Effects of dance on the mental health in college students after covid-19: a mixed-methods approach

Efectos del baile en la salud mental de estudiantes universitarios tras el confinamiento por la pandemia: aproximación de método mixto

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How to cite in APA

Polanco-Zuleta, K. M. ., Arenas-Landgrave, P., & Lucio y Gómez-Maqueo, M. E. (2025). Effects of dance on the mental health in college students after covid-19: a mixed-methods approach. *Retos*, *66*, 192–205. https://doi.org/10.47197/retos.v66.110393

Abstract

Objective: the purpose of this research was to know the effect of a dance program on the mental health in college students, considering their perception after COVID-19.
Method: a mixed methods approach design used a sequential approach with quantitative predominance. The sample consisted of 35 college students (control group = 17; age M = 19.35, SD = 2.8; and experimental group = 18; M = 18.94, SD = 2.4) from the National Autonomous University of Mexico.
Results: quantitative findings of the DASS-21 showed that depressive symptoms decreased significantly in both groups, being lower in the experimental group (Z = -3.16, p = .002). Anxiety showed significant differences only in the experimental group (Z = -2.70, p = .007). No significant changes in stress were observed in either group. RS-14 results indicated a significant increase in resilience only in the experimental group. Qualitative analysis revealed improvements in the perception of symptoms of depression, anxiety, stress, resilience, and emotional well-being.
Conclusion: it is concluded that a moderate to vigorous intensity Dance Program (DP) for two months reduces indicators of depressive symptoms, anxiety and improves resilience factors. Although quantitative results showed no difference in stress, qualitative insights suggest that dancing effectively relieves stress and promotes relaxation, as well as provides a space for personal enjoyment and socialization.

Keywords

Depression; anxiety; stress; resilience; dance program.

Resumen

Objetivo: conocer el efecto de un programa de baile sobre la depresión, ansiedad, estrés y resiliencia en jóvenes universitarios, considerando su percepción tras el confinamiento por la pandemia.
Método: se empleó un diseño de aproximación de métodos mixtos utilizando un enfoque secuencial con predominancia cuantitativa. Participaron 35 estudiantes (grupo control = 17; edad M = 19.35, DE = 2.8; y grupo experimental = 18; M = 18.94, DE = 2.4) de la Universidad Nacional Autónoma de México.
Resultados: los hallazgos cuantitativos del DASS-21 mostraron que los síntomas depresivos disminuyeron significativamente en ambos grupos, siendo más bajos en el grupo experimental (Z = -3,16, p = .002). La ansiedad mostró diferencias significativas solo en el grupo experimental (Z = -2.70, p = .007). No se observaron cambios significativos en el estrés en ninguno de los grupos. Los resultados del RS-14 indicaron un incremento significativo en la resiliencia únicamente en el grupo experimental. El análisis cualitativo reveló mejoras en la percepción en los síntomas de depresión, ansiedad, estrés, resiliencia y bienestar emocional.
Conclusión: Se concluye que un programa de baile de intensidad moderada a vigorosa durante dos meses reduce síntomas de depresión, ansiedad y mejora la resiliencia. Aunque los resultados cuantitativos no mostraron diferencias en el estrés, las percepciones cualitativas sugieren que el baile es efectivo para aliviar el estrés y promover la relajación, además de ofrecer un espacio para el disfrute personal y la socialización.

Palabras clave

Depresión; ansiedad; estrés; resiliencia; baile; universitarios.

Introduction

The global outbreak of COVID-19 has brought profound changes to people's lifestyles and their relationships with their environment. Although the Pan American Health Organization declared the end of the pandemic in May 2023, the persistence of COVID-19 remains a reality (Pan American Health Organization [PAHO], 2023). During the isolation period implemented to contain the virus, it set a precedent regarding the psychological consequences related to emotions and social interactions for those individuals who faced significant disruptions in their usual social connections, affecting people of all ages, especially the young (Bland et al., 2022; Gómez et al., 2024).

Specifically in Mexico, the National Health and Nutrition Survey (ENSANUT, by its Spanish acronym) on COVID-19 indicated that approximately 70.7% of the population experienced a change in their level of physical activity before and after the contingency, showing a decrease in physical activity in all age groups (National Institute of Public Health, [INSP by its Spanish acronym], 2021). Likewise, Shamah et al. 2020 reveal that, following the implementation of quarantine in Mexico, there was an increase in the percentage of those who did not exercise during confinement (from 3.6% to 24.6%). In addition, there was a reduction in the amount of time dedicated to physical activity before and after the quarantine, as the proportion of individuals who performed one hour of physical activity per day decreased from 54.7% to 28.5%.

