IRSTI 15.21.41 https://doi.org/10.26577/JPsS.2023.v84.i1.01

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PERCEIVED STRESS, PAIN, SLEEP QUALITY AND MINDFULNESS AS THEIR REGULATOR AMONG ADULT STUDENTS

The pandemic of COVID-19 became a very stressful experience for the population. Being unpredictable and unexplored disease, it brought additional stress and negative impact on people's psychological and physical functioning as well as well-being. In this study we assumed that mindfulness as a state of mind can become a regulator that helps to reduce negative consequences of perceived stress and aspects of psychophysical well-being: perceiving pain and sleep quality.

The main goal of this study is to determine how the level of perceived stress and aspects of psychophysical well-being (specifically: sleep quality and perceiving pain in daily life) were interconnected with the level of mindfulness among adult students during the times of pandemic.

In October 2021 we questioned 106 adult students with Mindful Attention Awareness Scale (MAAS), Meaning in Life Questionnaire (MLQ), Perceived Stress Scale (PSS), Numerical Pain Rating Scale (NPRS) and Sleep Quality Questionnaire. SPSS Statistics 23 program was used, Pearson's criteria was applied to investigate the correlations among these parameters.

As a result, it was clarified in our sample respondents with higher levels of mindfulness have lower levels of perceived stress and pain as well as better sleep quality.

The results of the study complement the body of knowledge in a sphere of interconnections between mindfulness, stress and aspects of psychophysical well-being. Results can be used for further researches in the field of mindfulness, stress, pain, sleep quality, psychophysical well-being in whole, post-covid conditions. In a practical sense results can be helpful in formation of training programs, psychotherapy, educational activities, including stress resistance training, mindfulness practices, post-covid rehabilitation.

Key words: perceived stress, chronic stress, pain, mindfulness, well-being, sleep quality, presence.

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Ересек студенттердің қабылданған стресс, ауыру, ұйқы сапасы және олардың реттеушісі ретінде саналы зейін

COVID-19 пандемиясы бәріміз үшін стресстік тәжірибе болды. Болжауға болмайтын және зерттелмеген ауру ретінде COVID-19 қосымша стресс әкелді және психологиялық және физикалық жұмысына, сондай-ақ әл-ауқатына теріс әсер етті. Бұл зерттеуде біз ақыл-ой күйі ретіндегі зейінді стресстің жағымсыз әсерлерін және ауырсыну сезімі мен ұйқы сапасы сияқты психофизикалық әл-ауқат аспектілерін азайтуға көмектесетін реттеуші болуы мүмкін деп болжадық.

Бұл зерттеудің мақсаты – қабылданған стресс деңгейлері мен психофизикалық әл-ауқат аспектілері (әсіресе ұйқы сапасы және күнделікті өмірдегі ауырсынуды қабылдау) пандемия кезінде ересек студенттердің саналы зейін деңгейімен қалай байланысты екенін анықтау.

2021 жылдың қазан айында 106 ересек оқушы арасында сауалнама жүргізілді: Зейіннің назарын аудару шкаласы (MAAS), өмірдің мәні сауалнамасы (MLQ), қабылданатын стресс шкаласы (PSS), визуалды аналогтық ауырсыну шкаласы (NPRS) және ұйқы сапалы сауалнама. SPSS Statistics 23 бағдарламасы қолданылды, ал бұл параметрлер арасындағы корреляцияны зерттеу үшін Пирсон тесті пайдаланылды.

Талдау нәтижесінде біздің іріктемемізде хабардарлық деңгейі жоғары респонденттерде стресс пен ауырсынуды қабылдау деңгейі төмен, сонымен қатар ұйқы сапасы жақсырақ екені анықталды.

Зерттеу нәтижелері зейін, күйзеліс және психофизикалық салауаттылық аспектілері арасындағы байланыс саласындағы білімдер жиынтығын толықтырады. Нәтижелер зейін, стресс, ауырсыну, ұйқы сапасы, жалпы психофизикалық әл-ауқат, COVID-тен кейінгі жағдайлар саласындағы әрі қарай зерттеулер үшін пайдаланылуы мүмкін. Практикалық тұрғыдан алғанда, нәтижелер стресске қарсы тұру жаттығуларын, зейінді жаттығуларды және COVID-тен кейінгі оңалтуды қоса алғанда, оқу бағдарламалары мен білім беру сессияларын құруда пайдалы болуы мүмкін.

