

The effects of in-class meditation practice on self-reported dispositional mindfulness of university students.

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Abstract:

Background: Integrating mindfulness practices into university settings can enhance a holistic approach to education and promote students' overall well-being by fostering personal development alongside academic success. This study aimed to evaluate the impact of meditation practices on students' perceived mindfulness abilities. **Methods:** This quasi-experimental study employed quantitative pre- and post-test measures. The sample included 74 first-year sport sciences students (female = 12, male = 62, age: 19.32 ± 1.62 years) divide into experimental and control groups. The Child and Adolescent Mindfulness Measure (CAMM) and the Facets of Mindfulness Questionnaire-Short Form (FFMQ) were implemented before and after the intervention in both groups. The experimental group participated in daily mindful challenges and in 5-minutes mindfulness practices during the last part of 24 classes of Psychology of Sport Sciences. A Mann-Whitney U test was carried out and the Wilcoxon test was used to verify the intragroup effect of the intervention. **Results:** The experimental group improved in the CAMM and in 3 out of the 5 dimensions of the FFMQ, being these differences significant for the dimension "describe". However, no significant differences were observed between the groups after the intervention. **Conclusions:** brief practices of mindfulness framed within the university schedule enhances the students' perceived ability to be aware of their thoughts, feelings and emotions, which may help them in enhancing their mental well-being. This first approach highlights the necessity for additional robust research that could extend the integration of mindfulness to other subjects and related degrees or applied in any academic studies in the form of brain-breaks.

Keywords: awareness; brain breaks; higher education; meditation; sustainability; well-being

Introduction

Sustainable development, through the Sustainable Development Goals (SDGs), has emerged as one of the central pillars in contemporary society. Among its specific objectives, particular attention is given to the mental health of all individuals (Goal 3.4 of SDG 3: Good Health and Well-being). This underscores the recognition of mental health impact as an essential component of human well-being and workplace productivity (Goal 8.3 of SDG 8: Decent Work and Economic Growth) (UNESCO, 2023). This approach aligns with the widely documented recognition in scientific literature of mental health as a crucial determinant for individual quality of life and well-being (WHO, 2013). Previous studies have demonstrated that good mental health not only enhances individuals' ability to manage stress and contribute productively to their work, thereby strengthening interpersonal relationships (Kawachi & Berkman, 2001), but is also fundamental for achieving SDGs related to labor productivity and social cohesion. Individual and collective mental health can be considered a structural element across various societal domains, extending even to an economic perspective. Mental health disorders are associated with a significant decrease in labor productivity, representing a considerable economic burden on healthcare systems (Chisholm et al., 2016). Furthermore, mental health plays a vital role in social cohesion and community stability, being essential for civic participation and the reduction of social issues such as crime (Sampson et al., 1997). Therefore, improving mental health is not only beneficial for individual well-being but is indispensable for economic and social development (Druss & Walker, 2011). This investment in mental health aligns crucially with the SDGs, emphasizing its relevance not only as a human right but as an economic and social imperative too.

In the realm of education, the relevance of mental health is particularly evident. From an early age, there has been an emphasis on strengthening emotional development and regulation as a key task, highlighting that primary intervention in this aspect can have lasting effects on individuals' emotional and social well-being

throughout life (Thümmler et al., 2022). Building on this idea, Tabroni et al. (2022) emphasize the importance of early education in constructing social and emotional intelligence in children, suggesting that educational environments play a fundamental role in this development. This early importance does not exempt the need to continue emphasizing emotional education in adolescents and university students. Currently, the mental well-being of young people and university students has garnered increasing attention from the scientific community due to the rise in cases within this population (Grasdalsmoen et al., 2020; Sheldon et al., 2021). Recent research reinforces the importance of this issue by indicating the prevalence and prediction of various psychological symptoms among university students, including depression, anxiety, obsessive-compulsive disorders, and suicidal ideation (Meda et al., 2023). In addition to this idea, Rufato et al. (2022) highlighted the importance of a comprehensive approach to addressing these issues, emphasizing the need for appropriate intervention and support strategies to enhance the mental health and quality of life of students. Hence, the importance of caring for students' educational experiences is considered, as these can impact students' mental health, suggesting that attention to these factors is crucial for the development of effective support and prevention strategies in the university setting (Nañagas & Kantartzis, 2022).

In the search for suitable strategies to be implemented in the university academic and adolescent contexts, some interventions have shown positive effects. For example, an emotional education program for adolescents highlighted its effectiveness in developing socio-affective skills (Postigo-Zegarra et al., 2019). In addition to this evidence, the importance of emotional literacy and self-awareness in adolescents was also noted, exploring the use of resources such as 'Atlas of the Heart' to enhance emotional education in schools (Bernard, 2023). On the other hand, Wang and Wang (2022) analyzed the infiltration of emotional education in university physical education, emphasizing the importance of emotional education in the comprehensive development of university students. Under this latter perspective, specific techniques such as mindfulness have emerged as a focus of study seeking effective application in educational contexts (Dawson et al., 2020). The implementation of mindfulness-based programs in university settings has shown a significant impact on the mental health and well-being of students. For example, the MindKinder program for adults, in university students, demonstrated notable improvements in mindfulness, as well as reductions in stress and anxiety. This study highlights how mindfulness practices can be effective tools for improving concentration and managing stress in an academic environment (Moreno-Gómez et al., 2023). Another example of the potential of this technique was a randomized controlled trial that also confirmed the benefits of mindfulness on the mental health of university students. The study's results indicated that mindfulness practices can effectively alleviate symptoms of anxiety and depression, emphasizing the importance of these practices as part of student well-being programs (Gallo et al., 2023). In addition to these benefits, a mindfulness-based education program showed how it affects the brain waves and autonomic nervous system of university students, demonstrating that mindfulness can help regulate stress and improve concentration, providing a scientific basis for adopting these practices in the educational environment (Jung & Lee, 2021). Finally, mindfulness may have incremental validity on motivational factors in predicting academic affect, cognition, and behavior (Kuroda et al., 2022).