Regarding mental health, Farfán-Latorre et al. (2023) evidenced that Peruvian university students, after returning to in-person classes following the confinement, experienced emotional, cognitive, and physiological responses that affected their physical and emotional well-being, showing moderate to high levels of depression (54.8%), anxiety (40.5%), and stress (57.1%). Depression is understood as a disorder that encompasses deep sadness or intense hopelessness that persists for more than a few days, interfering with daily activities and even causing physical pain (American Psychological Association [APA], 2023). Anxiety is defined as a disorder that involves feeling fear or excessive concern when facing a specific situation (World Health Organization [WHO], 2023). Stress, like any form of change that leads to physical, emotional, or psychological exhaustion (National Geographic, 2022; WHO, 2023).

Moreover, Riveros (2018) pointed out that among Mexican university students, there is evidence of greater educational demands. This is attributed to students facing academic pressure and a range of overwhelming situations such as identity exploration, family conflicts, socioeconomic circumstances, romantic breakups, and the hormonal changes of youth. Zarco (2022) explains that the university environment can generate high levels of stress, anxiety, and depression. According to statistics provided by the National Autonomous University of Mexico (UNAM, by its Spanish acronym), the most common disorders among the student community are anxiety (93%), depression (90.7%), and suicidal behavior (84%). Additionally, 60% of students report being stressed by their studies (Peralta, 2023).

In the midst of this scenario, it is crucial to explore effective activities that promote adherence to various strategies aimed at mitigating the negative effects of confinement on the mental health of young people. Several studies (Ahsan & Abualait 2024; De Souza-Lima et al., 2024; Flores et al., 2024) highlight the reciprocal connection between physical exercise and mental health, emphasizing the importance of adopting holistic approaches to well-being.

In this sense, physical exercise, particularly dance, is not only a physical activity but also a form of artistic expression that involves the mind, body, and emotions (Borowski, 2021), and it also helps to reduce sedentary behavior (Rodrigues-Krause, 2021). Regular practice helps to release endorphins, neurotransmitters related to feeling well and happiness (Bai et al., 2022; Lovatt, 2020). In addition, it should be noted that dance also fosters social connection, improves self-esteem, and promotes creative expression, which can be especially relevant in moments of social isolation (Humphiers et al., 2023). Dance can also generate higher adherence than other physical activities (Dos Santos et al., 2021). Thus, Delattre et al. (2024) and Dewa et al. (2024), state that a growing body of literature is investigating the potential of dance, particularly its social forms, to positively influence mental health and well-being. They suggest that dance can help young people not only survive another crisis but also thrive.

The results of the meta-analysis by Huang et al. (2023), confirmed the effective and positive role of physical exercise in reducing depressive mood states (I^2 = 63%, $p < 0.01$) and anxiety (I^2 = 36%, $p = 0.04$) among college students. The study notes that physical exercise can be used as a non-medical method to

improve students' mental health and promote their overall development. Similarly, the systematic review by Liu et al. (2023) showed that Latin dance improves cardiovascular health and benefits mental health by reducing stress and improving mood, social contact, and cognitive function.

The analysis from the study by Zhang et al. (2021) suggests that in a population of college students (901) dance was significantly associated with lower depression (OR = 0,55; 95% IC: 0.36 to 0.84, P < 0.01), acting as a protective factor to prevent depressive symptoms. It is important to note that activities such as dancing have been found to have similar effects to therapy-based interventions for participants with mild to moderate depression (Dingle et al., 2021). Regarding anxiety the results obtained by Finn et al. (2023) concluded that among young people aged 16 to 24 years, anxieties had a reduction (p = 0.005) when taking group dance classes over 8 weeks, having also positive results in the reduction of depressive symptoms and other psychological variables such as self-efficiency and emotional well-being. Concerning stress, Ferreira de Sousa et al. (2022) express that the stress level of college students significantly reduced in 66% of the population (p = 0.005) after a ballroom dance program, thereby improving their perceived quality of life. It concludes that dance can be an occupational therapeutic resource aimed at stress control.

In this regard, the study carried out by Salihu et al. (2021) shows that dance interventions significantly reduce the symptoms of depression (SMD = −0.69, 95% IC: −0.91 to −0.35, p <0.001), stress (SMP = −1.0, 95% IC = −1.03 to −0.017, p <0.05), and anxiety (SMS = −0.099, 95% CI = −1,92 to −0,05, p<0.05); showing that adults benefit from taking dance lessons for at least 150 minutes per week. However, in addition to direct mental health benefits, dance has also been shown to promote and develop resilience (Buck & Snook, 2020). One of the concepts of resilience defines it as the ability to adapt and recover from adverse situations (Simón-Saiz, et al., 2018). In this respect, dancing involves overcoming physical and emotional challenges, developing skills such as concentration, perseverance, and self-confidence (Borowski, 2021; Mesa, 2023). These qualities are critical to strengthening resilience and more effectively addressing life's challenges (Buck y Snook, 2020). The study conducted by Leão et al. (2023) where they evaluated 135 dancers concluded that the students who danced showed high values in resilience, self-confidence, and motivation. Similarly, the conclusions given by Paschali and Araújo (2013) in their qualitative research show that students who belonged to a dance group perceived greater resilience by adopting behaviors that promoted their health.

