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Article

Effectiveness of a Nature Sport Program on Burnout Among Nursing Students: A Clinical Trial

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Abstract

Background/Objectives: Academic burnout is an emerging problem among nursing students, characterized by emotional exhaustion, cynicism and reduced academic efficacy. Sport interventions have shown a positive effect on nurses as a preventive strategy against burnout. The aim was to evaluate effectiveness of a nature sport program in the levels of academic burnout in nursing students. **Methods:** a randomized clinical trial was performed. The intervention was a 12-week a nature exercise program with two sessions each week. The main dependent variables were burnout (measured with MBI-SS), stress (measured with PSS) and anxiety and depression (measured with HADS). **Results:** sample size with n=50 in the control group and n=58 in the intervention group (81.81% response rate). After the intervention significant differences were found in emotional exhaustion ($p<0.001$), stress ($p<0.05$) and mean steps per day ($p<0.001$), with the mean values being lower in IG: emotional exhaustion (3.28 points) stress (2.85 points) and steps per day a week (1381 steps). **Conclusions:** A nature exercise program has some positive effects in emotional exhaustion, stress and steps per day a week.

Keywords: sport; academic burnout; nursing; university students; prevention; mental health; nursing; mental health

1. Introduction

The term “burnout” comes from the English verb “to burn,” which means to consume oneself, and the adverb “out,” which means outside, extinguished, finished. From these two terms comes the word “burnout,” which means “to be burned out.” [1].

Before burnout was discussed scientifically, in the field of psychiatry, specialists Schwartz and Will published a description of a nurse affected by this syndrome in the journal *Psychiatry* in 1953. They described the case of Miss Jones, who worked in a psychiatric hospital and showed symptoms of exhaustion, irritability, demotivation, and indifference towards patients and colleagues. “Her depressed mood made her irritable, she felt exhausted and was insensitive and indifferent, particularly towards patients. Now Miss Jones only sees the negative side of her work and avoids social contact with patients and colleagues” [2].

Burnout syndrome was first discussed in 1969, when Bradley [3] described it as a psychological disorder. A few years later, in 1974, Freudenberg [4] studied the behavior of workers at an addiction center, finding that they were increasingly tired, dissatisfied, and showing less interest in their work. Over time, this caused some of these people to develop symptoms of depression, anxiety, and stress.

Cristina Maslach [5] and her team devised a system in 1986 to assess Burnout Syndrome, called the Maslach Burnout Inventory (MBI). This test-based system has been modified over the years. The current MBI studies three dimensions of burnout: emotional exhaustion (EE), depersonalization (D),

and reduced personal fulfillment (PF). The Likert-type test consists of seven possible responses rated from 0 to 6. This questionnaire has been validated, adapted, and translated into different languages [6]. In Spain, it was adapted by Seisdedos [7] in 1997.

Following the parameters of the World Health Organization (WHO), which defines health in its constitution as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (1946) [8], it can be inferred from this definition that protecting the mental health of workers is essential to achieving optimal health.

The WHO has developed the “Comprehensive Mental Health Action Plan 2013-2030,” whose purpose is “to promote mental well-being, prevent mental disorders, provide care, improve recovery, promote human rights, and reduce mortality, morbidity, and disability among people with mental disorders” [9].

Burnout goes beyond “being burned out” at work; it is a problem that, due to its characteristics, can have a very negative impact on people’s physical and mental health [10].

Many groups can suffer from burnout syndrome; however, this condition is highly prevalent among nursing staff [11], which leads to increased absenteeism, which in turn creates real problems at the organizational level and in terms of worker protection [12]. This is a significant problem, as workplaces are affected by absenteeism, reduced staffing levels, increased waiting times, and a decline in the quality of care [13].

Among the groups that are susceptible to burnout are university students, with nursing students experiencing high levels of stress and burnout during their training [14,15]. Some studies indicate that one way to reduce the symptoms of burnout in university students is to maintain healthy lifestyle habits, including proper nutrition, meditation, good sleep hygiene, and physical activity [16,17]. Physical activity has shown positive impact in burnout in university students, thus, it is important to assess if these effects are also found in nursing students and if doing the exercise outdoor in nature can have a greater impact.

The aim of the study was to analyze the effectiveness of a physical activity program in nature on burnout in nursing students.

2. Materials and Methods

A randomised clinical trial was conducted. The writing was done following CONSORT checklist (Supplementary Material) [18]. It was registered in OSF in August of 2025 (osf.io/93ndg)

2.1. Participants

Nursing students at their second year from the University of Granada who were included in the study. Students diagnosed with anxiety disorder or depression were excluded. Baseline data was collected the first week of March and post-intervention data after 12 weeks intervention May 2025.