Despite these benefits, the practice of mindfulness in university settings has shown mixed results in academic research. Some studies have failed to confirm significant positive effects of mindfulness on the mental health of university students. While some studies, such as those by Moreno-Gómez et al. (2023) and Jung and Lee (2021), have found positive effects on stress reduction and concentration improvement, heterogeneity in research methodologies and differences in the studied populations make results non-uniform and inconclusive. The study by Moreno-Gómez et al. (2023) showed improvements in mindfulness and reductions in stress and anxiety. However, this type of intervention may not be equally effective in all contexts or for all students, as individual differences and specific circumstances of each university environment can influence outcomes. On the other hand, the study by Jung and Lee (2021) indicated improvements in brain waves and the autonomic nervous system, but it is essential to consider that these physiological changes do not always directly translate into improvements in well-being or academic performance. Furthermore, recent research focused on the application of mindfulness in university settings found that mindfulness had incremental validity in predicting academic affect, cognition, and behavior. However, this finding does not rule out the possibility that other motivational factors or interventions may be equally or more effective in some contexts (Kuroda et al., 2022). These studies highlight the need for a deeper understanding of mindfulness in academic contexts. Although mindfulness has been shown to offer benefits in certain areas, such as stress management and concentration improvement, these results indicate that not all people or situations benefit in the same way. Additionally, they underscore the importance of considering individual, cultural, and contextual factors when assessing the effectiveness of mindfulness. Therefore, while there is evidence suggesting that mindfulness may be beneficial for university students, there is still a need for further research and rigorous evaluations to fully understand its effectiveness. Current results should be interpreted with caution, and additional studies addressing methodological limitations and exploring mindfulness effectiveness in a broader range of university contexts are recommended.

As argued throughout the text, it is important to assess the effect of mindfulness in specific knowledge areas. It is apparent that university students encounter considerable stress, prompting the need for moments of respite, calm, relaxation, and mindfulness in their busy lives. In this regard, the study of mindfulness in university

students majoring in sports sciences has not been widely explored. Previous studies addressed the relationship between mindfulness and autonomous motivation in physical education, an area that could significantly benefit from increased attention and understanding regarding mindfulness (Hutmacher et al., 2022). In the case of Fagioli et al. (2023), the effectiveness of a brief online mindfulness intervention for university students also indicates the need to explore how these practices can be adapted and applied in different academic disciplines, including sports sciences. Furthermore, D'Abundo et al. (2016) suggest the potential incorporation of mindfulness into university courses on physical activity and well-being. In the university degree in Physical Activity and Sports Sciences, the subject of Psychology of Physical Activity and Sport emerges as an ideal context to implement brief Mindfulness practices while addressing the curriculum requirements and, to our knowledge, no previous study has addressed this. Therefore, the aim of this study was to assess the effects of meditation practices on the perceived mindfulness ability of the students.

Materials and Methods

Design and participants

The methodological design of the study was quasi-experimental with quantitative pre- and post-test measures, using non-probabilistic convenience sampling. The total sample consisted of 74 students (female = 12, male = 62, age: $19,32 \pm 1,62$ years) attending 1st grade of Physical Activity and Sport Sciences (PASS) (see table 1). The inclusion criteria were to be enrolled in 1st grade of PASS degree. The experimental group practiced activities focused on mindfulness and the control group did not, just followed the regular schedule. The study was conducted in accordance with applicable national law and the declaration of Helsinki from 1975 (current and revised version) and was approved by the ethics committee of the Comillas Pontifical University (code 11-2324). All study participants signed a declaration of consent on the anonymous utilization of the collected data prior to the study.

Table 1. Description of the participants integrating each of the studied groups.

Group	All		Male		Female	
	N	Age	N	Age	N	Age
Experimental	43	19.6 ± 1.72	39	19.56 ± 1.74	4.00	20 ± 1.63
Control	31	18.93 ± 1.41	23	19.22 ± 1.54	8.00	18.12 ± 0.35

Instruments

The Child and Adolescent Mindfulness Measure (CAMM) and the Facets of Mindfulness Questionnaire-Short Form (FFMQ-SF) were used in this study. The CAMM (Guerra et al., 2019) is a simple psychological scale that globally assesses a child/adolescent's ability to be attentive and aware of the experience they are feeling in each present moment. Regarding the scale, it is a Likert-type scale consisting of five points (1 = Never to 5 = Always), where high scores correlate with negative scores (low mindfulness level), and low scores are related to positive scores (high mindfulness level). It comprises 10 questions, so the maximum score per test is 50, and the minimum score is 10. The test-retest reliability for the entire test according to the test authors is $\alpha = 0.88$. This instrument has a one-dimensional factor structure (Kuby et al., 2015). On the other hand, the FFMQ-SF consists of 24 items that assess five facets of mindfulness. Items are rated on a Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). The factors include observing (including noticing or attending to internal and external experiences such as sensations, thoughts, or emotions); describing (labeling internal experiences with words); acting with awareness (focusing on one's activities in the moment as opposed to behaving mechanically); non-judging of inner experience (taking a non-evaluative stance toward thoughts and feelings). Finally, non-reactivity to inner experience is allowing thoughts and feelings to come and go, without getting caught up in or carried away by them. All five scales demonstrated good internal consistency. Questionnaire FFMQ-SF presents good psychometric qualities of reliability and validity in its five component dimensions of mindfulness (the 5 dimensions presented an internal consistency of acceptable to good; 0.65 to 0.80), being an adequate questionnaire for the evaluation of mindfulness in non-clinical population (Asensio-Martínez et al., 2019).

