

PART I. DISEASES AND PROBLEMS DISTINGUISHED BY WHO AND FAO  
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WELL-BEING AS A STRENGTH OF SPORTS SCIENCE STUDENTS DURING  
THE COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY

DOBROSTAN JAKO SIŁA STUDENTÓW NAUK O SPORCIE PODCZAS PANDEMII  
COVID-19: BADANIE PRZEKROJOWE

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wyszukiwanie i analiza literatury  
G. Funds collection  
zebranie funduszy

Tables: 2  
Figures: 2  
References: 35  
Submitted: 2023 Jun 3  
Accepted: 2023 Jul 14

### Summary

**Background.** The COVID-19 pandemic worldwide challenged people's mental health. As a tool, physical activity can maintain resilience and well-being. Within this research, we aimed to examine students' well-being in the summer of 2022 and compare them from the perspective of their study programs.

**Material and methods.** This research was carried out in Slovenia and Serbia, with a sample of 700 students from two universities (Primorska and Novi Sad). To evaluate the students' well-being, the PERMA-Profil, a 15-item self-reported survey, was applied from May to July 2022. The SPSS was used for data analysis of the Mann-Whitney U test.

**Results.** The results revealed normal functioning for the total sample ( $M=7.47$ ,  $SD\pm 1.37$ ). In addition, when the researchers were making a comparison between the study programs (sports and other sciences), different responses were found with significantly higher scores attained by the sports science students ( $M=7.72$ ,  $SD\pm 1.38$ ) compared to the others ( $M=7.23$ ,  $SD\pm 1.31$ ).

**Conclusions.** This research follows the previously published articles about understanding the social consequences of the COVID-19 pandemic. The sports science students were less sensitive to changes, and their mental strength demonstrates their successful coping mechanisms for these new circumstances over a more extended period.

**Keywords:** COVID-19, pandemic, mental health, students, well-being

### Streszczenie

**Wprowadzenie.** Pandemia COVID-19 stanowiła wyzwanie dla zdrowia psychicznego ludzi na całym świecie. Aktywność fizyczna może być narzędziem służącym utrzymaniu odporności i dobrostanu. Celem niniejszego badania była ocena dobrostanu studentów latem 2022 roku i porównanie go w kontekście ich programów studiów.

**Materiał i metody.** Badanie zostało przeprowadzone w Słowenii i Serbii na próbie 700 studentów z dwóch uniwersytetów (Primorska i Novi Sad). Aby ocenić dobrostan studentów, od maja do lipca 2022 r. zastosowano 15-punktową ankietę PERMA-Profil. Do analizy danych wykorzystano test U Manna-Whitneya za pomocą oprogramowania SPSS.

**Wyniki.** Wyniki wykazały normalne funkcjonowanie w przypadku całej próby ( $M=7,47$ ,  $SD\pm 1,37$ ). Ponadto, gdy uwzględniono programy studiów (nauki o sporcie i inne dziedziny nauki) między uczestnikami, stwierdzono różne odpowiedzi, przy znacznie wyższych wynikach uzyskanych przez studentów nauk o sporcie ( $M=7,72$ ,  $SD\pm 1,38$ ) w porównaniu ze studentami innych nauk ( $M=7,23$ ,  $SD\pm 1,31$ ).

**Wnioski.** Badania te stanowią kontynuację wcześniej opublikowanych artykułów dotyczących zrozumienia konsekwencji społecznych pandemii COVID-19. Studenci nauk o sporcie byli mniej wrażliwi na zmiany, a ich siła psychiczna świadczy o skutecznych mechanizmach radzenia sobie z tymi nowymi okolicznościami w dłuższej perspektywie czasowej.

**Słowa kluczowe:** COVID-19, pandemia, zdrowie psychiczne, studenci, dobrostan

Milovanović IM, Maksimović N, Matić RM, Banjac B. Well-being as a strength of sports science students during the COVID-19 pandemic: a cross-sectional study. Health Prob Civil. 2023; 17(3): 197-206. <https://doi.org/10.5114/hpc.2023.130497>

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## Introduction

The Coronavirus disease was first identified in December 2019 in Wuhan, China. As effective measures, physical distancing, lockdowns, and self-isolation were imposed as new experiences for many people. These measures had a negative effect on mental well-being and emotional status [1], which is likely to be long-lasting [2]. In addition, the COVID-19 pandemic did not distinguish between countries, nations, people, gender, or social groups. Therefore the student population, as a vulnerable group to mental health diseases, was affected too [3,4].