2.2. Sample Size

The sample size was calculated using G*Power software, using a two-tailed Student’s t-test for comparison of means. A moderate effect size ($d = 0.5$), a significance level of 0.05, and 80% statistical power ($1-\beta = 0.80$) were assumed, with equal allocation between groups (1:1). Under these parameters, a total of 128 participants (64 per group) were estimated to be required to detect statistically significant differences in burnout levels based on sport practice. All the students from the second course ($n=132$) were invited to participate in the study and randomized.

2.3. Randomization

We used Excel software with “RANDOM.ENTRE(1;2)” formula. Number 1 was assigned to control group and number 2 to intervention group. Each participant in the excel randomly received one number.

2.4. Intervention

The intervention consisted of a 12-week in person and in the nature exercise sessions. Two sessions were performed each week, one included walking in the mountain for 1 hour and another 1-hour strength-resistance training session in an exercise park in front of the beach or outdoor in the university. There were 24 sessions in total. The sessions were led by one of the researchers who is also a professor of the subject "Sports physiology". The control group (CG) received the same information as the intervention group the day of the baseline measurement about the importance of exercise and number of steps per day for health.

2.5. Study Variables and Data Collection

Data collection was done through an online questionnaire using Google Form. The baseline measurement was performed in March 2025 and the second measurement one day after the 12-weeks intervention. The questionnaire included the following variables: socio-demographic variables (age, gender, marital status, educational level, having children), occupational variables (working and studying at the same time, number of hours working per week, engagement with university) and psychological variables (burnout, anxiety, stress and depression) and mean number of steps per week (using their smartphones stepcounts). The independent variable was the exercise intervention.

The validated instruments for psychological variables were Maslach Burnout Inventory-Student Survey (MBI-SS) for burnout (15-item for Emotional Exhaustion, Cynicism and Academic Efficacy) the Perceived Stress Scale (PSS) in its 10-item version for stress, Utrecht Work Engagement Scale (UWES) for assessing work engagement with the 9-item short version (UWES-9), Hospital Anxiety and Depression Scale (HADS) for measuring Anxiety and Depression with 14 items.

2.6. Blinding

The intervention was not blinded, nor for the researchers and for the participants due to its own characteristics. Data analysis was blinded for the researcher who did the data analysis in the software.

2.7. Statistical and Qualitative Data Analysis

First, a descriptive analysis with central-tendency measures (mean and standard deviation) for continuous variables and frequency analysis for categorical variables were performed.

Kolmogorov-Smirnov test was used to check normality of continuous variables. Baseline and postintervention inter-group mean difference was performed with the unpaired-sample Student's t-test for continuous variables and Chi-Square test for categorical variables.

Analyses were performed with the SPSS 28 statistical package.

2.8. Ethical Aspects

Before agreeing to participate, all participants received information about the study and that they could leave the study at any time without having to give any reason. Participation was voluntary and anonymous. The study was approved by the ethics committee of the University of Granada (4638/CEIH/2024) in November of 2024.

3. Results

3.1. Baseline Descriptive Analysis of the Sample:

132 persons were randomized and invited to participate. The final sample was n=108 nursing students with n=50 in the control group and n=58 in the intervention group (81.81% response rate). The flow diagram is shown in Figure 1.