Түйін сөздер: созылмалы стресс, қабылданатын стресс, ұйқы сапасы, әл-ауқат, зейінділік, қатысу.

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Воспринимаемый стресс, боль, качество сна и осознанность, как их регулятор у взрослых студентов

Пандемия COVID-19 стала стрессовым опытом для всех нас. Будучи непредсказуемым и неизученным заболеванием, COVID-19 принес дополнительную стрессовую нагрузку и негативно повлиял на психологическое и физическое функционирование, а также благополучие. В данном исследовании мы предположили, что осознанность как состояние психики может быть регулятором, позволяющим снизить негативные последствия воспринимаемого стресса и аспекты психофизического благополучия, такие как, переживание боли и качество сна.

Основная цель данного исследования — определить, как уровни воспринимаемого стресса и аспекты психофизического благополучия (в частности, качество сна и восприятие боли в повседневной жизни) взаимосвязаны с уровнем осознанности у взрослых студентов во время пандемии.

В октябре 2021 был проведен опрос 106 взрослых студентов: шкала осознанной внимательности (MAAS), опросник смысла жизни (MLQ), шкала воспринимаемого стресса (PSS), визуальная аналоговая шкала боли (ВАШ) и опросник качества сна. Использовалась программа SPSS Statistics 23, для исследования корреляций между этими параметрами применялся критерий Пирсона.

В результате проведенного анализа выяснено, что в нашей выборке респонденты с более высоким уровнем осознанности имеют более низкий уровень воспринимаемого стресса и боли, а также лучшее качество сна.

Результаты исследования дополняют совокупность знаний в области взаимосвязи осознанности, стресса и аспектов психофизического благополучия. Результаты могут быть использованы для дальнейших исследований в области осознанности, стресса, боли, качества сна, психофизического благополучия в целом, постковидных состояний. В практическом плане результаты могут быть полезны при формировании программ тренингов и образовательных занятий, в том числе, тренингов по стрессоустойчивости, практик осознанности, постковидной реабилитации.

Ключевые слова: воспринимаемый стресс, хронический стресс, боль, осознанность, благополучие, качество сна, присутствие.

Introduction

In times of uncertainty like pandemic of COVID-19 we all need holistic and systemic basement to rely on, to overcome disease and to feel better, a model how to improve our psychological and physical well-being. Studying of stress, pain, sleep quality and mindfulness as separate variables inevitably leads to the idea of their connection. Our interest in research brought us to the meta problem – what unifying, systemic model of psychophysical well-being can be relevant to current times?

Coming to a term *Psychophysical well-being* as to a new 'well-forgotten old' formulation of the complex condition with interconnections between psychological well-being and physical well-being seems to us relevant and urgently needed, as we observe connections between body and mind conditions in COVID-19 times and post-covid world. With a variety of interconnections between psychological and physical factors psychophysical well-being may be assumed as different, multifaceted phenomena and can be disclosed via models, qualitative and quantitative researches, using relevant circumstantial tests and inventories.

For the moment of now there are still no convincing models of psychophysical well-being. There are concepts of just well-being (Well-Being Concepts. Cdc.gov, 2018), there are 2 main perspectives of how to look at psychological well-being (DeJuanas et al., 2020) – a hedonistic one, connected with positive affect and the one connected with self-realization and social functioning (Ryff, 2013). But these theories do not support physical content of well-being and do not cover many physical states that influence and have 'rhymes' with psychological life (e.g. condition of health, pain, sleep quality, etc.). Parts of psychological well-being can be reasons as well as effects of physical well-being and vice versa, and if so, should be observed in a holistic, systemic way.

Psychological well-being can be defined as *the dynamic balance between one's personal needs and potentialities on one hand and the characteristics of the external environment on the other hand* (Puce et al., 2017). Physical wellbeing can be defined as

the ability to maintain a healthy quality of life that allows us to get the most out of our daily activities without undue fatigue or physical stress (Australian National University, n.d.). Therefore, psychophysical well-being can have more complicated and synergetic structure accommodating psychological well-being and physical well-being together. It can be more precise than a wide term 'well-being' which also accommodates social and economic well-being. Thus, psychophysical well-being can be defined as *the dynamic balance between one's personal conditions of mind and the ease of his physical functioning in daily activities without undue fatigue or stress.*

We believe it is important to affirm psychophysical well-being as independent systemic term and to study its content. For this particular study we were interested in aspects that can be content of psychophysical well-being: perceived pain, sleep quality and mindfulness as their regulator.

