

# **An online art intervention reduces university students' COVID-19 stress levels**

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## Abstract

Recent research investigating university students with respect to the impact of the COVID-19 pandemic found high levels of anxiety, worries about academic progress as well as stress imposed by the disruption of daily routine among students. However, the engagement with art presents an effective intervention for stress reduction. Accordingly, we designed and implemented a cross-cultural online art workshop for students in which they were invited to discuss and write their perceived challenges and coping strategies during the pandemic, practiced deep-listening, which includes focusing on the surrounding environment, and produced audio-visual material.

The workshop lasted for 8-days during three weeks at the beginning of the summer term in March 2021. Eighteen pedagogy students (15 females,  $M_{age} = 21.2$ ) from Universities of Greifswald (Germany) and Szczecin (Poland) filled in a questionnaire about perceived COVID-19 stress, general stress, and well-being before and after the intervention. Randomly chosen pedagogy students from both universities assigned to the control group ( $n=17$ , 16 females,  $M_{age} = 21.7$ ), filled in the same questionnaires during the same period of time. Statistical analyses indicate that students' COVID-19 stress reduced among the art workshop group, whereas their perceived general stress increased, and their well-being did not change. For students from the control group no significant changes were found. In addition, general stress and COVID-19 stress did not correlate, which might be an indication that these two types of stress are not related to one another. The results underline the positive impact that engagement with art may have on COVID-19 stress reduction.

*Keywords: COVID-19 related stress, general stress, well-being, art intervention, university students*

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## **Introduction**

The COVID-19 pandemic has caused anxiety, stress, and uncertainty in nearly all areas of life and among all age groups since March 2020. In detail, a longitudinal UK based study revealed that particularly young adults aged 18-29 years were at risk, reporting increased suicidal ideation, symptoms of anxiety, and levels of defeat and entrapment during the pandemic (O'Connor et al., 2020). Analyzing the tweets of almost 300,000 Twitter users during the pandemic from 20 US metropolitan areas, Bathina and colleagues (2021) detected a mood decline among users. Other social media-based (Valdez et al., 2020) and questionnaire-based studies (Zacher & Rudolph, 2021) revealed similar results as they detected a decrease in subjective well-being, life satisfaction, and positive affect due to the COVID-19 pandemic. Another study conducted during the pandemic with college students revealed that academic workload, separation from school, and fears of contagion were positively related to perceived stress which in turn increased the risk for physiological and psychological health impairments (Yang et al., 2021). In sum, various studies have linked the COVID-19 pandemic to increased general stress, COVID-19 related stress as well as impaired well-being among college and university students, of whom the majority reported difficulties in coping with COVID-19 (Clabaugh et al., 2021). Of all students, pedagogy students, in particular, present a vulnerable group as they are teaching in schools, where school life has been marked by uncertainties and constant changes in regulations imposed by the pandemic. Stress may occur if demands exceed students' resources (Lazarus & Folkman, 1984), which may be expressed by worrisome thoughts, impaired joy, feeling tense and overtaxed (Fliege et al., 2001). While perceived stress is not context bound and therefore a general measure of stress, COVID-19 related stress refers to the fear of contagion, the perception of social

distancing due to the restrictions enforced by measures undertaken during the pandemic (Zurlo et al, 2020).

With respect to well-being, two aspects can be distinguished: hedonic and eudaimonic well-being (Kahneman et al., 1999). While hedonic well-being contains both cognitive and affective components and is focused on both feeling satisfied with life (Diener et al., 1985) and the presence of positive emotions, the eudaimonic well-being refers to the meaning of life, self-fulfillment and purposefulness (Waterman et al., 2010).