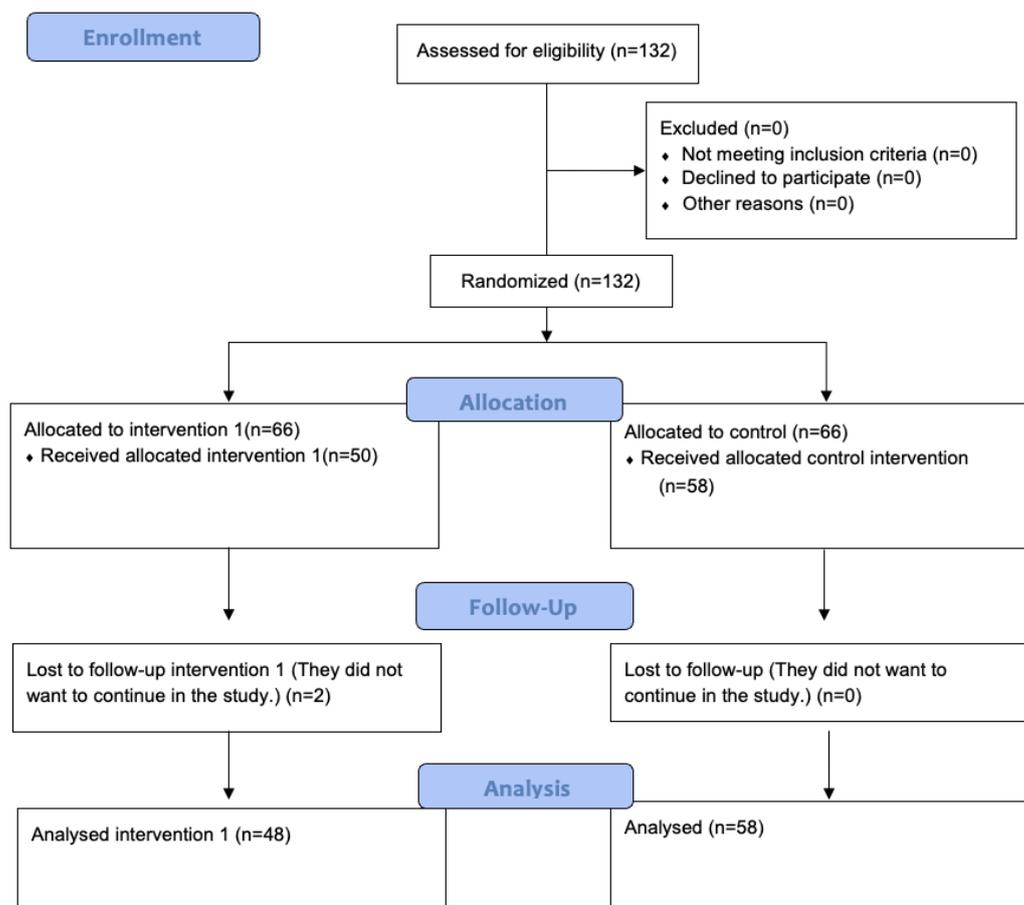


Figure 1. Flow diagram.

Most of the participants were women (79.93%), single (92.41%) and without children (96.02%). Comparing both group at baseline no differences were found between the intervention and the control group excepting the variable "marital status".

Table 1 shows the characteristics of each group at baseline and the result of the statistical test for comparison between groups.

Table 1. Baseline characteristics. n=108 (Control group (CG) n=50; Intervention group (IG)=58).

Variable	Mean (standard deviation)	t	p-value
Age	CG:22.28(7.87) IG: 21.24(1.83)	12,951	0,332
Working hours per week	CG: 3.7(12.22) IG:3.65(12.22)	0,311	0,982

Mean steps per day	CG: 7912.04(1150.88,04) IG: 8237.64(1284.77)	0,986	0,171
Emotional exhaustion	CG: 14.86(7.76) IG:12.44(7.28)	0,259	0,083
Cynicism	CG:4.06(4.13) IG: 4.55(5.08)	1,151	0,587
Academic efficacy	CG: 26.54(5.42) IG1: 23.68(9.20)	16,381	0,057
Stress	CG:18.76(6.75) IG1:18.44(7.08)	0,024	0,816
Anxiety	CG: 9.46(3.42) IG: 9.27(3.79)	0,820	0,793
Depression	CG: 12.28(1.96) IG1: 12,65(2.54)	2,401	0,063
Engagement	CG:3.96(1.18) IG1:3.50(1.54)	2,912	0,073
Categorical variables	Group	Categories %	Chi- p square
Sex	CG	Male:16% Female:84%	1.09 0,295
	IG	Male:24.4% Female:75.86%	
Marital Status	CG	Single:90% Couple:10%	96.70 <0,001
	IG	Single:94.82% Coupled:5.16%	
Children	CG	No:94%	3.57 0,167
	IG	No:98.04%	
Working and studying	CG	Yes:12%	1.46 0,227
	IG	Yes:20.64%	
Emotional exhaustion	CG	Low (50%), medium (16%) and high (34%)	2.66 0,264
	IG	low (63.64%), medium (15.48%) and high (20.64%)	
Cynicism	CG:	low (74%), medium (22%) and high (4%%)	0.448 0,799
	IG1:	low (70.52%), medium (22.36%) and high (6.88%)	

Academic efficacy	CG	high (44%), medium (34%) and low (22%)	2.76	0,252
	IG	high (43%), medium (22.36%) and low (34.4%)		
Burnout	CG	46%	3.72	0,444
	IG	37.84%		

Note: Control group =CG; Intervention group 1= IG1; Gamified intervention group 2 = IG2.

Post-Intervention Scores

During the 12 weeks intervention 2 people were lost from the initial measurement in the IG, leaving n=48. After the intervention 3 variables had significant differences between CG and IG emotional exhaustion ($p=0.028$), stress ($p=0.037$) and mean steps per day ($p<0.001$), with the mean values being lower in IG: emotional exhaustion (3.28 points) stress (2.85 points) and steps per day a week (1381 steps). The mean post-intervention values are shown in Table 2.

Table 2. Postintervention means (GC n=50; GI n=48) and comparison.