Studying stress, we observe that this phenomenon cannot be just psychological or just physical as we divide its physical and psychological manifestations. Therefore stress, or low stress (distress) can be counted as one of the integral aspects of psychophysical well-being. It is also a part of this study.

Pain is another point of the interest in this study as there are evidences that some types of pain (not acute, but chronic) can be part of perceiving emotions and can be managed by cognitive control (Bushnell et al., 2013). We also realized that 27,3% of students experience moderate or severe pain, 41,5% experience low intensity pain right during the educational process (Polyvyannaya et al., 2022) which can be of acute, chronical or temporal origin connected with body pose and some movement habits or have other reasons. Notwithstanding of origin it influences psychological well-being (Rau et al., 2021), can be connected with stress (Timmers et al., 2019) and can have interconnections with mindfulness (Phelps et al., 2021).

Mindfulness is a significant aspect of well-being. Mindfulness involves bringing awareness to present-moment experiences like thoughts, body sensations, and the environment (without judgement) (Castillo-Sánchez et al., 2022). Mindfulness or Mindful Attention can be the regulator that brings awareness and clearness in many psychological issues, can help to resolve them, find resources to deal with stress and negative emotions, bring coping with unpleasant feelings and as a practice can become a prophylaxis of mental breakdowns (Hofmann & Gómez, 2017).

Justification of the choice of articles and goals and objectives

Relevance of the topic was formulated in times of COVID-19 pandemic, as it brought additional stress to people. For example, this perceived stress can negatively impact learning engagement and academic outcomes of university students (Lu et al., 2022; Sfeir et al., 2022). At the same time, mindfulness can become a regulator that helps reduce the level of perceived stress (Castillo-Sánchez et al., 2022; Xu et al., 2022).

Being unpredictable and unexplored disease, COVID-19 brought negative impact on people's psychological and physical functioning as well as well-being. In this study we assumed that mindfulness as a state of mind can become a regulator that helps to reduce negative consequences of perceived stress and aspects of psychophysical well-being: perceiving pain and sleep quality.

This article is one in a series of investigations of the components of psychophysical well-being as well as what regulators can be applied to improve psychophysical well-being. In this case we examine if mindfulness has connection on the level of stress and pain (not acute but more of a chronic and psychosomatic type of pain). We are interested in aspects of psychophysical well-being, not just separate parts as psychological well-being and physical well-being, but more complicated synergetic phenomena. This is why we are in search what predictors or factors can become content of psychophysical well-being and are relevant for nowadays.

There is not enough understanding on how mindfulness affects perceived stress and perceived pain during pandemic times. As well, as how sleep quality and perceiving pain can be affected by mindfulness these times.

As Mindfulness itself and Perceived Stress are quite common topics for studies, here we decided to restrict our research by exact sample in exact time and also to add some other factors into study that could be predictors of stress, pain and being inter-

connected with each other can form the model of psychophysical well-being.

The main goal of this study is to determine how the levels of perceived stress and aspects of psychophysical well-being (specifically: sleep quality and perceiving pain in daily life) correlate with the level of mindfulness among adult students during the times of pandemic.

The first objective of this study is to determine if the level of perceived stress correlates with the level of mindfulness among adult students. The second objective is to determine if the level of perceived pain correlates with the level of mindfulness among adult students. The third objective is to determine if the level of perceived pain correlates with the level of perceived stress among adult students. The fourth objective is to determine if the level of sleep quality correlates with mindfulness, stress, pain among adult students. The fifth objective is to make a model of interconnected variables.

Hypothesizes are: 1) Mindfulness and perceived stress of adult students during pandemic times are interconnected; 2) Mindfulness and perceived pain of adult students during pandemic times are interconnected; 3) Perceived stress and perceived pain of adult students during pandemic times are interconnected; 4) Sleep quality and perceived stress, perceived pain, mindfulness of adult students during pandemic times are interconnected.