In order to cope with stressors and increase well-being, the engagement with art has shown to reduce stress in clinical and non-clinical studies (Curl & Forks, 2008; Kaimal et al., 2016). In detail, creative art interventions encourage and enable participants to actively create or generate art and express their internal reality through external (artistic) representations (Moon, 2006). Thereby, making art is not bound to rules, specified patterns or certain skills, which allows participants to go into a mindful framework ( Williams, 2018). Art interventions may activate participants' resources, support their coping abilities, increase action flexibility, self-efficacy, and empowerment, as pointed out in a systematic review (Martin et al., 2018). In fact, through the engagement with art fear can be linked to positive sensory experiences which in turn increases the control over emotions (Hass-Cohen & Carr, 2008).

Although the engagement with art has indicated positive effect on participants' stress reduction and an increase in well-being, little empirical research has investigated the effect of art interventions during the pandemic in non-clinical samples. One of the few studies, exploring the effects of an online art intervention with 22 elementary school students during the COVID-19 pandemic indicates improved mental health among the participants (Malboeuf-Hurtubise et al., 2021). Adding to empirical studies and expanding our knowledge about COVID-19 related stress interventions, the current study was designed to investigate the effect of an online art intervention on COVID-19 related stress, general stress, and well-being among university students.

### ***Aims and Hypotheses:***

Based on the empirical research investigating the effects of art interventions outlined above, the following hypotheses were formulated:

- (1) COVID-19 related stress is associated with higher general stress, i.e. worries, tension, demands, and lower levels of perceived joy as well as well-being, i.e. hedonic and eudaimonic well-being.
- (2) Students who participate in an online art intervention (experimental group) indicate lower levels of COVID-19 related stress, general stress and higher levels of well-being after the intervention compared to the students who do not participate in this intervention (control group).

## **Method**

### ***Participants and Procedure***

The data were collected in March 2021 in an online survey via Evasys. The workshop was announced for pedagogy students from the University of Greifswald (Germany) and the University of Szczecin (Poland). A total of 23 seats were offered on a basis of first come first serve. The number of participants for the current study was determined by (a) the capabilities of the workshop (b) willingness from the control group to participate in the questionnaire study; (c) signed forms of consent, that provided participants with information about the study; and (d) the number of students who participated in data collection over two timepoints. In the experimental group, from 23 German and Polish pedagogy students in total, 18 fulfilled the conditions (a)-(d) (15 female,  $M_{age} = 21.2$ ). In the control group, out of 26 German and Polish pedagogy students in total, 17 fulfilled the conditions (a)-(d) (16 female,  $M_{age} = 21.7$ ). All participants were assured that the collected data would be anonymized, collected voluntarily and their answers treated confidentially. All procedures were in accordance with the ethical standards of the institutional research committee.

### ***Online Art Intervention***

The workshop was designed as an intervention to overcome COVID-19 related stress by approaching the complexity of the current situation, often referred to as crisis, on cognitive, emotional, and creative-productive levels. As such, students cognitively engaged with the topic by reading about how the term ‘crisis’ emerged historically in Europe since ancient Greece and what meaning it had for different disciplines. In the next step, students produced their own texts about how they perceive the crisis and cope with COVID-19 related challenges. These texts were exchanged and discussed within a group of two, consisting of a student from Poland and a student from Germany. Furthermore, by addressing the question of how students could sharpen their attention to the entanglements with the immediate environment, students emotionally engaged in hands-on practices including deep listening. Deep listening combines elements of meditation, mindfulness, and perceiving without judging. Finally, students were invited to discuss and reflect their experiences during these practices in a cross-cultural team and created audio-visual art work, including photographs (e.g., see figure 1 and figure 2), and/or sound material combined with poems and personal texts. All art works can be accessed via the webpage: [www.inter-uni.eu](http://www.inter-uni.eu).

Figure 1

*Students’ photographs expressing their perception of the COVID-19 pandemic*



Figure 2

*Reflection of practicing deep-listening*



### **Method**

The scales used in this study are well-established self-report instruments, already validated on university student samples. The language in the workshop was English and the questionnaires were administered in English, too.