The World Health Organization defines mental health: as “a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community” [5]. Good mental health is often related to psychological well-being [6]. Well-being is a term with numerous definitions and meanings, but for our study, we adopted the definition offered by Martin Seligman. He states that well-being is the topic of positive psychology and a construct of five measurable elements (PERMA): positive emotions, engagement, relationships, meaning, and accomplishment. These elements are real and contribute to the overall picture of well-being [7].

Being physically active is one of the most common habits for better mental health [3]. Besides the well-known benefits, physical activity helps to relieve depression, anxiety and deal with stress [8-10]. On the other hand, a sedentary lifestyle may worsen it [11]. In addition, while the pandemic caused restrictive measures, precisely the stay-at-home orders, physical activity was associated with positive affect [12]. Therefore, people’s ability to cope with this unusual situation is important. In this context, we can refer to resilience as a “dynamic process encompassing positive adaptation within the context of significant adversity” [13] which is positively correlated with mental health. For resilience, building physical exercise can be a useful strategy. The benefits of being physically active could be explained by the release of neurotransmitters (serotonin etc.), promoting socialization, and improving psychological areas such as self-confidence [14]. Moreover, resilience mediates between cardiorespiratory fitness and health-related quality of life [15].

Research indicates that the duration and number of days spent performing moderate-intensity activity have a positive association with individuals’ subjective well-being [16]. In line with that, college students who actively participated in physical exercise, besides their subjective well-being, improved self-efficacy and emotional management [17]. On the contrary, a low level of physical activity, or inactivity, and a sedentary lifestyle were associated with poor well-being [11,18]. Therefore, physical activity can serve as a tool for maintaining resilience, positive mental health [10] and well-being during challenging and uncertain situations such as a pandemic. Based on the literature, university students had more healthy practices as they were involved more in sports [19]. As medical and sports science students maintained healthy daily routines during the first phases of the pandemic, we assumed that sports science students generally have better health practices than the other study programs.

Even though much of the data were collected during the first phases of the COVID-19 pandemic, due to the duration of this disease as a constant stressor that can affect mental health, it is important to maintain research and monitor the mental health of the student population [4,20]. Thus, the present study draws on previously published articles [21,22], where students showed increased well-being compared to the findings of the literature for previous years. Therefore, this research aimed to (i) examine students’ well-being in the summer of 2022 and (ii) compare them from the perspective of their study programs. We hypothesized that there are meaningful differences in students’ well-being across various study programs (sports and other sciences).

## Material and methods

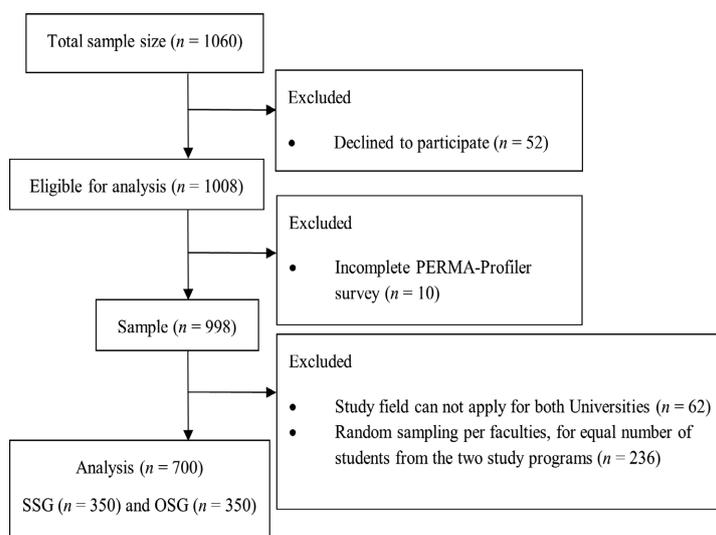
### Design

This study is a part of a bigger research project, which aimed to understand the impact of the COVID-19 pandemic on university students' everyday life and their ways of adaptation to these extreme social circumstances by comparing them according to different criteria [22].