Based on the above, the social contribution of this study lies in the interdisciplinary integration of physical exercise—specifically dance—and psychology in addressing mental health and promoting physical well-being. This approach not only strengthens cross-cutting educational training but also highlights the need for modifications in institutional policies from a public educational policy perspective, emphasizing the importance of mental health care for university students. Additionally, this study contributes to the scientific repository on the associated variables, contextualizing them within a Mexican population, which may serve as a reference for future interventions in similar contexts.

Therefore, the purpose of this research was to know the effect of a dance program on the mental health in college students, considering their perception after COVID-19.

Method

A mixed-methods design was employed using a sequential approach with a quantitative predominance (QUAN - Qual) (Creswell & Creswell, 2017). The quantitative component focused on the variables of depression, anxiety, stress, and resilience, while the qualitative component analyzed participants' perceptions after the dance program.

Participants

Participants were selected using a non-probabilistic convenience sampling method, considering the accessibility and availability of individuals within the context of the study.

The eligibility criteria included college students who: belonged to UNAM; were attending their first in-person semester after the pandemic lockdown, the Mexican government officially lifted the lockdown in October 2022; however, UNAM authorized the return to in-person classes starting in August 2022 (Medina-Mora & Hansberg, 2023); were aged between 18 and 26 years; did not have any physical-motor

limitations or had cardiovascular disease, as the dance program intensities ranged between 65% and 89% of heart rate frequency, which was monitored using the Borg scale (Borg & Noble, 1974) and radial heart rate measurements taken by each participant at the midpoint of each dance session. It is worth noting that the students were not undergoing any psychological therapy or psychiatric pharmacological treatment.

Dance program

The DP was taught by a professional from the sports department of UNAM. The program lasted for two months and was offered three times a week (Tuesday, Wednesday, and Thursday, considering students' availability) with a duration of 60 minutes per session, the intensity of which was moderate to vigorous. Each session had a three-phase structure: initial, central, and final. The initial phase focused on joint mobility and warm-up, involving body activation through soft musical rhythms such as ballads or pop songs. In the core phase, the desired intensity ranging from moderate to vigorous was achieved, focusing on movements based on various Latin rhythm genres (bachata, merengue, reggaeton, cumbia, salsa, rock and roll, electronic, and tropical, among others). The final phase, focused on the return to calm through group integration, or free expression of movement in addition to stretching.

Procedure

Initially, authorization was obtained from the faculty's academic authorities in coordination with the technical council, which assessed the relevance and methodological rigor of the study. The study was approved under the reference number Of.798, granting access to the classrooms to inform students about the dance program (DP). Simultaneously, several meetings were held with the director of physical culture at UNAM to present the study's objectives and obtain approval for the participation of the instructor leading the DP. Once the study was approved, three additional meetings were conducted with the dance instructor to define the most appropriate approach for implementing the intervention program, ensuring adherence to all study guidelines and regulations. Prior to data collection from the experimental group, a three-week pilot test was conducted to familiarize participants with the DP and refine execution processes.

Once the experimental and control groups were formed (participants were selected through convenience sampling, a process that took approximately one month), the questionnaires assessing the quantitative variables were administered. These were applied simultaneously to both groups at the beginning and upon completion of the intervention. The estimated time to complete the questionnaire was approximately 10 minutes. After the intervention, a semi-structured interview was conducted with the participants in the experimental group to assess their perceptions regarding the quantitative variables in relation to the dance program (DP). During the intervention period, the control group did not engage in any physical exercise or alternative dance activities, maintaining their usual routines. Additionally, they were informed that upon completion of the intervention with the experimental group, they would have the opportunity to participate in the same DP.

Quantitative Instrument

Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995), adapted to Spanish in a clinical sample of university students in Mexico (Arenas-Landgrave et al., 2024). The questionnaire shows acceptable fit indices and high-reliability indicators (depression=0.87; anxiety=0.86; stress=0.91). Responses are Likert-type, 4-point self-report scales. Each subscale consists of 7 items aimed at assessing the emotional states of depression, anxiety, and stress.

The Resilience Scale (RS-14, Wagnild, 2009) in the Spanish version by Sanchéz-Teruel and Robles-Bello (2015) was used to assess resilience. The questionnaire measures two factors: Factor I: Personal Competence (11 items, including self-confidence, independence, decisiveness, resourcefulness, and perseverance) and Factor II: Acceptance of self and life (3 items, including adaptability, balance, flexibility, and a stable life perspective).

Qualitative Instrument

Semi-structured interview: Instruments measuring the variables of depression, anxiety, stress, and resilience were used as a guide to adapt them to the perceptions of the students who participated in the

DP. The interview consisted of 12 questions (three questions corresponding to each of the quantitative variables) and was conducted individually.