*COVID-19 related stress* was measured by The COVID-19 Scale (Zurlo et al., 2020) (experimental group  $\alpha T1 = .50$ ;  $\alpha T2 = .71$ ; control group:  $\alpha T1 = .62$ ;  $\alpha T2 = .85$ ). The scale is comprised of seven items, addressing different dimensions of COVID-19 related stress (e.g., “How do you perceive the risk of contagion during this period of COVID-19”? or “ How do you perceive the condition of social isolation imposed during this period of COVID-19?”). Answers ranged from 1 = “not at all stressful” to 5 = “extremely stressful” on a five-point Likert scale.

*General stress* was addressed by a short (PSQ-20) version of the Perceived Stress Questionnaire by Fliege et al., 2001. The scale ( $\alpha T1 = .70$ ;  $\alpha T2 = .71$ ), included four subscales, each comprised of five items and rated on a four-point Likert scale (from 1= “almost never” to 4= “usually”). Subscales included the following: worries e.g., “You have many worries” (experimental group  $\alpha T1 = .81$ ;  $\alpha T2 = .78$ ; control group:  $\alpha T1 = .85$ ;  $\alpha T2 = .87$ ), tension e.g., “You feel tense” (experimental group  $\alpha T1 = .67$ ;  $\alpha T2 = .81$ ; control group:  $\alpha T1 = .80$ ;  $\alpha T2 = .79$ ), demands e.g., „You feel under pressure from deadlines“ (experimental group  $\alpha T1 = .84$ ;  $\alpha T2 = .82$ ; control group:  $\alpha T1 = .86$ ;  $\alpha T2 = .83$ ) and joy as a counterpart e.g., “You are full of energy” (experimental group  $\alpha T1 = .40$ ;  $\alpha T2 = .69$ ; control group:  $\alpha T1 = .89$ ;  $\alpha T2 = .86$ ). Three items out of 20 were recoded for further analyses.

Two scales were used to access different aspects of well-being: (1) *Eudaimonic well-being*, from QEWB (Waterman et al., 2010), comprised of 21 items (experimental group  $\alpha T1 = .81$ ;  $\alpha T2 = .85$ ; control group:  $\alpha T1 = .91$ ;  $\alpha T2 = .87$ ), e.g., “I can say that I have found my purpose in life.”. The answers ranged on a Likert scale from 1 “strongly disagree” to 5 “strongly agree”. The negatively coded items were recoded for further analyses. (2) *Hedonic well-being* was addressed with the Satisfaction with life - SWLS Scale (Diener et al., 1985), consisting of five items (experimental group  $\alpha T1 = .88$ ;  $\alpha T2 = .84$ ; control group:  $\alpha T1 = .94$ ;  $\alpha T2 = .97$ ), e.g., “In most ways my life is close to ideal.”. The answers rated on a Likert scale from 1 = “strongly disagree” to 7 = “strongly agree”.

### ***Statistical Analyses***

The study has a quasi-experimental design due to not absolutely random choice of participants (Campbell & Stanley, 1963). According to Cohen et al. (2007), or Gall et al. (1996), in experimental study designs, the sample should include at least 15 participants in the experimental and control groups. To test the hypotheses, we used correlational analyses and mean comparisons in SPSS (Version 27). For the t-tests, we used Hedges’s *g*, recommended for the estimation of effect sizes in small samples (Lakens, 2013).

## Results

Correlational analyses of all students, participating in the questionnaire study before the intervention indicates that students who indicated to feel stressed in general were more likely to report low eudaimonic ( $r(35) = -.39, p < 0.05$ ) and hedonic well-being ( $r(35) = -.43, p < 0.05$ ). Students who reported high levels of eudaimonic well-being were also more likely to report hedonic well-being ( $r(35) = .65, p < 0.01$ ). Interestingly, COVID-19 related stress was not associated with general stress. Investigating the subscales of general stress indicates that students who experienced more worry, reported lower hedonic ( $r(35) = -.63, p < 0.01$ ) and eudaimonic well-being ( $r(35) = -.53, p < 0.01$ ). Similarly, tension revealed significant negative associations with hedonic ( $r(35) = -.55, p < 0.01$ ) and eudaimonic ( $r(35) = .65, p < 0.01$ ) well-being. Reported stress in relation to experienced demands showed a significant negative association only with hedonic ( $r(35) = -.32, p < 0.05$ ) well-being. On the contrary, the perception of joy revealed a significant positive association both with hedonic ( $r(35) = .76, p < 0.01$ ) and eudaimonic ( $r(35) = .69, p < 0.01$ ) well-being.