Procedure

The mindfulness training was carried out for 8 weeks (24 classes) in the first semester of the 2022-2023 academic year, within the Psychology lecture. This course was selected due to its curricular connection with mindfulness, which justified the dedication of class time to this type of practice. The training consisted of a 5-minute guided meditation as the final part of the class, following the instructions of an audio of the app "Petit Bambou", which provides many guided meditations. These practices included breath exercises, body scan, guided visualization, loving-kindness meditation. The main objective was to pay attention to the breath and body, as well as to thoughts without judgment. The teacher started the app on his phone and connected it to the classroom speakers. During the practice, the lights were turned off, and the computers were switched off. Moreover, the participants in the experimental group were asked to do a daily mindfulness challenge during the academic schedule and/or at home (see appendix).

Data analysis

The SPSS 28.0 statistics software was used to carry out all the analyzes. Each factor's descriptive statistics (mean and standard deviation) were calculated. Shapiro-Wilk's normality test was performed, obtaining non-normal distributions in all cases ($p < 0.05$). The dependent variables were five domains in FFMQ and only one in CAMM. Time (pre- and post-intervention) was the within-subject factor, whereas the group (control vs. experimental) was the inter-subject factor. To analyze the differences between the experimental and the control group, a Mann-Whitney U test was carried out with the entire groups. The Wilcoxon test was used to verify the intragroup effect of the intervention (pre-post).

Results

Baseline differences

Descriptive characteristics of both groups (control and experimental) are presented in Table 2. At pre-test, both groups presented similar starting values regarding the research variables, except to Non react ($p = 0,044$).

Table 2. Comparing variables between experimental (n=43) and control group (n=31) at baseline using Mann-Whitney test (Av±SD).

Variables	Experimental		Control		Z	p
	Av	SD	Av	SD		
Describe	2,84	± 0,53	2,87	± 0,56	0,287	0,774
Non react	3,36	± 0,64	3,02	± 0,63	-2,010	0,044
Non judge	2,52	± 0,75	2,51	± 0,68	-0,022	0,982
Observe	3,38	± 0,81	3,16	± 0,73	-1,340	0,180
Act aware	2,53	± 0,71	2,45	± 0,65	-0,749	0,454
CAAM	2,46	± 0,74	2,53	± 0,82	0,418	0,676

Av= Average; SD= Standard Deviation; Sig = P-Value
CAAM= Child and Adolescent Mindfulness Measure

Final differences

Final characteristics of both groups (control and experimental) are presented in Table 3 including final differences. At post-test, the U Mann-Whitney test showed no significant differences in any variables. However, both groups registered slight improvements in all variables except for the experimental group in the dimensions non judge and observe.

Table 3. Comparing variables between experimental (n=43) and control group (n=31) at post-test using Mann-Whitney test (Av±SD).

Variables	Experimental		Control		Z	p
	Av	SD	Av	SD		
Describe	3,14	± 0,47	2,97	± 0,48	-1,513	0,130
Non react	3,44	± 0,58	3,32	± 0,44	-0,285	0,796
Non judge	2,48	± 0,73	2,63	± 0,78	0,876	0,381
Observe	3,22	± 0,70	3,21	± 0,84	-0,160	0,873
Act aware	2,68	± 0,72	2,47	± 0,46	-1,450	0,147
CAAM	2,50	± 0,75	2,55	± 0,85	0,121	0,904

Av= Average; SD= Standard Deviation; Sig = P-Value
CAAM= Child and Adolescent Mindfulness Measure

Longitudinal differences

Table 4 shows the results obtained after applying the Wilcoxon test. The results indicated that after the intervention, only the experimental group significantly improved after the intervention, in the variable describe ($p = 0,015$).

Table 4. Intragroup comparative analysis of the variables using Wilcoxon test.

		Describe	Non react	Non judge	Observe	Act aware	CAMM
Experimental	Z	2,422	0,431	-0,119	-0,991	1,150	0,182
	Sig.	0,015	0,666	0,905	0,322	0,250	0,856
Control	Z	0,445	1,997	0,575	0,285	0,544	-0,227
	Sig.	0,656	0,061	0,565	0,776	0,587	0,821

Sig = P-Value

CAMM: Child and Adolescent Mindfulness Measure

Discussion

The objective of this study was to assess the effects of meditation practices on the perceived mindfulness ability of the students. In this case, first year students, with an average age of 19.32 years. Full attention, as an action of bringing attention towards ourselves, inward and focused on the experiences we live moment by moment, enjoying the present without being overwhelmed or reacting naturally and without excesses to what is happening around us, is presented as a discipline that has been shown to have positive effects in areas such as physical activity and sports (López & Gené-Morales, 2021; López-Secanell et al., 2021; Palmi & Solé, 2016; Schneider et al., 2018) and in specific groups such as university students (Ergas & Hadar, 2019; Hernández-Amorós & Urrea-Solano, 2019; López-Secanell et al., 2021; Martínez-Rubio et al., 2020).

The first fact on which we must pay attention is the aspect that, after the intervention carried out, all the variables of the control group have experienced slight, minimal advances, but improvements were recorded in all the variables, but without significant differences. This is a fact that draws our attention, since this result may be due to a test effect in the participants, who in the pre-test did not have any type of information about it but, in the post-test, they had time to think and reflect on the questions that were asked. In any case, as Moreno-Gómez et al. (2023) and Jung and Lee (2021), in addition to this test effect, when the results are not as positive as one would expect, it would be necessary to consider individual, cultural and contextual factors, among others, to correctly explain or understand these results. Moreover, it is important to note that in some instances, questionnaires tend to be lengthy, and students respond to many of them throughout the course. Considering that participants had to answer to two questionnaires in the present study, there is a possibility that, due to this lengthiness, the responses may not be taken with the necessary seriousness. This could explain the slight improvements of the control group in the post-test evaluation. Furthermore, we were unable to account for potential influences from participant expectations. Subsequent research endeavors should focus on identifying the most effective control condition.