The validation of the questions that comprised the semi-structured interview was carried out through three approaches: theoretical consistency based on previous literature, consultation with experts (two psychologists specializing in clinical psychology), and the implementation of a pilot test. This process allowed for the adjustment of each construct and ensured the collection of relevant information for the study.

Data analysis

Information processing was implemented using SPSS version 25 and dynamic tables in Excel. To compare the variables of depression, anxiety, stress, and resilience performed before and after the DP, they were analyzed using non-parametric tests. For related samples, the Mann-Whitney U test was used, and for independent samples, the Wilcoxon test. In both tests, the significance level $p < .05$ was estimated, and the effect size was calculated with Cohen's d. For the analysis of qualitative data on students' perspectives after the dance program, a content analysis technique (Díaz, 2018) was used, utilizing the qualitative data analysis software ATLAS.ti 5.

Results

Quantitative Results

To determine the equivalence of the DASS-21 and RS-14 variables in both groups before the intervention program, the Mann-Whitney U test was used (Table 1), which showed no significant differences ($p > 0.05$). When comparing the groups after the dance program, it was observed that the control group had higher scores in depression and anxiety (U =75, $p < 0.05$; U =66.5, $p < 0.05$) compared to the experimental group. These differences show a large effect size in both variables. For depression, 14.69% of the total variance is explained, while 20.65% of the total variance in anxiety is explained by the intervention program. Similarly, regarding resilience, lower scores in personal competence and acceptance of self and life were also identified (U =246, $p < 0.05$; U =289, $p < 0.001$) compared to the experimental group. The observed differences show a large and negative effect size of d = -1.25 and d = -2.23, respectively.

Table 1. Descriptive and inferential analysis of the DASS-21 and RS-14 before and after in both groups.

	Before										
	Control G. n = 17				Experimental G. n = 18						
	M±SD	*Med*	*Min*	*Máx*	*M±SD*	*Med*	*Min*	*Máx*	*U*	*p*	*d*
DASS -21											
Depression	12.54±2.46	12	9	18	12.17±3.50	11	7	19	121	.303	.25
Anxiety	8.88±2.36	8	5	14	9.61±4.3	8.5	4	20	159	.858	.21
Stress	10.24±4.8	9	2	19	11.22±4.73	12	5	19	186	.273	-.41
RS-14											
Personal C.	54.82±14.4	56	18	76	51.44±7.74	50	42	70	124	.351	.29
Acceptance	12.88±4.48	12	8	15	11.44±1.94	12	8	15	122	.318	.41
	After										
	Control G. n = 17				Experimental G. n = 18						
	M±SD	*Med*	*Min*	*Máx*	*M±SD*	*Med*	*Min*	*Máx*	*U*	*p*	*d*
DASS-21											
Depression	9.41±4.21	8	4	18	5.61±4.84	5	0	16	75	.009*	.83
Anxiety	8±3.51	8	3	17	4.28±3.75	3.50	0	12	66.5	.003*	1.02
Stress	10.4±4.55	10	3	19	8.01±4.32	7.50	0	17	108	.143	.54
RS-14											
Personal C.	53.12±8.82	57	37	67	62.89±6.65	63.5	50	75	246	.002*	-1.25
Acceptance	11.76±2.65	12	7	16	17.28±2.27	17	12	20	289	.000*	-2.23

Note: M ± DS = Mean ± Standard Deviation. Med = Median. Min = Minimum. Max = Maximum. U = Mann-Whitney U test. p = Significance level. d = Cohen's effect size.
Mann-Whitney U test
*p < .050

The Wilcoxon test was used to make intragroup comparisons, contrasting before and after within each group (Table 2). Concerning depression and anxiety, the results showed a significant decrease in the experimental group after the dance program (Z = -3.16, p = .002; Z = -2.70, p = .007), with a large effect size observed in both variables (d = 1.56; d = 1.31). However, to the stress variable, although there was

a decrease in the mean in the experimental group, it did not show a statistically significant difference, unlike the control group where there was a slight increase in the mean.

Additionally, in the control group, a significant decrease was observed only in depression (Z = -2.30, p = .021), but its effect size was smaller (d = 1.02) compared to the experimental group.

Regarding resilience, in the experimental group, scores increased in both factors of personal competence and acceptance of self and life (Z = 3.12, p = .002; Z = 3.62, p = .001), compared to the control group where no significant changes were observed.

Table 2. Descriptive and inferential analysis of the DASS-21 and RS-14 in both groups.