Theoretical significance of this study is to complement the body of knowledge in a sphere of interconnections between mindfulness, stress and aspects of psychophysical well-being on the example of pain and sleep quality as well as to bring attention and a point of view to a problem of description of psychophysical well-being and its model. Practical significance of this study is that results can be used for further researches in the field of mindfulness, stress, pain, sleep quality, psychophysical well-being in whole, post-covid conditions. In a practical sense results can be helpful in formation of training programs, educational activities, including stress resistance training, mindfulness practices, post-covid rehabilitation as well as to psychotherapy or psychological consultations if we the work is connected with stress, pain and improving well-being of the clients.

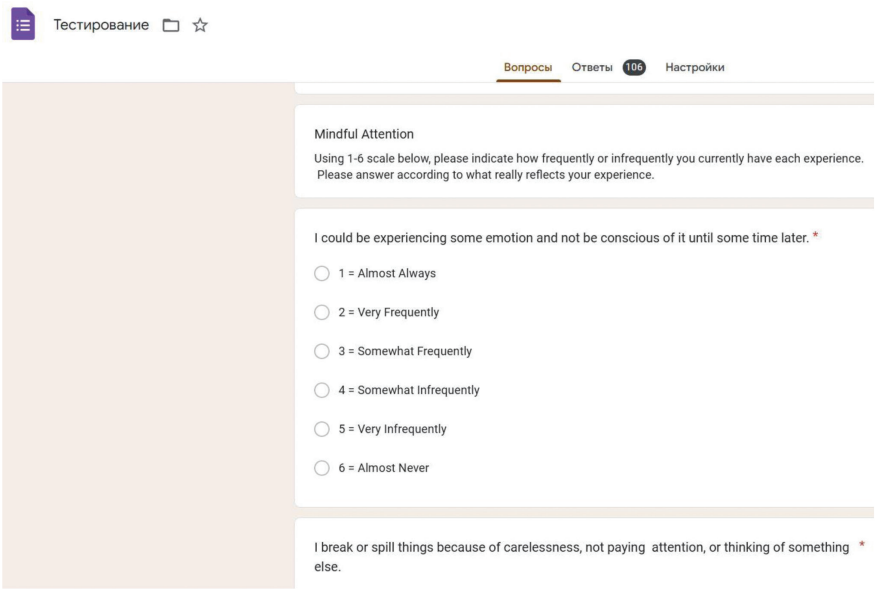
Scientific research methodology

Study design and participant sample

In this study questioned 106 adult students were questioned, age 18-20 years. The sample consisted of students of various specialties in the humanities who are native Kazakh and Russian speakers but are in university programmes who study all their curriculum in English. Participants were students of 3 different institutions. Males 23, females 83. Participation was voluntary and participants did not receive remuneration in any form. Data was collected in October 2021 in Almaty using Google Forms.

To measure mindfulness two questionnaires were used: Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003). To deepen understanding of the mindfulness phenomena we also used Meaning in Life Questionnaire (MLQ) (Steger et al., 2006) and its subscales ‘presence’ and ‘search’. To measure level of perceived stress we used Perceived Stress Scale (PSS) (Cohen et al., 1983) and its subscales ‘overstrain’ and ‘resistance’. To deepen understanding of perceived stress that can be connected with sleep quality we used Sleep Quality Questionnaire. To understand if students experience any pain in daily life, we used Numerical Pain Rating Scale (NPRS) for pain that consist on just 1 question.

All scales were presented in one Google Form. Short demographic questionnaire about gender, age, specialization and some other questionnaires not mentioned in this study were also part of the Google Form used for the study. On Picture 1 there is a screenshot from Google Forms with MAAS scale in English can be seen.



Picture 1 – Screenshot from Google Forms with MAAS scale in English

Students answered to almost all questionnaires in English via Google forms, except Sleep Quality Questionnaire it was in its original form in Russian. None of students had problems in understanding questions well. All students expressed consent to participate in the study understanding their personal data remain anonymous.

For data analysis the SPSS 23 program was used, Pearson's correlation criteria was applied.