In the experimental group, not all variables experienced improvements; the dimensions Non judge and Observe registered lower scores compared to the pre-test in this group. Observation (which involves the way in which sensory awareness is used) and Non-judgment (an experience without prejudice linked to the fact that the inner critic does not affect the happiness and positive mental state of the person) drop in score but remain in average or slightly above average. The daily challenges proposed placed special emphasis on the ability to observe; however, improvements were not achieved as expected. It is important to mention that completion of the challenges was not mandatory, with the intention of not pressuring students and encouraging them to develop a liking for the activity. This aspect will be considered in the future to ensure the level of commitment to their training and the adherence to the intervention. The Non Judge is the variable that has the lowest score (2.48), perhaps due to the difficulty that mindfulness participants have with this feeling of “letting go” so as not to harm the person's happiness or your state of positive consciousness. Moreover, these results align with the type of intervention conducted in this study, which, in addition to the daily challenges, included breath exercises, body scan, guided visualization, loving-kindness meditation, and the daily challenges. The nature of this type of activities did not specially focus on the capacity of Non judge.

These general positive effects recorded in our study are correlated with different research that supports our results. At a general level, a large part of the studies related to the effects of a mindfulness intervention with university students that analyze the effects at a psychological, emotional and cognitive level (stress, anxiety, depression, well-being, motivation, resilience or conflict resolution) and even at the level of academic performance, programs with a duration similar to that of our study (short interventions of 5-10 minutes in 10-20 sessions), registered positive results (Cavanagh et al., 2018; Gu et al., 2018; Moore et al., 2020; Solhaug et al., 2016); although not all of them managed to conclude with significant improvements associated with mindfulness training, such as the studies by Wimmer et al. (2020) or Turner et al. (2020).

In this regard, De Bruin et al. (2016), in a study with 75 young adults to evaluate the effects of daily meditations (5 weeks and 10-20 minutes a day) on mindfulness in relation to physical exercise, using the FFMQ-SF scale, demonstrated that interventions were effective over time. Mothes et al. (2014) related the benefits of practicing physical activity to improvements in mindfulness, reasoning that physical exercise can lead to better self-regulation of attention, which leads to greater mindfulness too. Furthermore, the study by De Bruin et al. (2016) highlights the benefits of performing these meditation exercises outdoors, in contact with nature, perceiving the interaction with the basic elements of the environment, such as heat, cold, humidity, dryness..., which improves consciousness of the present moment. In the same vein as previous studies, El Morr et al. (2020), in a study with 160 Canadian university students to evaluate the effectiveness of mindfulness exercises (online) for 8 weeks in reducing symptoms of depression, anxiety and stress (primary outcomes) and increasing mindfulness (secondary outcome), using different instruments (including the FFMQ-SF scale), recorded a significant increase in mindfulness scores in the experimental group, demonstrating that mindfulness and online interventions can be effective in addressing students' mental health conditions.

Additionally, García-Taibo et al. (2023), in a study with 39 adolescent students to assess the effects of a mindfulness intervention developed in the return to calm in physical education classes, using the CAMM and EAP (full attention scale) scales, recorded notable improvements in the experimental group, compared with the control group, in their full attention, especially with the CAMM scale, these differences being statistically

significant. In accordance with these results, Delgado-Montoro et al. (2022) implemented short meditations at the end of PE sessions and daily mindfulness challenges in secondary schools ($N = 127$) over 4 weeks. They found that the experimental group showed significant improvement ($p \leq 0.05$) in most of the measured parameters, including external attention, kinesthetic attention, and the mean of the CAMM. In our study, notable improvements were observed, although they did not reach the level of significance. Likewise, mindfulness interventions in physical education classes play a decisive role in the psychological well-being of students. In fact, a similar study that included mindfulness practices in primary education also reported significantly better results in the CAMM for the experimental group compared to the control. Likewise, these activities were conducted at the end of the class and consisted of progressive relaxation and visualization exercises (Colón-Calvo et al., 2022).

In relation to the factors of the FFMQ-SF scale, in the pre-test, a statistically significant difference is recorded in the variable Non react. However, in the post-test, no significant differences were recorded in this regard. This factor, referring to the internal experience of allowing thoughts and feelings to come and go, without getting trapped in them or getting carried away by them, would have greater meaning if significant differences were recorded in the post-test. The value of 0.044, very close to non-significance, can be attributed to individual, cultural or contextual factors that should be considered to evaluate the effectiveness of mindfulness (Jung & Lee, 2021; Moreno-Gómez et al., 2023), but that are not included in this study. On the other hand, the experimental group did register statistically significant differences, after the intervention, in the variable describe, with a value of 0.015.

The fact of being able to label internal experiences with words or seek an explanation for them may be derived from the significance that the intervention had for the participants. In fact, in the pre-test it was one of the factors with intermediate scores (neither the highest nor the lowest) and the improvements were recorded after the intervention, with the most notable factor highlighted by the participants, with an increment of 0.30. This could be explained because the ability to Describe could serve as a precursor to more complex skills such as Act aware or Non Judge. Moreover, The Non React dimension presented good results in the post-test, being the variable with the highest score (3.44) (this variable already presented significant differences between the control and experimental groups in the pre-test). McManus et al. (2012) already explained the importance of active detachment from negative thoughts and emotions, to accept them and choose not to react to them, as a prior step for people who practice mindfulness to acquire adequate emotional resilience and restore their mental balance.