	Control G. n = 17								
	Before			After					
	M±SD	*Min*	*Máx*	*M±SD*	*Min*	*Máx*	*Z*	*p*	*d*
DASS -21									
Depression	12.54±2.46	9	18	10.04±4.21	8	18	-2.30	.021*	1.02
Anxiety	8.88±2.36	5	14	8.01±3.51	3	17	-1.58	.113	.29
Stress	10.24±4.8	2	19	10.40±4.55	3	19	1.74	.081	-.25
RS-14									
Personal C.	54.82±14.4	18	76	53.12±8.82	37	67	-1.03	.299	.14
Acceptance	12.88±4.48	8	15	11.76±2.65	7	16	-1.37	.169	.30
	Experimental G. n = 18								
	Before			After					
	M±SD	*Min*	*Máx*	*M±SD*	*Min*	*Máx*	*Z*	*p*	*d*
DASS-21									
Depression	12.17±3.50	7	19	5.61±4.84	0	16	-3.16	.002*	1.56
Anxiety	9.61±4.3	4	20	4.28±3.75	0	12	-2.70	.007*	1.31
Stress	11.22±4.73	5	19	8.01±4.32	0	17	-1.92	.055	.71
RS-14									
Personal C.	51.44±7.74	42	70	62.89±6.65	50	75	3.12	.002*	-1.59
Acceptance	11.44±1.94	8	15	17.28±2.27	12	20	3.62	.001*	-2.76

Note: M ± DS = Mean ± Standard Deviation. Min = Minimum. Max = Maximum. Z = Wilcoxon test. p = Significance level. d = Cohen's effect size. Wilcoxon test
*p < .050

Qualitative Results

Based on the information obtained from interviews with participants in the experimental group, a table was created with five categories: depressive symptoms, anxiety symptoms, stress, resilience, and emotional well-being. These categories facilitated the analysis of the interviewees' discourse. Each cell contains the most representative excerpts from each student, who were identified using a letter code to ensure confidentiality.

The responses given by the students (Table 3) demonstrated that the dance program has shown a positive impact on various aspects of the participants' mental health and emotional well-being. Concerning depressive symptoms, all participants reported significant improvements, highlighting an increased interest in activities, better sleep quality, and a decrease in feelings of sadness and lack of motivation. For example, ER mentioned that she stopped feeling sad and cried less, in addition to experiencing an improvement in her sleep, while CC indicated that dancing helped her feel motivated and interested in school and improved her sleep.

Regarding anxiety symptoms, most participants experienced a decrease in anxiety. Regarding anxiety symptoms, most participants experienced a decrease in anxiety. Participants reported feeling calmer, better able to control anxious behaviors such as nail-biting or leg shaking and experiencing an improved ability to relax. For instance, FF noted that dancing helped her feel more relaxed and led to noticeable changes in her sense of urgency, even to the point of stopping her nail-biting. Meanwhile, NG mentioned that she initially experienced anxiety attacks and cried frequently, but over the course of the dance program, she became calmer and felt more in control.

Stress was also significantly reduced, as participants found dance to be an effective method for alleviating it. They described feeling more relaxed, enjoying the moment, and perceiving dance as a means of

disconnecting from academic concerns. VC mentioned experiencing relaxation while completing assignments and acknowledged that if she was unable to manage everything at once, she could resume later. OG highlighted that dancing helped her relax, feel peaceful, and forget about her academic worries.

They described feeling more relaxed, enjoying the moment, and perceiving dance as a means of disconnecting from academic concerns. VC mentioned experiencing relaxation while completing assignments and acknowledged that if she was unable to manage everything at once, she could resume later.

In terms of resilience, participants strengthened their ability to face stressful situations, manage their time, and organize themselves better. FF took learning new steps as an opportunity to persevere, while MG saw dance as a challenge that motivated her to overcome obstacles and gain more self-confidence. Furthermore, their emotional well-being improved as they felt happier, more confident, and more socially engaged. SV noted that dancing not only improved her fitness but also helped her quit smoking, making her aware of the importance of reducing a sedentary lifestyle. LH mentioned that his mood improved; he no longer felt as angry about various things and was able to let go of lingering worries. Dance motivated him to move forward.

The dance program not only helped reduce negativity but also fostered positive and healthy coping skills, proving to be a valuable tool in reducing symptoms of depression, anxiety, and stress. Similarly, students reported greater resilience.