Measures

Mindfulness

We used English version of Mindful Attention Awareness Scale (MAAS). The scale consists of 15 items (e.g. "I could be experiencing some emotion and not be conscious of it until sometime later"). Each question has 1 to 6 points Likert scale "1=almost always" to "6=almost never".

The Cronbach's alfa for this study was 0.75, which is sufficient.

To deepen understanding of the mindfulness phenomena we also used Meaning in Life Questionnaire (MLQ) and were interested in its subscales 'presence' and 'search'. The scale consists of 10 items (e.g. "I understand my life's meaning"). Each question has 1 to 7 points Likert scale "1=absolutely true" to "6= absolutely untrue".

The Cronbach's alfa for this study was 0.72, which is sufficient.

Perceived stress

To measure level of perceived stress we used Perceived Stress Scale (PSS) and its subscales 'overstrain' and 'resistance'. The scale consists of 10 items (e.g. "In the last month, how often have you been upset because of something that happened unexpectedly"). Each question has 1 to 5 points Likert scale "1=never" to "5=very often".

This scales also can be divided into diagnostical sub groups. Scores are disturbed from 0 to 40 with higher scores showing higher perceived stress. 0-13 understood as low stress. 14-26 understood as moderate stress. 27-40 is high perceived stress.

The Cronbach's alfa for this study was 0.75, which is sufficient.

Sleep Quality

To deepen understanding if perceived stress that can be connected with sleep quality, we used Sleep Quality Questionnaire developed by Wayne A. and Levin Y. This questionnaire was in Russian, none of students has problems in understanding questions. The scale consists of 6 items (e.g. "Duration of sleep" or "Night awakenings"). Each question has 1 to 5 points Likert scale suitable for the current question (e.g. "1-instant", "2-short", "3-medium", "4-long", "5-very long" for the first example or "1-no", "2-rarely", "3-often", "4-infrequently", "5-very often" for the second example).

The Cronbach's alfa for this study was 0.71, which is sufficient.

Pain

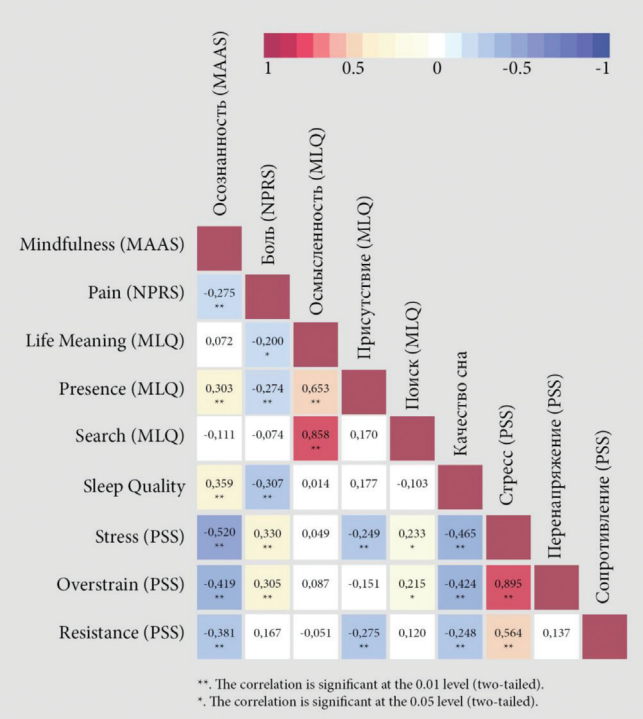
We used adapted Numerical Pain Rating Scale (NPRS). The scale consists of 1 question which is – "Right now I have pain in my body that distracts me and its intensity is…"). Respondents should choose 1 answer on a scale from 0 to 10, where "0=no pain" to "10=the worst pain ever experienced".

Results and discussion

Power of correlation was conditionally counted as 0 – no correlation, 0.1-0.2 – weak correlation, 0.25-0.4 – noticeable, 0.45-0.6 – moderate correlation, 0.65-0.8 – strong correlation, 0.85-1 – very strong correlation.

The correlation significance for the study was taken at the level of $p<0.01$ (two-tailed) for most of the cases. Still there is also represented data on some correlations significant at the level of $p<0.05$ (two-tailed), but these factors were not taken into account in the final conclusions.