Our study was developed with short interventions in mindfulness programming (5 minutes daily for 8 weeks -24 sessions-). Several authors assure that, to assimilate the positive aspects of mindfulness, a process of at least 8 weeks is necessary (Kiens & Larsen, 2020; Yook et al., 2017). In this sense, short versions of mindfulness programs can have the same beneficial effects as long programs (López-Secanell et al., 2021; Solhaug et al., 2016), although it is understood that longer programs, well-structured and directed, can yield better results and, at the same time, very disparate results in relation to very short sessions (for example, 5 minutes) (López-Secanell et al., 2021).

Mindfulness is a natural ability that can be improved through training and regular practice (Senker et al., 2022); therefore, more frequent mindfulness interventions with young adolescents and adults and with correct training, will favor better results at a psychological, emotional and cognitive level in the students.

It was highlighted in the theoretical section of this study that the educational field was a context to carry out research aimed at evaluating the emotional development and well-being in students (Bernard, 2023; Gallo et al., 2023; Postigo-Zegarra et al., 2019; Wang & Wang, 2022). Recent research on mindfulness-based interventions in educational centers has reported notable differences between the age groups studied, with early adolescent students reporting the smallest effect (Mckeering & Hwang, 2019).

Although different studies reflect that research in the educational context usually presents non-uniform or conclusive results due to the characteristics of the context, the students and their own circumstances (Baena-Morales et al., 2022; Jung & Lee, 2021; Moreno-Gómez et al., 2023), this study provides evidence (non-significant) of the improvements of mindfulness interventions in young adults (in this case, university students).

This fact gives meaning to our research, since this type of practices are not very developed in the field of Physical Education in educational centers, and it can be seen how good results are achieved with a small program (short duration), although the small sample size does not allow for the generalization of our results. Significant improvements would surely have to be sought in longer, more stable, structured programs and, also, in the routine of this type of practices for students at all educational stages which, as Sarroeira et al. (2022) have shown, mental well-being must be present in the educational context from early childhood education.

Despite its limitations, this is a novel study, being the first research, to our knowledge, that integrates mindfulness practices as part of the curriculum in Sport Sciences degree, hoping to serve as inspiration for replication. Robust intervention studies are crucial to untangle existing biases and elucidate the role of Mindfulness-Based Interventions in higher education settings. It is recommended that more randomized and controlled trials, including follow-up assessments and physiological measures, be conducted in this context to enhance the accurate and consistent measurement of their effects (Chiodelli et al., 2022).

Conclusions

The issue of mental health among today's youth is a growing and complex concern. The practice of mindfulness can be a valuable tool for improving emotional well-being, academic performance, and coping skills in young people, providing them with resources to face life's challenges in a healthier way. In the context of education for sustainable development and particularly regarding the achievement of Goal 3.4, which advocates for the promotion of mental health and well-being, we have assessed whether a mindfulness intervention could assist in the perceived ability of students to be aware of themselves. We have partially confirmed the research hypothesis, that meditation positively influences self-reported dispositional mindfulness of the students. Thus, this approach may contribute to the well-being of the students. However, both groups (experimental and control) registered slight improvements in most variables, which seems to indicate that, more studies are needed in this research topic, to clarify what are the key aspects of the academic interventions based on mindfulness, as well as replicating this type of research with stronger designs. Therefore, these findings do not reduce the potential value of mindfulness programs, but instead highlight the necessity for additional robust research that refines the applied methods within the studies. This is the first study, to our knowledge, that integrates mindfulness practices as part of the curriculum in Sport Sciences degree. In future research, this approach could be extended to other subjects and related degrees or applied in any academic studies in the form of brain-breaks.

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Appendix

Daily mindfulness Challenge

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- “Mindful” shower: feel the water on your skin, the temperature, the scent of the soap, and the sound of the water.
 - Active listening to the other: actively concentrate on the speaker, avoid distractions, and show that you are fully engaged in the conversation
 - Keep 2.5 hours without checking the mobile phone.
 - “Mindful” breakfast: Being fully aware of the food you eat, the sensations, and the experience of eating
 - Conscious body posture during my day.
 - I sit at home for 10 minutes doing nothing. I observe and let go of thoughts.
 - Conscious walking of my body.
 - I realize when I get distracted in class and refocus.
 - I am aware of my emotions: i.e., “I feel stressed”, “I feel calm”, “I feel excited”.
 - I am aware of my facial expression (“I look serious”, “I look relaxed”, “I smile kindly”).
 - 0 I tidy up my room/my house for 10 minutes without trying not to think about anything else.
 - 1 I observe my breathing and bodily sensations, and I am aware of them while in bed as I fall asleep.
 - 2 Conscious eating/dinner: I eat while eating, focus on the flavors/textures, and notice when I get distracted.
 - 3 Active listening: I call a close person for at least 10 minutes and practice active listening.
 - 4 I sit for 10 minutes (in a park, in a cafe, in a shopping center) and simply observe my surroundings trying not to think, or
 - 5 observing my thoughts without judging.
 - 6 In my physical training routine, I try to focus on the physical sensations of the present moment.
 - 7 I do homework at home, noticing when I get distracted from the task, and returning to it.
 - 8 When I communicate throughout the day, I am mindful of how I speak (volumen and speed of my voice, do I maintain eye contact with my interlocutorlook ...).
 - I sit for 10 minutes in a natural space (park, beach, on my terrace...).