Table 3. Perceptions of the experimental group on the dance program

	Depressive S.	Anxieties S.	Stress	Resilience	Emotional Well-being
RS	“(...) I stopped going to the psychologist, but at least dancing helped me with sleep"	“Honestly, I would say that I do not feel, or very little, similar to how I was before”	"(...) joyful moments that helped me relax”	"Dancing helped me trust myself, to understand that I can handle difficult situations"	“Freedom to try to dance without fear of mistaking, made me feel confident”
ER	"(...) I stopped feeling sad and don't cry as much anymore, and it even improved my sleep"	"(...) it helped me release some anxiety; I noticed changes in my performance"	"(...) being active and interacting with people helped me unwind"	"Seeking healthier ways to cope with situations"	"The dancing helped me feel emotionally well. Socializing with others was helpful"
VC	"Dancing helped me cope with sadness, sleep better, and control my cravings to eat a lot"	"(...) I was able to relax a bit more to have that bodily awareness"	"(...) I would go out relaxed to do my homework and understand that if I couldn't handle everything, I would continue it later"	"(...) It helped me control my thoughts and everything around me to concentrate more"	"(...) It's a moment where you can be with yourself, enjoy yourself, and at the same time connect with others"
MG	"I regained interest in certain things, it made me feel good, and I felt my sleep improved"	"I used to shake my leg and crack my knuckles, but now I'm calmer and don't do it anymore"	"I felt more relaxed; it was a happy moment for me, it calmed me down"	"I felt capable of handling stressful projects and completing assignments on time"	"I no longer felt distressed; it made me happy and helped me express myself with others"
RZ	"I feel better now and have motivation to continue. It helped me sleep better and be more interested in school"	"At the end of the dance program, I was in final exams and would get anxious, but I liked how I managed my anxiety"	“(...) it helped me get out of all that tension and stress I felt. (...) I went out relaxed, with a better mood for my house"	"It helped me because now I can face problems and try to handle them in the best way possible"	"Having a space to move, I feel well emotionally (...) it helped with my eating habits”
CC	"(...) dancing helped me stay motivated and interested in school, and improved my sleep"	“I felt anxious at the beginning, but then I relaxed a lot, feeling calmer and happier”	“I find it helps me release stress; I distract myself. (...) academic tension would go away”	"I helped me structure my life. I felt prepared for exams"	"I helped me feel good (...) arriving home relaxed, socializing, I really liked that"
SS	"I felt motivated with my self-image (...) it helped me sleep better"	"I used to bite my nails before. During the dance program, I stopped doing it; I felt calm and relaxed. (...)"	"I liked that I could dance with others; it made me feel calm and relaxed, and I enjoyed the moment"	"(...) I mean, I started to manage my time better. It helped me feel confident"	"It helped me focus on myself; I feel light, secure, confident, and better because I want to be happy"
NG	“During the dance program, I reconnected with things that no longer interested me, and the sadness decreased a lot"	"At first, I had panic attacks and cried a lot (...) during dancing, it was different; I calmed down and felt in control"	"It helped me challenge myself in coordination, so I focused on that and forgot about my academic worries"	"I think so; I no longer drown in my thoughts and see that this way I can perform all tasks better, trying to solve them"	"I believe it’s more about body expression; it made me feel good because I feel like I take care of my body, and it improves my mood"
MS	"I saw myself happier in the mirror and more	"At first, my hands were sweating, my heart was	"The movement with music and keeping the	"It helped me feel safe and confident, to know	"It helped me quit smoking and made me realize

	confident. It made me realize that there are things that can cheer me up and make me feel better"	pounding, then I realized that the important thing was to have fun"	rhythm helped me release stress. And feel calm even in things not related to dancing"	that I can do things in the best way, to try several times"	that there are healthier ways to manage worry, anxiety, and stress"
HO	"(...) In terms of insomnia, there was not much difference, but dancing helped me get motivated to do other things"	"There was not much change in me, I am introverted, but at the moment of dancing, I cleared my mind"	"If I arrived very stressed, after dancing, I felt encouraged and less stressed"	"(...) I used to waste a lot of time, but now I made better use of the time I had"	""Dancing provides a way to unwind and feel better, especially after a stressful day"
FF	"Going to dance classes, I no longer felt so lethargic. I felt more interested and motivated"	"With dancing, I feel more relaxed. (...) I no longer feel jittery, I even stopped biting my nails"	"Being able to share with my classmates made me feel relaxed, I felt the stress go away"	"Learning new steps, if I didn't get them right, I didn't give up and kept trying"	"It helped me enjoy what I was doing and, above all, to have a better attitude throughout the day"
SV	"Dancing helped me regulate them, I feel that there has been a reduction in those symptoms, and I hope they continue like this"	"After dancing, I felt relaxed and could face other things more calmly"	"(...) after dancing, I felt relaxed and laughed with others, something I didn't do before"	"(...) it helped me do things for pleasure and not out of obligation"	"Dancing not only improved my fitness, but I also quit smoking, and my mobility habits improved"
LH	"After dancing, I don't feel as sad, and I like that. (...) my sleep also improved"	"Now that we are in finals, I've felt anxiety again, but during dance sessions, I could feel calmer"	"Yes, especially in the last few weeks, I had a lot of academic loads, but in dancing, I released the stress I had"	"It helped me focus my thoughts on one thing at a time and not overthink the things that worry me"	"My mood changed for the better; I no longer felt as angry about things and could let them go (...) dancing motivated me to keep going"
TM	"(...) now I have regained interest in school activities, I feel enthusiastic about certain things"	"I believe it helped me many times to expend my energy and not be thinking about many problems"	"I believe that having contact with others, being able to socialize, relaxed me a lot, made me feel calm"	"It helped me with my problems, to see them from another perspective, to look for solutions"	"Dancing made me realize that doing things I enjoy is also important, that not everything is about school and work"
MP	"(...) I overcame my social barriers, I was more motivated, I left behind dark thoughts, my sadness decreased"	"I realized I could apply it as a new tool to stop overthinking and reduce my anxiety"	"Many times, I went angry because I have anger issues, but during dancing, I relaxed, my anger went away"	"Dancing gave me a break, made me take things more calmly, and find ways to solve problems"	"I think dancing really helped me with depression and anger management; I really enjoyed it a lot, and I will miss it"
OG	"(...) you know, dancing made me feel alive again, before I felt in a dark place"	"During dancing, that feeling of nervousness decreased, that state, dancing made me feel alive"	"It gave me the opportunity to relax, to feel peace for a few minutes, and that is already a gain"	"I think it helped me to regain that part of socializing and not isolating myself so much when I am sad"	"I think dancing made me feel calm and at peace, and that is something I am grateful for"
SC	"It helped me fall asleep, have more energy for what I was doing, and prevented me from drowning in my thoughts"	"(...) dancing made me calm down and relax with everything I had to do"	"It was very important, it helped me relax, focus on dancing, and release energy"	"Dancing allows you to overcome a challenge, which in turn motivates you to overcome other challenges, it helped me have more self-confidence"	"It helped me rest by doing something other than studying, which I needed. (...) It made me feel happy"
JS	"I stopped feeling so sad, I stopped crying, I liked that a lot, dancing helped me believe in myself"	"During and after dancing I felt calm, I no longer felt so agitated (...)"	"I would wake up thinking I was going to dance and knew I would feel better because I had a lot of academic pressure"	"(...) it helped me feel confident in myself and that I could solve things I might have been avoiding"	"I generally don't have many friends; I felt that dancing helped me strengthen my socializing skills"