First, we analyze data on Picture 2. There is a warmth diagram of correlations between Mindfulness (MAAS), Pain (NPRS), Life Meaning (MLQ) and its subscales Presence and Search, Sleep Quality, Stress (PSS) and its subscales Overstrain and Resistance. English and Russian equivalents of scales is presented. The sample is N=106. Legend of colors is also presented on a procure -from 'warm' colors starting from red as correlation equals to 1, index of 0 is white, and negative correlation is in 'cold' colors, dark blue is -1. Depending on power of correlation shades of colors are changed, but negative is always of blue shade and positive is always of yellow and red shades.



Picture 2 – Warmth diagram of correlations between Mindfulness (MAAS), Pain (NPRS), Life Meaning (MLQ) and its subscales Presence and Search, Sleep Quality, Stress (PSS) and its subscales Overstrain and Resistance (Eng/Rus equivalents of scales), N=106

Mindfulness

The results indicate that mindfulness (MAAS) has noticeable correlations with 'presence' subscale ($r=0.3$, $p<0.01$), sleep quality ($r=0.36$, $p<0.01$) and negative moderate correlation with perceived stress ($r=-0.52$, $p<0.01$). Mindfulness shows moderate negative correlation with 'overstrain' ($r=-0.42$, $p<0.01$) and noticeable 'resistance' ($r=-0.38$, $p<0.01$). Mindfulness also has noticeable negative correlation with pain ($r=-0.28$, $p<0.01$).

Indicators of Life meaning scale (MLQ) didn't show any significant correlations with other variables except its own subscales and negative noticeable negative correlation with pain (r=-0.2, p<0.01).

'Presence' shows weak negative correlation with perceived stress (r=-0.25, p<0.01), pain (r=-0.27, p<0.01) and 'resistance' (r=-0.28, p<0.01).

The subscale 'search' has positive noticeable correlation with perceived stress (r=0.22, p<0.05) and it's another subscale 'overstrain' (r=0.22, p<0.05).

Perceived stress

Perceived stress (PSS) has negative moderate correlation with mindfulness (MAAS) as was said above. It also has noticeable negative correlations (r=-0.25, p<0.01) with subscales of MLQ 'presence' – negative and 'search' positive (r=-0.23, p<0.05). Perceived stress (PSS) has negative moderate correlation with Sleep quality (r=-0.47, p<0.01).

Sleep Quality

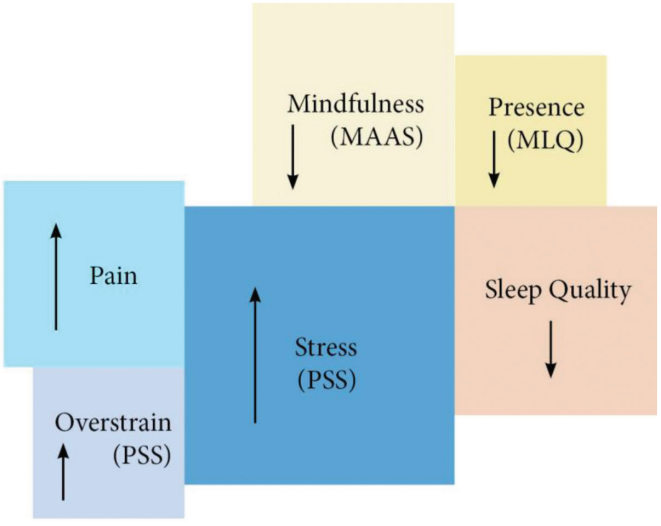
Sleep quality has positive noticeable correlations with mindfulness (r=0.36, p<0.01), moderate negative correlations with perceived stress (r=-0.47, p<0.01) and overstrain (r=-0.42, p<0.01). Negative noticeable correlation was also found out with subscale 'resistance' (r=-0.25, p<0.01). And negative noticeable with pain (r=-0.3, p<0.01).

Pain

Pain shows noticeable negative correlation with mindfulness (r=-0.28, p<0.01) also with Life meaning scale (MLQ) – noticeable negative correlation (r=-0.2, p<0.01) as well as noticeable negative correlation with presence (r=-0.27, p<0.01). Positive noticeable correlation with stress (r=0.33, p<0.01) and positive noticeable correlation with overstrain (r=0.31, p<0.01).