Investigating associations between the variables of interest after the intervention separately for the experimental and control group, revealed the following correlations as depicted in table 1 and table 2.

Table 1

*Summary of Intercorrelations, Means, and Standard Deviations for stress, COVID-19 stress, and well-being of students of the experimental group, second measurement point*

Measure	1	2	3	4	5	6	7	8	M	SD
1.COVID-19 Stress T2	-									
		.140								
2. Stress: General T2			.635**	.784**	-.119	.859**	-.116	-.053	2.60	.31
3.Stress: Worry T2				.607**	-.586**	.381	-.619**	-.655**	2.69	.74
4.Stress: Tension T2					-.430	.588*	-.215	-.393	2.65	.63
5.Stress: Joy T2						-.189	.511**	.761**	2.74	.70
6.Stress: Demands T2							.059	.140	2.96	.59
7.Hed. Well-Being T2								.690**	3.57	.55
8.Eud Well-Being T2									4.17	1.70

Note. \*  $p < .01$ ; \*\*  $p < .05$

Table 2

*Summary of Intercorrelations, Means, and Standard Deviations for stress, COVID-19 stress, and well-being of students of the control group, second measurement point*

Measure	1	2	3	4	5	6	7	M	SD	
1.COVID-19 Stress T2	-									
		-.163	.055	.258	-.295	-.346	-.061	-.119	3.17	.89
2. Stress: General T2			.777**	.795**	-.651*	.883	-.449	-.113	2.77	.30
2.Stress: Worry T2				.651**	-.863**	.676**	-.809**	-.503*	2.69	.74
3.Stress: Tension T2					-.678**	.554*	-.414	-.146	2.65	.63
4.Stress: Joy T2						-.534*	.782**	.655**	2.74	.70
5.Stress: Demands T2							-.422	-.256	2.96	.59
6.Hed. Well-Being T2								.701**	3.57	.55
7.Eud Well-Being T2									4.17	1.70

Note. \*  $p < .01$ ; \*\*  $p < .05$

The t-test showed that in the experimental group, students reported significantly lower COVID-19 stress levels after ( $M = 2.49$ ,  $SD = .69$ ) than before ( $M = 2.85$ ,  $SD = .61$ ) the online art intervention  $t(17) = 3.097$ ,  $p < .01$ , 95% CI [.114, .603]. The intervention had a medium effect with respect to the reduction of students' COVID-19 related stress level (Hedges's  $g = .50$ ). On the contrary, the t-test in the control group did not reach a level of significance:  $t(16) = -322$ ,  $p = .75$ , 95% CI [-.430, .316]. With respect to feeling stress by

demands, students who participated in the online art intervention reported increased levels of demands after the intervention (before:  $M = 2.51$ ,  $SD = .71$ ; after:  $M = 2.84$ ,  $SD = .55$ ),  $t(17) = -2.126$ ,  $p < .05$ , 95% CI  $[-.664, -.002]$ , with a medium effect (Hedges's  $g = .68$ ). In the control group, no significant changes were found with respect to stress related demands ( $t(16) = -1.949$ ,  $p = .069$ , 95% CI  $[-.368, .015]$ ).