- 9 When I wake up, I stay in bed for 5 minutes, focusing on my bodily sensations and breathing.
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1 When I commute to the university, I focus on stimuli around me that I don't usually pay attention to (landscape,
1 people...).
2 I observe stimuli at the university that I had never noticed before: 'smells, objects, details.
2
3 I take a walk down the street, paying attention to details around me that I don't usually admire.
3
4 I am aware of my feeling of hunger (e.g., when I eat, I do it because I'm hungry; when I stop eating, it's because I no
4 longer feel hungry; I eat even when I'm not hungry).

References

- Asensio-Martínez, A., Masluk, B., Montero-Marin, J., Oliván-Blázquez, B., Navarro-Gil, M.T., García-Campayo, J., & Magallón-Botaya, R. (2019). Validation of Five Facets Mindfulness Questionnaire - Short form, in Spanish, general health care services patients sample: Prediction of depression through mindfulness scale. *PLoS One*, *14*(4): e0214503. <https://doi.org/10.1371/journal.pone.0214503>
- Baena-morales, S., Ferriz-Valero, A., & García-Taibo, O. (2022). Influence of cooperative strategies and mindfulness on the perception and control of emotions in primary physical education. A proposal to improve sustainability in the social dimension. *Journal of Physical Education and Sport*, *22*(7), 1590–1598. <https://doi.org/10.7752/jpes.2022.07200>
- Bernard, D.M. (2023). Emotional Literacy and Self-Awareness in Adolescents: Exploring Brené Brown's Atlas of the Heart for Schools. *Cienc. Lat. Rev. Científica Multidiscip.*, *7*, 6775–6798. https://doi.org/10.37811/cl_rcm.v7i3.6673
- Cavanagh, K., Churchar, A., O'Hanlon, P., Mundy, T., Votolato, P., Jones, F., Gu, J., & Strauss, C.A. (2018). Randomized controlled trial of a brief online mindfulness-based intervention in a non-clinical population: replication and extension. *Mindfulness*, *9*(4), 1191-1205. <https://doi.org/10.1007/s12671-017-0856-1>
- Chiodelli, R., Nesi de Mello, L.T., Neves de Jesus, S., Ribeiro, R., Russel, T., & Andretta, I. (2022). Mindfulness-based interventions in undergraduate students: a systematic review. *Journal of American College Health*, *70*(3), 791-800. <https://doi.org/10.1080/07448481.2020.1767109>
- Chisholm, D., Sweeny, K., Sheehan, P., Rasmussen, B., Smit, P.F., Cuijpers, P., & Saxena, S. (2016). Scaling-up treatment of depression and anxiety: a global return on investment analysis. *The Lancet Psychiatry*, *3*(5), 415-424. [https://doi.org/10.1016/S2215-0366\(16\)30024-4](https://doi.org/10.1016/S2215-0366(16)30024-4)
- Colón-Calvo, A., Baena-Morales, S., Ferriz-Valero, A., & García-Taibo, O. (2022). A new vision of mindfulness in physical education. Contributing to the social dimension of sustainable development. *J. Phys. Educ. Sport*, *22*, 2618–2626. <https://doi.org/10.7752/jpes.2022.11332>
- D'Abundo, M.L., Sidman, C.L., & Fiala, K.A. (2016). The Potential of Promoting Mindfulness in a University Physical Activity and Wellness Course. *Int. J. Adult Vocat. Educ. Technol.*, *7*, 39–49. <https://doi.org/10.4018/ijavet.2016010103>
- Dawson, A.F., Brown, W.W., Anderson, J., Datta, B., Donald, J.N., Hong, K., Allan, S., Mole, T.B., Jones, P.B., & Galante, J. (2020). Mindfulness-Based Interventions for University Students: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. *Appl. Psychol. Heal. Well-Being*, *12*, 384–410. <https://doi.org/10.1111/aphw.12188>
- De Bruin, E.I., Van der Zwan, J.E., & Bögels, S.M. (2016). A RCT comparing daily mindfulness meditations, biofeedback exercises, and daily physical exercise on attention control, executive functioning, mindful awareness, self-compassion, and worrying in stressed young adults. *Mindfulness*, *7*, 1182-1192. <https://doi.org/10.1007/s12671-016-0561-5>
- Delgado-Montoro, R., Ferriz-Valero, A., García-Taibo, O., & Baena-Morales, S. (2022). Integrating Mindfulness into the Subject of Physical Education-An Opportunity for the Development of Students' Mental Health. *Healthcare*, *10*(12): 2551. <https://doi.org/10.3390/healthcare10122551>
- Druss, B.G. & Walker, E.R. (2011). Mental disorders and medical comorbidity. *Synth. Proj. Res. Synth. Rep.*, *21*, 1–26.
- El Morr, C., Ritvo, P., Ahmad, F., Moineddin, R., & Team, M.V.C. (2020). Effectiveness of an 8-week web-based mindfulness virtual community intervention for university students on symptoms of stress, anxiety, and depression: randomized controlled trial. *JMIR Mental Health*, *7*(7): e18595. <https://doi.org/10.2196/18595>
- Ergas, O. & Hadar, L.L. (2019). Mindfulness in ad as education: a map of a developing academic discourse from 2002 to 2017. *Review of Education*, *7*(3), 757-797. <https://doi.org/10.1002/rev3.3169>
- Fagioli, S., Pallini, S., Mastandrea, S., & Barcaccia, B. (2023). Effectiveness of a Brief Online Mindfulness-Based Intervention for University Students. *Mindfulness*, *14*, 1234–1245. <https://doi.org/10.1007/s12671-023-02128-1>