Table – Hypothesis testing for declared variables

	Hypothesis	Hypothesis testing
1	Mindfulness and perceived stress of adult students during pandemic times are interconnected	Hypothesis accepted, there is moderate negative correlation.
2	Mindfulness and perceived pain of adult students during pandemic times are interconnected	Hypothesis accepted, there is noticeable negative correlation.
3	Perceived stress and perceived pain of adult students during pandemic times are interconnected	Hypothesis accepted, there is noticeable positive correlation.
4	Sleep quality and perceived stress, perceived pain, mindfulness of adult students during pandemic times are interconnected	Hypothesis accepted, there is moderate negative correlation between sleep quality and stress, noticeable positive between sleep quality and mindfulness, noticeable negative between sleep quality and pain.



Picture 3 – Model of content orientation between Mindfulness (MAAS), Pain (NPRS), Presence, Sleep Quality, Stress (PSS), Overstrain

On Picture 3 we construct is a model of content orientation between Mindfulness (MAAS), Pain (NPRS), Presence, Sleep Quality, Stress (PSS), Overstrain. We took these scales and subscales because they show persuasive interconnection with each other. Arrows show the direction if the level of variable grows or falls down in connection to each other.

The sizes of the squares were taken roughly based on the assumed significance of the factors for the model of psychophysical well-being. It has no measuring function the only goal was to present orientation – where variables move in their levels. Therefore, we see that if the level of stress is higher together with its subscale overstrain, as well (but not necessarily) with the level of pain – levels of mindfulness, together with presence as important factor of being in a moment, and (but not necessarily) sleep quality levels show lesser values.

Conclusion

The influence of pandemic brought its impact on lowering levels of psychological and physical well-being. With this study we wanted to clarify what content can fulfill the model of psychophysical well-being, as well as to study if declared variables as perceived stress, perceived pain, sleep quality and mindfulness are interconnected on the example of our sample.

As we see from the study, the interconnection between mindfulness and lower level of perceived stress can be defined as moderate. Mindfulness is positively connected with presence; presence can be determined as a part of it. Also, lower 'overstrain' and 'resistance' show higher mindfulness. The opposite is also true, the less stress person perceives, the more mindful he or she can be about life. As well as mindfulness has negative correlations with stress, overstrain, resistance and pain and positive with sleep quality and feeling of presence, it possibly can become a regulator that helps reduce the level of perceived stress, perceived pain (where possible), and improve the sleep quality. This is in line with the main ideas of Mindful Based Stress Reduction (MBSR) practices (Keng et al., 2011; Noonan, 2014).

Better sleep quality is connected with higher mindfulness, it works both ways: the more person cares about sleep the more resources he has from a good sleeping. Sleep quality and perceived stress have reverse moderate interconnection and can bring influence one to each other. Sleep quality effects on overstrain more than on resistance, both these subscales have negative correlations with sleep quality. This is why managing sleep during COVID-19 and post-covid times is important, stress reduction is possible with normalizing sleep quality. This is in line with the relevant researches dedicated to interconnections between stress, sleep quality and some other aspects of psychophysical well-being (Du et al., 2021; Vgontzas et al., 2021).

Perceiving pain in daily life is challenging for many people, and some types of pain can be connected with emotional processes, have no physical reason in body can be regulated mindfully. Our study shows some noticeable correlations between stress and pain but it works both sides, if a person has pain today – it brings additional stress for him today. By these results we cannot clearly say that we've met with phenomenon where stress causes pain. Further research with specifying what types of pain, what possible origin or diagnosis respondent may be will shed the light on this interconnection.

Thus, we recommend developing mindfulness, feeling of presence and improving sleep quality to lower stress level, overstrain and resistance for adult students in times of COVID-19 and post-covid times.

The results of the study can complement the body of knowledge in a sphere of interconnections between mindfulness, stress and aspects of psychophysical well-being on the example of pain and sleep quality as well as to bring attention and a point of view to a problem of description of psychophysical well-being and its model. In a practical sense results can be helpful in formation of training programs and educational activities, including stress resistance training, non-pharmacological pain management and mindfulness practices, in psychological interventions with people inquiring how to deal with stress and pain and post-covid rehabilitation.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, upon request.

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