatry*, 10, 291. <https://doi.org/10.1038/s41398-020-00982-4>
- Bazanova, E. M., & Sokolova, E. E. (2017). Massive open online course on academic writing: Management of students' motivation to study. *Vysshee obrazovanie v Rossii (Higher Education in Russia)*, 2, 99–109. (in Russ.).
- Bekova, S. K., Terentev, E. A., & Maloshonok, N. G. (2021). Educational inequality and COVID-19 pandemic: Relationship between the family socio-economic status and student experience of remote learning. *Voprosy obrazovaniya (Educational Studies Moscow)*, 1, 74–92. <https://doi.org/10.17323/1814-9545-2021-1-74-92> (in Russ.).
- Bekova, S. K., Vilkova, K. A., Dzhafarova, Z. I., Larionova, V. A., Maloshonok, N. G., Semenova, T. V., ... Shcheglova, I. A. (2020). Online, don't panic! Models and effectiveness of integration of massive open online courses into Russian universities. *Sovremennaya analitika obrazovaniia. Express-vypusk*, 11. <https://ioe.hse.ru/sovaobr> (in Russ.).
- Bysova, V. M., & Perikova, E. I. (2020). Emotional intelligence in the structure of metacognition among youth. In A. L. Zhuravlev, M. A. Kholodnaya, P. A. Sabadosh (Eds.). *Abilities and mental human resources in the changes in a global world* (pp. 318–324). Moscow: IP RAS. (in Russ.).
- Carbon, C.-C. (2020). Wearing face masks strongly confuses counterparts in reading emotions. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.566886>
- Carter Jr, R. A., Rice, M., Yang, S., & Jackson, H. A. (2020). Self-regulated learning in online learning environments: Strategies for remote learning. *Information and Learning Sciences*, 121(5/6), 321–329. <https://doi.org/10.1108/ILS-04-2020-0114>
- Chirikov, I., Soria, K. M., Horgos, B., & Jones-White, D. (2020). *Undergraduate and graduate students' mental health during the COVID 19 pandemic*. Berkeley: Center for Studies in Higher Education. Retrieved from <https://escholarship.org/uc/item/80k5d5hw>
- Goodlet, K. J., Raney, E., Buckley, K., Afolabi, T., Davis, L., Fekkether, R. M., ... Tennant, S. (2022). Impact of the COVID-19 pandemic on the emotional intelligence of student pharmacist leaders. *American Journal of Pharmaceutical Education*, 86(1). <https://doi.org/10.5688/ajpe8519>
- Harris, L., Dargusch, J., Ames, K., & Bloomfield, C. (2020). Catering for 'very different kids': Distance education teachers' understandings of and strategies for student engagement. *International Journal of Inclusive Education*. <https://doi.org/10.1080/13603116.2020.1735543>
- Jia, M. (2021). The influence of distance learning during COVID-19 pandemic on student's self-regulated learning in higher education: A qualitative study. In *5th International conference on digital technology in education* (pp. 47–52). <https://doi.org/10.1145/3488466.3488492>
- Karpov, A. V., & Petrovskaya, A. S. (2008). *Psychology of emotional intelligence: theory, diagnostics, practice*. Yaroslavl: Yaroslavl State University. (in Russ.).
- Khalimova, A. A., & Bogomaz, S. A. (2021). Psychological state of youth: emotional intelligence and meaning orientations under the conditions of pandemic. In B. S. Alishev, A. O. Prokhorov (Eds.). *Psychology of mental states: Collection of materials of the XV International theoretical and practical conference for students, undergraduates, graduate students, young scientists, and*

- university teachers* (pp. 544–548). Kazan: Kazan University. (in Russ.).
- Kizilcec, R. F., Saltarelli, A. J., Reich, J., & Cohen, G. L. (2017). Closing global achievement gaps in MOOCs. *Science*, 355(6322), 251–252. <https://doi.org/10.1126/science.aag2063>
- Lahiri, D., Dubey, S., & Ardila, A. (2020, July). Impact of COVID-19 related lockdown on cognition and emotion: A pilot study. *MedRxiv*. <https://doi.org/10.1101/2020.06.30.20138446>
- Leontiev, D. A., & Osin, E. N. (2014). “Good” and “bad” reflection: From an explanatory model to differential assessment. *Psikhologiya. Zhurnal Vysshei shkoly ekonomiki (Psychology. Journal of the Higher School of Economics)*, 11(4), 110–135. (in Russ.).
- Li, J.-B., Yang, A., Dou, K., & Cheung, R. Y. M. (2020). Self-control moderates the association between perceived severity of coronavirus disease 2019 (COVID-19) and mental health problems among the Chinese public. *International Journal of Environmental Research and Public Health*, 17(13), 4820. <https://doi.org/10.3390/ijerph17134820>
- Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Educational Technology & Society*, 12(4), 282–293.
- Littlejohn, A., Hood, N., Milligan, C., & Mustain, P. (2016). Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *The Internet and Higher Education*, 29, 40–48. <https://doi.org/10.1016/j.iheduc.2015.12.003>
- Lyusin, D. V. (2009). An emotional intelligence questionnaire, Emln: New psychometric data. In D. V. Lyusin, D. V. Ushakov (Eds.). *Social and emotional intelligence: From models to measurements* (pp. 264–278). Moscow: IP RAS. (in Russ.).
- Magomed-Eminov, M. S. (2008). *The phenomenon of extremeness*. Moscow: Psychoanalytic Association. (in Russ.).
- Mandrikova, E. Yu. (2010). The self-organization of activity questionnaire. *Psikhologicheskaya diagnostika (Psychological Diagnostics)*, 2, 87–111. (in Russ.).
- Melnichuk, M. V., & Belogash, M. A. (2021) Emotional intelligence as the subject of studying metacognitive processes in universities. *Sibirskii pedagogicheskii zhurnal (Siberian Pedagogical Journal)*, 6, 89–100. <https://doi.org/10.15293/1813-4718.2106.10> (in Russ.).
- Milligan, C., & Littlejohn, A. (2014). Supporting professional learning in a massive open online course. *The International Review of Research in Open and Distributed Learning*, 15(5). <https://doi.org/10.19173/irrodl.v15i5.1855>
- Moreno-Fernandez, J., Ochoa, J. J., Lopez-Aliaga, I., Alferez, M. J. M., Gomez-Guzman, M., Lopez-Ortega, S., & Diaz-Castro, J. (2020). Lockdown, emotional intelligence, academic engagement and burnout in pharmacy students during the quarantine, *Pharmacy*, 8(4), 194. <https://doi.org/10.3390/pharmacy8040194>
- Pelikan, E. R., Lüftenegger, M., Holzer, J., Korlat, S., Spiel, C., & Schober, B. (2021). Learning during COVID-19: The role of self-regulated learning, motivation, and procrastination for perceived competence. *Zeitschrift für Erziehungswissenschaft*, 24, 393–418. <https://doi.org/10.1007/s11618-021-01002-x>
- Perikova, E. I., & Bysova, V. M. (2021). Mental self-regulatory system of educational activities: Metacognitive approach. *Sibirskiy Psikhologicheskii Zhurnal (Siberian Journal of Psychology)*, 79, 15–29. <https://doi.org/10.17223/17267080/79/2> (in Russ.).
- Perikova, E. I., & Byzova, V. M. (In press). Factor structure of the Russian version of the Metacognitive Awareness Inventory. *Kul'turno-istoricheskaya psikhologiya (Cultural-Historical Psychology)*. (in Russ.).