The present study has a cross-sectional design using a quantitative survey to evaluate the students' well-being in 2022. The field research was conducted in two European countries (Slovenia and Serbia). Ethical approval (No. 47-12-12/2021-1) for data collection was obtained by the Faculty of Sport and Physical Education, University of Novi Sad ethic committee. The research was conducted in accordance with the Declaration of Helsinki.

### Participants

The sampling process for this research is presented in Figure 1. Although  $n=1060$  students enrolled in the questionnaire through the above-mentioned research project,  $n=52$  disagreed to participate, and  $n=10$  dropped out or left the survey incomplete. Consequently,  $n=998$  met the inclusion criteria (completed mandatory questions). For the purpose of this study, considering the study field to be available in both universities, and in order to have an equal number of students in the final groups (SSG as sports science students, OSG as other science students),  $n=236$  students were excluded.



**Figure 1.** The sampling process of the participants

The final sample included  $n=700$  students during the 2021-2022 academic year from two countries (Serbia and Slovenia), who studied at the University of Primorska (UP) in Slovenia: Faculty of Health Sciences, Faculty of Humanities, Faculty of Mathematics, Natural Sciences and Information Technologies, Faculty of Tourism Studies; or at the University of Novi Sad (UNS) in Serbia: Faculty of Sport and Physical Education, Faculty of Medicine, Faculty of Philosophy, Faculty of Natural Sciences and Mathematics.

We hypothesized that there are meaningful differences in students' well-being across various study programs. Therefore, the sample was divided into two groups: (a) sports science students, including sports, physical education, and applied kinesiology study programs (SSG), and (b) other science students, involving medical, natural, and social sciences; humanities and others (OSG).

### *Instruments*

The questionnaire as a measurement tool was part of the bigger research project, which included both a quantitative and qualitative approach. However, for the purpose of this study, we only analyzed the part of the questionnaire which included the data for students' well-being evaluation (PERMA-Profiler survey) and sociodemographic characteristics. Therefore, the measurement tool contained the two following sections:

- Introductory part – including socio-demographic information with variables such as gender, age, university course, the students' view of the pandemic and their sports experience (at least for 3 consecutive years involving competitions),
- Main part – the PERMA-Profiler questionnaire.

Based on Martin Seligman's theory of positive psychology [7], Butler and Kern constructed the PERMA-Profiler, a 15-item self-reported questionnaire for adults measuring well-being across five domains: (P) positive emotion, (E) engagement, (R) relationships, (M) meaning, and (A) accomplishment. Each of the five domains contains three questions worded in a positive direction with an 10-point Likert scale between scores of 1 (never/not at all) and 10 (always/completely) [23]. For the overall well-being score, the composite scores from each dimension (15 items) are averaged and classified as: very high functioning (9 and above), high functioning (8-8.9), normal functioning (6.5-7.9), sub-optimal functioning (5-6.4) and languishing (below 5) [24]. On the other hand, the final PERMA-Profiler questionnaire contains additional subscales (eight items) to evaluate negative emotion, loneliness, and physical activity, but these were not included in this study. The validation study represented acceptable reliability, cross-time stability, internal consistency, construct validity [23]. In the present study Cronbach alpha coefficients were moderate or high for positive emotion ( $\alpha=0.919$ ), relationships ( $\alpha=0.774$ ), meaning ( $\alpha=0.851$ ), accomplishment ( $\alpha=0.786$ ) and for the entire scale ( $\alpha=0.923$ ). The engagement factor was the exception ( $\alpha=0.527$ ), which is in line with previous published studies [22,23,25]. Furthermore, all factors (P, E, R, M, A) were positively correlated with each other. Therefore, when a respondent gave a higher score for positive emotion, they tended to report a higher level of engagement ( $r=0.59$ ,  $p<0.01$ ), relationships ( $r=0.66$ ,  $p<0.01$ ), meaning ( $r=0.71$ ,  $p<0.01$ ), and accomplishment ( $r=0.57$ ,  $p<0.01$ ).

The translation of the original PERMA-Profiler into Serbian and Slovenian followed the back translation procedure. First, the English version was translated into the languages mentioned above. They were then translated back by a second and third translator. At that point, the authors included four expert committee members (one from the Psychology of Sports, one from English in Sports Science, and two from the Sociology of Sports). Next, the surveys were translated back into English with a review by the expert committee and the authors confirmed its accuracy. Lastly, the translated scale versions were pre-tested, after which the expert committee agreed on the final versions.