Comparison of quantitative and qualitative results

After the intervention of the dance program, both the perception of depressive symptoms ($M_{control}$ = 10.04 vs $M_{experimental}$ = 5.61) and anxiety ($M_{control}$ = 8.01 vs $M_{experimental}$ = 4.28) showed better indicators in the experimental group compared to the control group. This was also confirmed by the perceptions of the students in the experimental group, who, for example, expressed that depressive symptoms had decreased, such as a reduction in sadness, an increase in interest in activities, and improved sleep. Regarding anxiety, the students reported a significant decrease in their responses to activities that caused anxiety, particularly in physical reactions such as better control over leg movements and reduced nail-biting.

Regarding stress, although the quantitative results did not show a statistically significant decrease in stress levels within the experimental group, in contrast to the slight increase in the control group's mean, the qualitative data presents a different perspective. According to the participants' descriptions, stress was significantly reduced through dancing, which was identified as an effective method for alleviating it. Participants reported feeling more relaxed, enjoying the moment, and using dance as a way to disconnect from academic concerns.

As for resilience, quantitative data showed a significant increase in the experimental group's scores on both factors, personal competence and acceptance of self and life ($Z = 3.12$, $p = .002$; $Z = 3.62$, $p = .001$), compared to the control group where no significant changes were observed. These results are supported by qualitative data, where participants reported having strengthened their ability to cope with stressful situations, as well as increased feelings of self-confidence and security. The congruence between the quantitative and qualitative data suggests that dance not only improved measurable aspects of resilience but also had a positive impact on participants' perceptions of their ability to face and overcome challenges.

Discussion

The purpose of this research was to know the effect of a dance program on the mental health in college students, considering their perception after COVID-19. While depression, anxiety, and stress have been studied in relation to physical exercise, few previous studies have explored the link between a dance program and resilience, particularly after students returned to in-person university classes (eg. Bohn & Hogue, 2021; Buck & Snook, 2020).

Concerning depression outcomes in both groups (control and experimental), a significant decrease was observed. However, lower scores were obtained in the group that underwent the dance program. Specifically, average depression scores in the experimental group decreased from 12.17 to 5.61, while in the control group, they decreased from 12.54 to 10.04. Qualitative findings support these quantitative results, as students in the experimental group reported feeling more optimistic and in better moods regarding depressive symptoms after the dance program.

These results align with previous studies demonstrating the mental health benefits of dance, particularly in reducing depressive symptoms. Koch et al. (2007) and Koch et al. (2019) found that dance serves as an effective form of therapy for depression due to its combination of physical activity, emotional expression, and social component, allowing participants to have fun, interact with their environment, and create a space for self-regulation. Jeong et al. (2005) also noted that dance improves emotional well-being and reduces cortisol levels, a hormone associated with stress and depression. In addition, the release of endorphins during physical exercise is another plausible explanation for the increase in well-being; aerobic exercise like dance has been shown to modulate neurotransmitters such as dopamine, serotonin, and noradrenaline, substances linked to reducing depressive symptoms (Eyre et al., 2018; Pahlavani, 2024).