## Discussion

The current study investigated the effect of an online art intervention on pedagogy students' COVID-19 related stress, general stress, and well-being. The online art intervention was designed to follow a wholistic approach to the topic of COVID-19 by including cognitive, emotional and creative-productive elements. In the frame of the workshop, the students were invited to explore the concept of 'crisis', reflect on how they perceived the current situation, got involved in the perception of their immediate environment and created audio-visual art. Against hypothesis 1, COVID-19 related stress was not significantly related to general stress and well-being. However, students who reported to feel generally stressed exhibited lower hedonic as well as eudaimonic well-being, which is in line with previous studies (Valdez et al., 2020; Zacher & Rudolph, 2021). As COVID-19 related stress was not significantly linked to general stress, it may be an indication that both concepts are distinct from another. While COVID-19 related stress covers the fear of contagion, the relationship to significant others as well as the perception of social distancing, general stress includes feeling tense, overtaxed by demands, worries, and impaired joy. Hence, both concepts, i.e. COVID-19 related stress and general stress, may map on different areas of life. As the perception of COVID-19 stress may differ considerably among females and males (Barzilay et al., 2020; Pradhan & Olsson, 2020) as well as between individuals from higher risk groups (due to pre-existing conditions) vs. low risk groups (no impaired health condition), person-oriented analyses with large samples may give insight on individual profiles. A latent profile analysis conducted with 506 university students indicated that 46% of students were classified into the high COVID-19

fear and medium psychological symptoms profile, 38% of students were identified as low psychological symptoms and high mindfulness and resilience, while another 16% were classified as high COVID-19 fear, psychological symptoms and low mindfulness and resilience (Yalçın et al., 2021). Next to individual profiles that differ with respect to the extent of COVID-19 related fear, the study of Yalçın and colleagues (2021) indicates that mindfulness may be a key variable in supporting resilience when exposed to COVID-19 related stress. These findings are supported by the current study, as the students who participated in an online art intervention reported a decrease in COVID-19 related stress as compared to the students who did not participate in the intervention. Hence, this study contributes to the little research conducted so far on the effects of art interventions on participants' stress and well-being during the COVID-19 pandemic. As participation in an online art intervention reduced COVID-19 related stress but did not significantly improve well-being or affect general stress, as expected, hypothesis two could only be partially confirmed. Surprisingly, participants who attended the art intervention reported higher stress-induced demand levels at the end of the intervention compared to the control group where no changes were found. As the art intervention focused particularly on the current pandemic by engaging participants in cognitive, emotional, and creative-productive tasks, this may be the reason why COVID-19 related stress reduced as a result of the intervention, but not stress-related demands. As this online art intervention was conducted at the beginning of the summer term, it is possible that the students felt that demands in relation to other study obligations put them under pressure. Although the students from the experiment group reported that their COVID-19 related stress decreased through the intervention, taking part in this 8-full-day intervention in a short period of 3 weeks, might have put additional pressure on them next to other obligations at the beginning of the semester. Hence, future interventions should consider additional obligations participants may get involved in, so that the intervention can develop its effects and not be considered as a source of burden.

In sum this study reveals that an online art intervention, following a wholistic approach by stimulating cognitive, emotional, and creative-productive engagement with the COVID-19 pandemic may be a successful tool to reduce COVID-19 related stress. Therefore, it is advisable to integrate the intervention into the curriculum as it supports students in dealing with COVID-19 related stress, on condition that this intervention is not perceived as an additional burden to obligatory seminars that students have to attend.

### References

- Akdeniz, G., Kavakci, M., Gozugok, M., Yalcinkaya, S., Kucukay, A., Sahutogullari, B. (2020). A survey of attitudes, anxiety status, and protective behaviors of the university students during the COVID-19 outbreak in Turkey. *Frontiers in Psychiatry*. 11:695. <https://doi.org/https://doi.org/10.3389/fpsyt.2020.00695>.
- Barzilay, R., Moore, T. M., Greenberg, D. M. DiDomenico, G. E., Brown, L. A., White, L. K., Gur, R. C., 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>
- Bathina, K. C., ten Thij, M., Valdez. D., Rutter, L. A., Bollen, J. (2021). Declining well-being during the COVID-19 pandemic reveals US social inequities. *PLoS ONE* 16(7): e0254114. <https://doi.org/10.1371/journal.pone.0254114>
- Campbell, D.T., & Stanley, J. (1963). *Experimental and quasi-experimental designs for research*. Rand McNally.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287(112934). <https://doi.org/10.1016/j.psychres.2020.112934>

- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. Routledge.
- Cohen J. (1992): A power primer. *Psychological Bulletin*, 112(1), 155–159.  
<https://doi.org/10.1037/0033-2909.112.1.155>
- Curl, K. & Forks, G. (2008). Assessing stress reduction as a function of artistic creation and cognitive focus. *Art Therapy: Journal of the American Art Therapy Association*, 25(4), 164–169.
- Debowska, A., Horeczy, B., Boduszek, D., Dolinski, D. (2020). A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. *Psychological Medicine*, 1–4.  
Advance online publication. <https://doi.org/https://doi.org/10.1017/s003329172000392x>.
- Díaz-Jiménez, R. M. P., Caravaca-Sánchez, F. P., Martín-Cano, M. C. P., De la Fuente-Robles, Y. M. P. (2020). Anxiety levels among social work students during the COVID-19 lockdown in Spain. *Social Work Health Care*. 59(9–10), 681–693.  
<https://doi.org/https://doi.org/10.1080/00981389.2020.1859044>.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49(1), 71–75.  
[https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
- Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*. Longman Publishing.
- Hass-Cohen, N., & Carr, R. (Eds.). (2008). *Art therapy and clinical neuroscience*. Jessica Kingsley.
- Husky, M. M., Kovess-Masfety, V., & Swendsen, J. D. (2020). Stress and anxiety among university students in France during Covid-19 mandatory confinement.  
*Comprehensive Psychiatry*. 102:152191.
- Kahneman, D., Diener, E., & Schwarz, N. (1999). *Well-being: The foundations of hedonic psychology*. Russell Sage Foundation.

- Kaimal, G., Ray, K., & Muniz, J. (2016). Reduction of cortisol levels and participants' responses following art making. *Journal of the American Art Therapy Association, 33*(2), 74–80. <https://doi.org/10.1080/07421656.2016.1166832>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology, 4*, 863. [https://doi:10.3389/fpsyg.2013.00863](https://doi.org/10.3389/fpsyg.2013.00863)
- Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and Coping*. Springer.
- Liu, X., Liu, J., & Zhong, X. (2020). Psychological state of college students during COVID-19 epidemic. *Lancet. preprint*. <https://doi.org/https://doi.org/10.2139/ssrn.3552814>.
- Moon, B. (2006). *Ethical issues in art therapy*. Charles C Thomas.
- Malboeuf-Hurtubise, C., Léger-Goodes, T., Mageau, G.A., Taylor, G., Herba, C. M., Chadi, N., & Lefrancois, D. (2021). Online art therapy in elementary schools during COVID-19: results from a randomized cluster pilot and feasibility study and impact on mental health. *Child and Adolescent Psychiatry Mental Health, 15*(1). <https://doi.org/10.1186/s13034-021-00367-5>
- Martin, L., Oepen, R., Bauer, K., Nottensteiner, A., Mergheim, K., Gruber, H., & Koch, S. (2018). Creative arts interventions for stress management and prevention—A systematic review. *Behavioral Sciences, 8*(2), 28. [https://doi:10.3390/bs8020028](https://doi.org/10.3390/bs8020028)
- Meda, N., Pardini, S., Slongo, I., Bodini, L., Zordan, M. A., Rigobello, P., Visioli, F., Novara, C. (2021). Students' mental health problems before, during, and after COVID-19 lockdown in Italy. *Journal of Psychiatric Research, 134*, 69–77. <https://doi.org/10.1016/j.jpsychires.2020.12.045>.
- O'Connor, R. C., Wetherall, K., Cleare, S., McClelland, H., Melson, A. J., Niedzwiedz, C. L., O'Carroll, R. E., O'Connor, D. B., Platt, S., Scowcroft, E., Watson, B., Zortea, T., Ferguson, E., & Robb, K. A. (2020). Mental health and well-being during the COVID-19 pandemic: longitudinal analyses of adults in the UK COVID-19 Mental Health &