### *Procedures*

The participants accessed the self-administered questionnaire during or after classes at their faculties (UNS, UP) or through a hyperlink. Prior to starting the survey, they were provided with a brief description of the research objective and terminology and with verbal or electronic consent to agree to voluntarily participate without giving any personal information (name, birth date, or contact). They could withdraw anytime. They received no reward or payment for participation. All the data were collected from May to July 2022 in accordance with the General Data Protection Regulation (GDPR). The online survey was constructed across the 1KA website, an open-source application that runs online surveys created by the Centre for Social Informatics at the Faculty of Social Sciences, University of Ljubljana [26].

### Statistics

All the data analyses were performed with the IBM SPSS program version 26.0. For the introductory part of the questionnaire, we calculated descriptive statistics for the variables (frequency, mean and standard deviation). Furthermore, for the main part, we evaluated the 15 items together for the overall well-being score for the total and the subsamples (SSG and OSG). Later, we applied the nonparametric Mann-Whitney U test to discover if there are differences between the two independent groups with the criteria for significance level at .05.

## Results

### Description of the respondents

The sample of subjects in the present study included  $n=700$  participants ( $n_{(male)}=341$ , 48.7%;  $n_{(female)}=359$ , 51.3%) between the ages of 19 and 30 years ( $M=23.01$ ;  $SD=2.03$ ). They were classified as students regarding their educational affiliation (sports and other sciences), as well as study degree: undergraduate ( $n=475$ , 67.9%), graduate ( $n=209$ , 29.9%), or postgraduate programs ( $n=16$ , 2.3%) at the time of the research. They studied at the University of Primorska in Slovenia ( $n=280$ , 40%) and the University of Novi Sad in Serbia ( $n=420$ , 60%). The sample size from Serbia and Slovenia was proportional to the size of the two mentioned universities. Furthermore, as the main of the research project was to compare sports science students to other sciences students, half of the sample attended courses for sport, physical education and kinesiology. The students mainly described their view of the pandemic situation as an opportunity for improvement ( $n=351$ , 50.1%), then as a crisis in their lives ( $n=309$ , 44.1%), while the rest chose "other" ( $n=40$ , 5.7%), meaning that it was both an opportunity and a crisis, or nothing at all. The majority categorized themselves as former athletes ( $n=312$ , 44.6%), in comparison to non-athletes ( $n=264$ , 37.7%) or athletes ( $n=124$ , 17.7%).

The subsamples included sports science students ( $n_{(SSG)}=350$ ,  $n_{(male)}=182$ , 52%;  $n_{(female)}=168$ , 48%;  $M_{(age)}=22.98$ ,  $SD=2.19$ ), and other sciences students ( $n_{(OSG)}=350$ ,  $n_{(male)}=159$ , 45.4%;  $n_{(female)}=191$ , 54.6%;  $M_{(age)}=23.04$ ,  $SD=1.850$ ). If we look at the groups' socio-demographic characteristics, they did not differ significantly in gender, age, or their view of the pandemic situation. On the contrary, for their graduation program (undergraduate, graduate, or postgraduate), the SSG was slightly different ( $Mr_{(SSG)}=326.87$ ,  $Mr_{(OSG)}=374.13$ ,  $U=52979$ ,  $z=-3.803$ ,  $p=0.000$ ,  $r=-0.14$ ). It has to be mentioned that the students in the two countries have different university systems in length of the undergraduate and graduate programs. The university system for undergraduate programs usually takes four years in Serbia and three in Slovenia. In addition, the graduate program length in Serbia is an average of one year, although in Slovenia, two years. However, if we look at the participants' ages, the groups have similar characteristics. Furthermore, in the SSG group, there were more students with active or former athletic status ( $n_{(active)}=98$ ,  $n_{(former)}=192$ ) than in the OSG ( $n_{(active)}=26$ ,  $n_{(former)}=120$ ) with a significant difference ( $Mr_{(SSG)}=268.83$ ,  $Mr_{(OSG)}=432.17$ ,  $U=32666$ ,  $z=-11.574$ ,  $p=0.000$ ,  $r=-0.44$ ).