- Gallo, G.G., Curado, D.F., Machado, M.P.A., Espíndola, M.I., Scattone, V.V., & Noto, A.R. (2023). A randomized controlled trial of mindfulness: effects on university students' mental health. *Int. J. Ment. Health Syst.*, 17(1): 32. <https://doi.org/10.1186/s13033-023-00604-8>
- García-Taibo, O., Cerdá-Llull, M.M., Baena-Morales, S., & Rodríguez-Fernández, J.E. (2023). Psychological effects of a mindfulness intervention performed during the cool down in the physical education class: a quasi-experimental study. *Retos*, 49, 926-934. <https://doi.org/10.47197/retos.v49.93401>
- Grasdalsmoen, M., Eriksen, H.R., Lønning, K.J., & Sivertsen, B. (2020). Physical exercise, mental health problems, and suicide attempts in university students. *BMC Psychiatry*, 20(1): 175. <https://doi.org/10.1186/s12888-020-02583-3>
- Gu, J., Cavanagh, K., & Strauss, C. (2018). Investigating the specific effects of an online mindfulness-based self-help intervention on stress and underlying mechanisms. *Mindfulness*, 9(4), 1245-1257. <https://doi.org/10.1007/s12671-017-0867-y>
- Guerra, J., García-Gómez, M., Turanzas, J., Cordon, J.R, Suárez-Jurado, C., & Mestre, J.M. (2019). A Brief Spanish Version of the Child and Adolescent Mindfulness Measure (CAMM). A Dispositional Mindfulness Measure. *Int J Environ Res Public Health*, 16(8): 1355. <https://doi.org/10.3390/ijerph16081355>
- Hernández-Amorós, M.J. & Urrea-Solano, M.E. (2019). Evaluación de un taller de mindfulness: la apuesta por una tutoría más humanista en la Facultad de Educación. In R. Roig-Vila (Ed.), *Investigación e innovación en la Enseñanza Superior: nuevos contextos, nuevas ideas* (pp. 956-966). Octaedro.
- Hutmacher, D., Eckelt, M., Bund, A., Melzer, A., & Steffgen, G. (2022). Uncovering the Role of Mindfulness in Autonomous Motivation across Physical Education and Leisure Time: Extending the Trans-Contextual Model. *Int. J. Environ. Res. Public Health*, 19(20): 12999. <https://doi.org/10.3390/ijerph192012999>
- Jung, M. & Lee, M. (2021). The effect of a mindfulness-based education program on brain waves and the autonomic nervous system in university students. *Healthc.*, 9(11): 1606. <https://doi.org/10.3390/healthcare9111606>
- Kawachi, I. & Berkman, L.F. (2001). Social ties and mental health. *J. Urban Heal*, 78, 458-467. <https://doi.org/10.1093/jurban/78.3.458>
- Kiens, K. & Larsen, C.H. (2020). Provision of a mental skills intervention program in an elite sport school for student-athletes. *Journal of Sport Psychology in Action*, 12(2), 11-25. <https://doi.org/10.1080/21520704.2020.1765925>
- Kuby, A.K., McLean, N., & Allen, K. (2015). Validation of the Child and Adolescent Mindfulness Measure (CAMM) with Non-Clinical Adolescents. *Mindfulness*, 6, 1448-1455. <https://doi.org/10.1007/s12671-015-0418-3>
- Kuroda, Y., Yamakawa, O., & Ito, M. (2022). Benefits of mindfulness in academic settings: trait mindfulness has incremental validity over motivational factors in predicting academic affect, cognition, and behavior. *BMC Psychol.*, 10(1): 48. <https://doi.org/10.1186/s40359-022-00746-3>
- López, I. & Gené-Morales, J. (2021). Revisión sistemática de la investigación sobre el uso del mindfulness en la educación física. *Cuadernos de Psicología del Deporte*, 21(3), 83-98.
- López-Secanell, I., Gené Morales, J., & Hernaiz Agreda, N. (2021). Mindfulness y educación física en la población universitaria. Una revisión sistemática. *Retos*, 42, 821-830. <https://doi.org/10.47197/retos.v42i0.86382>
- Martínez-Rubio, D., Sanabria-Mazo, J.P., Feliu-Soler, A., Colomer-Carbonell, A., Martínez-Brotóns, C., Solé, S., Escamilla, C., Giménez-Fita, E., Moreno, Y., Pérez-Aranda, A., Luciano, J.V., & Montero-Marin, J. (2020). Testing the intermediary role of perceived stress in the relationship between mindfulness and burnout subtypes in a large sample of Spanish university students. *Int. J. Environ. Res. Public Health*, 17(19): 7013. <https://doi.org/10.3390/ijerph17197013>
- Mckeering, P. & Hwang, Y.S. (2019). A systematic review of mindfulness-based school interventions with early adolescents. *Mindfulness*, 10, 593-610. <https://doi.org/10.1007/s12671-018-0998-9>
- McManus, F., Surawy, C., Muse, K., Vázquez-Montes, M., & Williams, J.M.G. (2012). A randomized clinical trial of mindfulness-based cognitive therapy versus unrestricted services for health anxiety (hypochondriasis). *Journal of Consulting and Clinical Psychology*, 80(5), 817-828. <https://doi.org/10.1037/a0028782>
- Meda, N., Pardini, S., Rigobello, P., Visioli, F., & Novara, C. (2023). Frequency and machine learning predictors of severe depressive symptoms and suicidal ideation among university students. *Epidemiol. Psychiatr. Sci.*, 32: e42. <https://doi.org/10.1017/S2045796023000550>
- Moore, S., Barbour, R., Ngo, H., Sinclair, C., Chambers, R., Auret, K., Hased, C., & Playford, D. (2020). Determining the feasibility and effectiveness of brief online mindfulness training for rural medical students: a pilot study. *BMC Medical Education*, 20, 1-12. <https://doi.org/10.1186/s12909-020-02015-6>
- Moreno-Gómez, A., Luna, P., García-Diego, C., Rodríguez-Donaire, A., & Cejudo, J. (2023). Exploring the effects of a mindfulness-based intervention in university students: MindKinder adult version program (MK-A). *Eval. Program Plann.*, 97: 102252. <https://doi.org/10.1016/j.evalprogplan.2023.102252>