Variable	Mean (standard deviation)	<i>t</i>	<i>p-value</i>
Emotional exhaustion	GC: 17.24(7.31) GI:13.96(6.39)	2.23	0,028
Cynicism	CG:5.29(5.43) IG: 5.60(4.84)	-0.28	0,779
Professional efficiency	CG: 26.05(4.69) IG: 25.15 (6.69)	0.699	0,486
Stress	CG:20.35(7.25) IG: 17.50(5.36)	2.11	0,037
Anxiety	CG: 9.59(2.76) IG: 9.27(3.36)	0.46	0,641
Depression	CG: 11.97(2.51) IG: 11.39(2.87)	1.06	0,291
Engagement	CG: 4.04(1.04) IG: 4.06(1.13)	-0.10	0,920
Mean steps per day	CG: 8573(1337.22) IG: 9954.55(1204.85)	-5.06	<0,001

Note: Control group =CG; Intervention group (sport intervention) = IG.

4. Discussion

In response to the aim of the study, we found that a scheduled sports intervention in nature for nursing students significantly reduced academic burnout, especially levels of emotional exhaustion and stress, compared to the control group.

These data are consistent with the scientific literature on the subject, which highlights the therapeutic role of outdoor physical exercise as a modulator of psychological well-being in adolescents, university students, and healthcare professionals in general [19,20].

After 12 weeks of outdoor aerobic and strength training, there was a significant reduction in emotional exhaustion and stress levels compared to the control group. This result is consistent with the study conducted by Ricardo-Rosales et al.[21], in which university students who underwent an aerobic exercise program reduced their level of emotional exhaustion by 26.4%, while the group that

underwent an intervention based on strength training improved their emotional exhaustion to a lesser extent (19.5%).

Regarding the dimensions of burnout, for depersonalization and efficacy, no statistically significant relationship was found with physical exercise in nature. Unlike other studies, which found a significant association between student participation in a sports program based on strength exercises and improved levels of depersonalization and efficacy [21,22]. This finding could be interpreted in terms of the 12-week sports program that our students followed, which is considered insufficient in duration to influence the dimensions of burnout syndrome mentioned above [22]. Similarly, it is possible that the physical exercise performed by the students was not of the intensity required for them to experience significant changes in their mental health, sleep quality, improved engagement, or reduced physical vulnerability to stress [23].

Likewise, scientific literature has described the existence of several variables that act as mediators between physical exercise and the development of academic burnout, such as resilience and self-efficacy [21,24]. These mediators act to protect students from the psychological effects of stress experienced in the university environment [25].

Similarly, the benefits of practicing sports in nature for students' mental health, especially in terms of anxiety control, stress management, and fatigue, have been widely described in the scientific literature [26,27]. Studies describe how nursing students show greater interest in caring for their physical and mental well-being as they progress through their studies [26,28,29]. In other words, students who are closer to practicing as nurses tend to sign up for more sports activities and create healthy lifestyle habits, especially after the lockdown due to the COVID-19 pandemic [28]. These data are consistent with the results obtained in the study, showing that students in the intervention group had a significantly higher average number of steps per day than those in the control group.

4.1. Limitations of the Study and Future Research.

The main limitations of this study were the non-probabilistic sampling method, the loss of students during the intervention, and the possible influence of the proximity of the exam period on the students' responses. This could have influenced the fact that the relationship between variables did not become significant in some analyses.

4.2. Strengths of the Study.

For future research, a longitudinal study could be conducted to collect data on the students who participated in this study and analyze whether practicing outdoor sports during their formative years has had a significant influence on the development of burnout in the workplace.

5. Conclusions

After analyzing the results obtained, we can conclude that it is necessary to include a physical exercise program in nature in each year of the nursing degree program as a preventive strategy against the development of academic burnout. These organized outdoor activities appear to be effective in improving the levels of emotional fatigue and stress of nursing students, as well as increasing the average number of steps per week.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org, CONSORT checklist.

Author Contributions: Conceptualization, IPC, MJMJ, GACD and JLGU; methodology, JLGU, GACD and MJMJ; software, NSM, IPC.; validation, SGO, MDLC and NSM; formal analysis, GACD and JLGU; investigation, IPC, MDLC, JLGU, MJMJ; resources, IPC, SGO; data curation, IPC and SGO; writing—original draft preparation, IPC, MJMJ, JLGU; writing—review and editing, GACD, NSM ; visualization, SGO, JLGU; supervision, NSM, GACD; project administration, JLGU, GACD, MJMJ; funding acquisition, GACD, JLGU and MJMJ. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was approved by the ethics committee of the University of Granada (approval code: 4638/CEIH/2024; approval date: 12 November 2024).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

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Abbreviations

The following abbreviations are used in this manuscript:

CG Control group
IG Intervention group

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