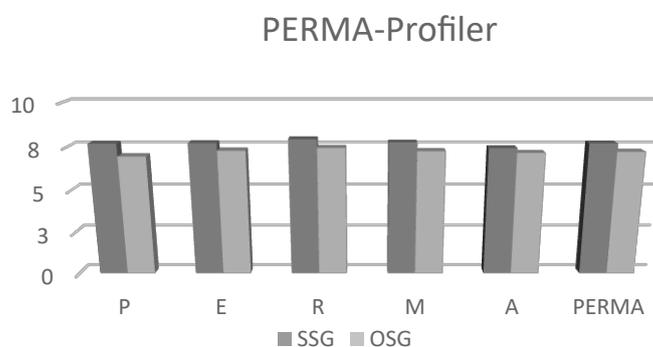
### PERMA-Profiler results for the participants

The quantitative analysis for the total sample revealed that they are in the category of normal functioning for overall well-being and for each dimension as we can see in Table 1.

**Table 1.** Description of the participants PERMA-Profilier results

| PERMA-Profilier results          | Sports science students |      | Other science students |      | All students |      |
|----------------------------------|-------------------------|------|------------------------|------|--------------|------|
|                                  | M                       | SD   | M                      | SD   | M            | SD   |
| Positive emotion (P)             | 7.70                    | 1.73 | 6.96                   | 1.80 | 7.33         | 1.80 |
| Engagement (E)                   | 7.73                    | 1.36 | 7.30                   | 1.43 | 7.51         | 1.41 |
| Relationships (R)                | 7.95                    | 1.64 | 7.46                   | 1.80 | 7.70         | 1.73 |
| Meaning (M)                      | 7.76                    | 1.70 | 7.27                   | 1.78 | 7.52         | 1.76 |
| Accomplishment (A)               | 7.43                    | 1.56 | 7.16                   | 1.52 | 7.30         | 1.55 |
| Overall well-being score (PERMA) | 7.72                    | 1.38 | 7.23                   | 1.31 | 7.47         | 1.37 |

Even though the sports science students scored similarly for each dimension of the PERMA model, their values were significantly higher, which can also be applied for the overall well-being score (Figure 2).



**Figure 2.** Mean scores of SSG (sports science students) and OSG (other science students) on the PERMA-Profilier

*Differences in well-being between SSG and OSG*

The following paragraph will describe the findings on the comparison of sports science and other science students on the PERMA-Profilier questionnaire. As seen in Table 2, the overall well-being score (PERMA) in SSG (Mr=390.27) significantly differs from the OSG (Mr=310.73) group, U=47329, z=-5.205, p=0.000, r=-0.20. Moreover, significant differences between the two groups can be found also in positive emotion, engagement, relationships, meaning and accomplishment factors with higher scores for the SSG.

**Table 2.** Summary of the Mann-Whitney U test among SSG and OSG

| PERMA                            | SSG    |     | OSG    |     | U         | z      | p       | r     |
|----------------------------------|--------|-----|--------|-----|-----------|--------|---------|-------|
|                                  | Mr     | n   | Mr     | n   |           |        |         |       |
| Positive emotion (P)             | 396.09 | 350 | 304.91 | 350 | 45295.000 | -5.978 | 0.000** | -0.23 |
| Engagement (E)                   | 381.24 | 350 | 319.76 | 350 | 50492.000 | -4.033 | 0.000** | -0.15 |
| Relationships (R)                | 379.09 | 350 | 321.91 | 350 | 51245.000 | -3.749 | 0.000** | -0.14 |
| Meaning (M)                      | 380.10 | 350 | 320.90 | 350 | 50891.500 | -3.881 | 0.000** | -0.15 |
| Accomplishment (A)               | 367.57 | 350 | 333.43 | 350 | 55274.000 | -2.239 | 0.025*  | -0.08 |
| Overall well-being score (PERMA) | 390.27 | 350 | 310.73 | 350 | 47329.000 | -5.205 | 0.000** | -0.20 |

Notes: \*\*p<0.01; \*p<0.05; SSG – sports science students; OSG – other science students; Mr – mean rank.

## Discussion

Since the COVID-19 pandemic was ongoing, we wanted to investigate the students' mental health and if the study context made any differences between them. Therefore, this research aimed to (i) examine students' well-being in the summer of 2022 and (ii) compare them from the perspective of their study programs (SSG, OSG) through the PERMA dimensions of well-being.