- Wellbeing study. *The British journal of psychiatry: the journal of mental science*, 1–8.  
Advance online publication. <https://doi.org/10.1192/bjp.2020.212>
- Pradhan, A., Olsson, P. E. (2020). Sex differences in severity and mortality from COVID-19: are males more vulnerable? *Biology of Sex Differences*, *11*(53).  
<https://doi.org/10.1186/s13293-020-00330-7>
- Rogowska, A. M., Kuśnierz, C., & Bokszczanin A. (2020). Examining anxiety, life satisfaction, general health, stress and coping styles during COVID-19 pandemic in polish sample of university students. *Psychology Research and Behavior Management*, *13*, 797–811.
- Schlichtiger, J., Brunner, S., Steffen, J., Huber, B. C. (2020). Mental health impairment triggered by the COVID-19 pandemic in a sample population of German students. *Journal of Investigative Medicine*, *68*(8), 1394–1396.  
<https://doi.org/https://doi.org/10.1136/jim-2020-001553>.
- Valdez, D., Ten Thij., M., Bathina, K. C., Rutter, L. A., & Bollen J. (2020). Social media insights into US mental health during the COVID-19 pandemic: Longitudinal analysis of twitter data. *Journal of medical Internet research*, *22*(12): e21418. pmid:33284783
- Waterman, A. S., Schwartz, S. J., Zamboanga, B. L., Ravert, R. D., Williams, M. K., Agocha, M. B., & Donnellan, V. B. (2010). The questionnaire for eudaimonic well-being: Psychometric properties, demographic comparisons, and evidence of validity. *The Journal of Positive Psychology*, *5*(1), 41–61. doi:10.1080/17439760903435208
- Williams, P. (2018). ONEBird: Intégration de la pleine conscience, de l'autocompassion et de l'art-thérapie [ONEBird: Integrating mindfulness, self-compassion, and art therapy]. *Canadian Art Therapy Association Journal*, *31*(1), 23–32.  
<https://doi.org/10.1080/08322473.2018.1454687>
- Yalçın, İ., Can, N., Mançe Çalışır, Ö., Yalçın, S., & Çolak, B. (2021). Latent profile analysis of COVID-19 fear, depression, anxiety, stress, mindfulness, and resilience. *Current*

*Psychology*, 1–11. Advance online publication. <https://doi.org/10.1007/s12144-021-01667-x>

Yang, C., Chen, A., & Chen, Y. (2021). College students' stress and health in the COVID-19 pandemic: The role of academic workload, separation from school, and fears of contagion. *PloS one*, *16*(2), e0246676. <https://doi.org/10.1371/journal.pone.0246676>

Zacher, H., & Rudolph, C. W. (2021). Individual differences and changes in subjective wellbeing during the early stages of the COVID-19 pandemic. *The American Psychologist*, *76*(1), 50–62. <https://doi.org/10.1037/amp0000702>

Zurlo, M. C., Della Volta, M. F. C., Vallone, F. (2020). COVID-19 Student Stress Questionnaire: Development and validation of a questionnaire to evaluate students' stressors related to the coronavirus pandemic lockdown. *Frontiers in Psychology*, *11*(2892). <https://doi.org/10.3389/fpsyg.2020.576758>  
<https://doi.org/https://doi.org/10.1016/j.comppsyg.2020.152191>.

### **Declaration of interest statement**

The authors declare no conflict of interest.

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**Disclosure statement.** This is to acknowledge any financial interest or benefit that has arisen from the direct applications of your research.

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**Justification of sample size.**

The study has a quasi-experimental design due to not absolutely random choice of participants (Campbell & Stanley, 1963). According to Cohen et al. (2007), or Gall et al. (1996), the sample should include at least 15 participants in the experimental and control groups. For effect size estimation, we used Hedge's  $g$  instead of Cohen's  $d$  due to the small sample size (Lakens, 2013)

**Data availability statement.**

Data will be made available on justified request.