- Mothes, H., Klaperski, S., Seelig, H., Schmidt, S., & Fuchs, R. (2014). Regular aerobic exercise increases dispositional mindfulness in men: a randomized controlled trial. *Mental Health and Physical Activity*, 7(2), 111-119. <https://doi.org/10.1016/j.mhpa.2014.02.003>
- Nañagas, M.L. & Kantartzis, S. (2022). Occupational alienation and the mental health of university students. *Brazilian J. Occup. Ther.*, 30(spe): e3097. <https://doi.org/10.1590/2526-8910.ctoRE23433097>
- Palmi, J. & Solé, S. (2016). Intervenciones basadas en mindfulness (atención plena) en psicología del deporte. *Revista de Psicología del Deporte*, 25, 147-155.
- Postigo-Zegarra, S., Schoeps, K., Montoya-Castilla, I., & Escartí, A. (2019). Emotional education program for adolescents (PREDEMA): evaluation from the perspective of students and effects on socio-affective competences / Programa de educación emocional para adolescentes (PREDEMA): valoración desde la perspectiva de los participantes. *Infanc. y Aprendiz.*, 42, 303-336. <https://doi.org/10.1080/02103702.2019.1578925>
- Rufato, F.D., Rossetto, E., & Wilkon, N.W.V. (2022). Psychic illness in young university students. *Rev. Tempos e Espaços em Educ.*, 15: e16903. <https://doi.org/10.20952/revtee.v15i34.16903>
- Sampson, R.J., Raudenbush, S.W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 277(5328), 918-924. <https://doi.org/10.1126/science.277.5328.918>
- Sarroeira, S., Oliveira Pereira, B., Carvalho, G.S., & Rodríguez-Fernández, J.E. (2022). Relaxation methods based interventions in a school context from a perspective of health and well-being promotion: a systematic review. *Retos*, 45, 583-590. <https://doi.org/10.47197/retos.v45i0.90898>
- Schneider, J., Malinowski, P., Watson, P.M., & Lattimore, P. (2018). The role of mindfulness in physical activity: a systematic review. *Obes Rev.*, 20(3), 448-463. <https://doi.org/10.1111/obre.12795>
- Senker, K., Fries, S., & Grund, A. (2022). Mindfulness in everyday life: between -and within- person relationships to motivational conflicts. *Current Psychology*, 41, 2786-2801. <https://doi.org/10.1007/s12144-020-00760-x>
- Sheldon, E., Simmonds-Buckley, M., Bone, C., Mascarenhas, T., Chan, N., Wincott, M., Gleeson, H., Sow, K., Hind, D., & Barkham, M. (2021). Prevalence and risk factors for mental health problems in university undergraduate students: A systematic review with meta-analysis. *J. Affect. Disord.*, 287, 282-292. <https://doi.org/10.1016/j.jad.2021.03.054>
- Solhaug, I., Eriksen, T.E., deVibe, M., Haavind, H., Friborg, O., Sorlie, T., & Rosenvinge, J.H. (2016). Medical and psychology student's experiences in learning mindfulness: benefits, paradoxes, and pitfalls. *Mindfulness*, 7(4), 838-850. <https://doi.org/10.1007/s12671-016-0521-0>
- Tabroni, I., Hardianty, D., & Sari, R.P. (2022). The Importance of Early Childhood Education in Building Social and Emotional Intelligence in Children. *J. Multidisiplin Madani*, 2, 1219-1226. <https://doi.org/10.54259/mudima.v2i3.508>
- Thümmler, R., Engel, E.M., & Bartz, J. (2022). Strengthening Emotional Development and Emotion Regulation in Childhood—As a Key Task in Early Childhood Education. *Int. J. Environ. Res. Public Health*, 19(7): 3978. <https://doi.org/10.3390/ijerph19073978>
- Turner, L., Galante, J., Vainre, M., Stochl, J., Dufour, G., & Jones, P.B. (2020). Immune dysregulation among students exposed to exam stress and its mitigation by mindfulness training: findings from an exploratory randomized trial. *Scientific Reports*, 10(1): 5812. <https://doi.org/10.1038/s41598-020-62274-7>
- UNESCO (30 December 2023). *Quality Physical Education Policy Project*. <https://www.unesdoc.unesco.org/ark:/48223/pf0000231340>
- Wang, Z. & Wang, J. (2022). Analysis of Emotional Education Infiltration in College Physical Education Based on Emotional Feature Clustering. *Wirel. Commun. Mob. Comput.*, ID7857522, 1-9. <https://doi.org/10.1155/2022/7857522>
- WHO (6 January 2013). *Mental health action plan 2013-2020*. <https://www.who.int/publications/i/item/9789241506021>
- Wimmer, L., Bellingrath, S., & Von Stockhausen, L. (2020). Mindfulness training for improving attention regulation in university students: is it effective? And do yoga and homework matter? *Frontiers in Psychology*, 11: 719. <https://doi.org/10.3389/fpsyg.2020.00719>
- Yook, Y.S., Kang, S.J., & Park, I. (2017). Effects of physical activity intervention combining a new sport and mindfulness yoga on psychological characteristics in adolescents. *International Journal of Sport and Exercise Psychology*, 15(2), 109-117. <https://doi.org/10.1080/1612197X.2015.1069878>