- Rivers, D. J., Nakamura, M., & Vallance, M. (2021). Online self-regulated learning and achievement in the era of change. *Journal of Educational Computing Research*, 60(1), 104–131. <https://doi.org/10.1177/073563312111025108>
- Serdyukov, P., & Hill, R. A. (2013). Flying with clipped wings: Are students independent in online college classes. *Journal of Research in Innovative Teaching*, 6(1), 52–65.
- Sergienko, E. A. (2014). The theory of mind as a paradigm of social cognition. *Psikhologicheskie Issledovaniya (Psychological Studies)*, 7(36). <http://psystudy.ru/index.php/num/2014v7n36/1017-sergienko36.html> (in Russ.).
- Soria, K. M., & Horgos, B. (2020, September). *Social class differences in students' experiences during the COVID-19 pandemic*. UC Berkeley: Center for Studies in Higher Education. Retrieved from <https://escholarship.org/uc/item/3hw2m00g>
- Soria, K. M., Chirikov, I., & Jones-White, D. (2020). *The obstacles to remote learning for undergraduate, graduate, and professional students*. UC Berkeley: Center for Studies in Higher Education. Retrieved from <https://escholarship.org/uc/item/5624p4d7>
- Taylor, R., Thomas-Gregory, A., & Hofmeyer, A. (2020). Teaching empathy and resilience to undergraduate nursing students: A call to action in the context of Covid-19. *Nurse Education Today*, 94. <https://doi.org/10.1016/j.nedt.2020.104524>
- Vargas Valencia, Á. R., Vega-Hernández, M. C., Aguila Sánchez, J. C., Vázquez Espinoza, J. A., & Hilerio López, Á. G. (2022). Self-perceived emotional intelligence levels in nursing students in times of a pandemic: Multivariate representation. *International Journal of Environmental Research and Public Health*, 19(3), 1811. <https://doi.org/10.3390/ijerph19031811>
- Watson, S. L., Watson, W. R., Yu, J. H., Alamri, H., & Mueller, C. (2017). Learner profiles of attitudinal learning in a MOOC: An explanatory sequential mixed methods study. *Computers & Education*, 114, 274–285. <https://doi.org/10.1016/j.compedu.2017.07.005>
- Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices: Digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology*, 45(2), 107–114. <https://doi.org/10.1080/17439884.2020.1761641>
- Zheng, C., Liang, J.-C., Li, M., & Tsai, C.-C. (2018). The relationship between English language learners' motivation and online self-regulation: A structural equation modelling approach. *System*, 76, 144–157. <https://doi.org/10.1016/j.system.2018.05.003>
- Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45(1), 166–183. <https://doi.org/10.3102/0002831207312909>

Received: March 08, 2022

Revision received: March 21, 2022

Accepted: March 29, 2022

Author Contribution

E. I. Perikova carried out statistical analysis, interpreted the results, prepared and edited the text of the manuscript.

V. M. Byzova developed the research concept and collected data.

Perikova, Byzova

Impact of the Covid-19 Pandemic on the Metacognition and Emotional Intelligence...

RUSSIAN PSYCHOLOGICAL JOURNAL, 2022, Vol. 19, No. 1, 112–126. doi: 10.21702/rpj.2022.1.9

PSYCHOLOGY OF PERSONALITY

Author Details

Ekaterina Igorevna Perikova – Cand. Sci. (Psychology), Senior Researcher, Laboratory of Behavioural Neurodynamics, Saint Petersburg State University, Saint Petersburg, Russian Federation; Scopus Author ID: 57204564307, ResearcherID: Y-2335-2019, SPIN code: 6456-1762; e-mail: chikurovaEI@gmail.com

Valentina Mikhailovna Byzova – Dr. Sci. (Psychology), Professor, Department of General Psychology, Saint Petersburg State University, Saint Petersburg, Russian Federation; SPIN code: 6614-9013; e-mail: vbysova@mail.ru

The authors declare no conflicts of interest.