In terms of anxiety, quantitative results show a significant decrease in the experimental group compared to the control group. Specifically, anxiety scores in the experimental group decreased from 9.61 to 4.28, whereas in the control group, the decrease was minimal, from 8.88 to 8.01. These data suggest that the dance intervention had a considerable impact on reducing anxiety symptoms. Qualitative data support these findings, as participants in the experimental group reported feeling more relaxed and less worried after the dance sessions, describing their anxiety as manageable and reduced by many.

These findings are consistent with previous studies highlighting dance as a key strategy for reducing anxiety symptoms. Finn et al. (2023) found that group dance can decrease anxiety in youth by providing a structured and social activity that helps focus and relax the mind. Laird et al. (2021) also suggest that dance promotes emotional expression and overall well-being, factors contributing to anxiety reduction. According to Karkou et al. (2019), the music and rhythm of dance can induce states of relaxation and enjoyment, thereby reducing anxiety levels. Given these results, a dance program may be considered as a participatory approach to enhance students' well-being in anxiety-inducing environments.

With regard to stress, although the quantitative results did not show a statistically significant difference between the two groups, the average scores indicate a moderate decrease in the experimental group from 11.22 to 8.01, while the control group experienced a slight increase from 10.24 to 10.40. These data suggest that the dance intervention did not have as strong an impact as it did on depression and anxiety. However, qualitative data provide additional insight, as participants reported feeling a reduction in tension and increased ability to handle stressful situations after dance sessions. This can be explained by stress being a variable linked to the context that cannot be controlled but can be managed through individual resources. These findings align with existing literature. According to Ferreira de Sousa et al. (2022), longer dance programs may have a more significant impact on stress reduction. Salihu et al. (2021) argues in their meta-analysis review that dance interventions reduce stress symptoms when engaged for at least 150 minutes per week and suggest incorporating dance into health promotion activities to enhance psychological well-being.

Finally, regarding resilience, quantitative results indicate a significant improvement before and after in the experimental group, both in personal competence with an average score increasing from 51.44 to 62.89 score of 51.44 to 62.89 and in acceptance of self and life revealing an average score rising from 11.44 to 17.28. a situation that was not evident in the control group where no significant differences were demonstrated. These findings are consistent with qualitative results, as participants described feeling more self-assured and capable of making important decisions with greater autonomy. Additionally, they reported increased perseverance and creativity in facing challenges, reflecting enhanced personal competence. They also expressed that dance sessions provided them with tools to maintain better emotional balance and be more flexible in response to unexpected changes.

This is consistent with studies such as that of Quiroga-Murcia et al. (2010), who found that dancing can significantly improve self-esteem and positive self-perception. Furthermore, Duberg et al. (2016) state that dance as movement therapy can strengthen self-efficacy and self-confidence by providing a safe space for emotional expression and the development of personal skills. In this regard, Bräuninger (2012) suggests that a dance therapy program increases self-acceptance and mind-body connection, creating a key mechanism for promoting emotional well-being and resilience in various populations.

Our study has some limitations. The number of male students is much lower compared to female students, so it was not possible to conduct an analysis of the variables by sex. On the other hand, the relatively small sample size limits the generalization of the study's results. Furthermore, we believe that not having collected qualitative data on the perceptions of the students who participated in the experimental group before the dance program prevented us from making a comparison between perceptions.

For future research, it is suggested to consider larger samples and evaluate the effects of dance over time to obtain a more comprehensive understanding of its benefits. Additionally, it would be useful to investigate how different types of dances can influence various dimensions of mental health.

Conclusions

The findings of this study suggest that implementing a dance program of moderate to vigorous intensity over a two-month period, with a frequency of three sessions per week, can contribute to reducing symptoms of depression and anxiety while enhancing resilience-related factors. Although the quantitative results did not reveal significant differences in stress levels, the qualitative testimonies of the participants indicate that the dance program constitutes an effective strategy for stress relief and relaxation, providing a space for personal enjoyment and social interaction.

Finally, it is essential for higher education institutions to implement diverse strategies aimed at improving mental health, thereby enhancing the quality of life of university students. The findings of this study are expected to foster further discussion and provide robust evidence to support the inclusion of dance as a viable alternative or complementary approach to psychological therapies and the promotion of physical activity.

Acknowledgements

We would like to express our special thanks to dance instructor Roberto Ramírez Romero from the General Directorate of University Sports at UNAM, whose support and professionalism were essential for the successful execution of the dance program. We would also like to thank the university students who participated in the intervention and adjusted their academic schedules to attend punctually.

Financing

This research was supported by the Postdoctoral Fellowship Program at UNAM from Departamento General de Asuntos de Personal Académico (DGAPA) of the National Autonomous University of Mexico.

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