Based on the literature, students' well-being worsened [27], especially during the stay-at-home measures [20]. Even graduate kinesiology students experienced poor mental health with high perceived stress [28]. Additionally, student-athletes who engaged in regular physical activity had mental illness challenges during the pandemic [29,30].

It is encouraging that the overall well-being of the Slovenian and Serbian university students during the summer of 2022 fell within the category of normal functioning ( $M=7.47$ ,  $SD\pm 1.37$ ). Our results align with one study [31], where the authors stated that as time progressed, psychological well-being improved.

Different responses were found as we considered the study programs (sports and other sciences) among the participants. Sports science students had significantly higher scores ( $M=7.72$ ,  $SD\pm 1.38$ ) compared to the others science students ( $M=7.23$ ,  $SD\pm 1.31$ ) for their overall well-being, as well as for individual components. These results follow that the "health-oriented" students were less sensitive to changes in habits than students from other study programs [21]. Despite the primary discouragement of sports science students from sports activities due to the confinement, they adapted and found ways to exercise [19]. Possibly these students, due to their education program, have a higher awareness of healthy lifestyle practices since their future profession relates to it.

The positive psychology theory focuses on building and maintaining the five elements of well-being. In the present research, relationship was the most prominent dimension. The same can be noticed among the SSG ( $M_{(SSG)}=7.95$ ,  $SD\pm 1.64$ ), which indicates that having a feeling of belonging, support, and connection with others has a positive impact [7]. The interaction between people is one of the essential dimensions of well-being [32]. At the beginning of the pandemic, the stay-at-home measures had an inevitable negative impact on relationships [31], which underlines that loneliness is a disabling condition, drawing attention to the relationships that are fundamental to human well-being [7]. Chen pointed out that the personal relationships of students with a higher level of distress and a lower level of exercise tended to worsen during the pandemic [20].

To further improve our understanding of sports science students' resilience, we have to mention that for these students, sports was a vital necessity [19]. They tend to participate in sports in a higher rate, than in other degree courses [33]. In line with that, we know that generally they exercised regularly during the first phase of the pandemic [21,34], which indicates that these study programs have health-related everyday routines. Having in mind all of the above, we need to consider the impact of specific learning environment on sports science students' persistence to keep an active lifestyle [35].

This study contributes to better understanding of social consequences of the COVID-19 pandemic. It highlights the importance of the sports science students' mental strength as an important factor compared to students of other study programs when faced with a challenging situation such as the COVID-19 pandemic. Analysis of well-being helps to understand the mechanisms of coping with everyday life situations. We believe that this study extends the knowledge of the previously published articles. However, this study has its limitations. Future research should include conclusions based on causality and investigation of changes over time, not only a description of the current well-being state as a cross-sectional study. Furthermore, a broader range of study programs with a higher number of participants would be highly recommended. As we investigated the well-being of students in Slovenia and Serbia, other countries could be included for stronger evidence that sports science students are more resilient compared with students of other courses. Then, the level of the students'

physical activity could be included as possibly one of the main influencing factors for better well-being and mental health. Lastly, how sports science students adapted to this uncertain and challenging COVID-19 pandemic has to be investigated to better understand why and how they maintained good mental health.

## Conclusions

The present study examined the well-being of Slovenian and Serbian university students. The results revealed normal functioning for the total sample ( $M=7.47$ ,  $SD\pm 1.37$ ). In addition, when the study programs of the participants (sports and other sciences) were considered, different responses were found, with the sports science students scoring significantly higher ( $M=7.72$ ,  $SD\pm 1.38$ ) compared to the others ( $M=7.23$ ,  $SD\pm 1.31$ ). So, this research follows the previously published articles about understanding the social consequences of the COVID-19 pandemic. Furthermore, the results revealed that the sports science students were less sensitive to changes, and their mental resilience demonstrates their successful coping strategy with these new circumstances over a more extended period.

## Disclosures and acknowledgments

The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article. The authors declare that the manuscript is part of the project (Reg. No: 142-451-3121/2022-01) financed by the Provincial Secretariat for Higher Education and Scientific Research (Serbia). The authors wish to thank all the participants for agreeing to participate in the present study.

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