Deportistas de doble carrera y estrés psicofisiológico

Dual career athletes and psycho-physiological stress

Authors

Francesca Latino [1]
Pierpaolo Limone [2]
Francesco Peluso Cassese [3]
Rosabel Martinez-Roig [4]
Giulia Amato[5]
Francesco Tafuri[6]

[1] Pegaso University (Italy)
[2] Pegaso University (Italy)
[3] Pegaso University (Italy)
[4] University of Alicante (Spain)
[5] University of Naples "Parthenope" (Italy)
[6] Niccolò Cusano University (Italy)

Corresponding author:
Francesca Latino
francesca.latino@unipegaso.it

How to cite in APA

Latino, F., Limone, P., Peluso Cassese, F., Martinez-Roig, R., Amato, G., & Tafuri, F. (2025). Dual career athletes and psycho-physiological stress. *Retos*, *63*, 693–704. https://doi.org/10.47197/retos.v63.111368

Abstract

Introduction: The high-level athletic careers frequently conclude significantly earlier than those in other fields, and at times, despite the considerable efforts exerted, they do not consistently flourish as anticipated. Consequently, numerous athletes concurrently pursue academic pathways to adequately prepare for alternative professional opportunities beyond the realm of sports. Objective: Accordingly, the objective of the current investigation was to examine the efficacy of Yoga in ameliorating the stress levels experienced by student-athletes. Methodology: A cohort of 50 dual-career athletes with ages ranging from 18 to 25 years, was selected from five universities. The participants in the experimental group participated in a Yoga regimen in addition to their standard training protocol. In contrast, the participants within the control group continued to engage in conventional sport-specific training. Preceding and after the Yoga intervention, the students underwent psycho-physiological assessments, including the State Mindfulness Scale (SMS) and vagus-mediated heart rate variability (HRV). Results: The results indicated a significant Time x Group interaction effect for both the SMS and HRV, suggesting a substantial enhancement in the treatment groups. Discussion: This study confirmed that meditative practice through Yoga can be a source of improvement of psycho-physiological parameters in the context of interventions aimed at improving the well-being of dual career students Conclusions: In conclusion, there is a need to support and increase research in this area to have new and adequate information about the reality of the Dual Career and to be able to help student-athletes to reconcile school and sports paths.

Keywords

Academic achievement; cardiac activity; sport; stress; physiology.

Resumen

Introducción: Las carreras deportivas de alto nivel suelen concluir significativamente antes que las de otros campos, y en ocasiones, a pesar de los considerables esfuerzos realizados, no florecen sistemáticamente como se esperaba. En consecuencia, numerosos atletas buscan simultáneamente trayectorias académicas para prepararse adecuadamente para oportunidades profesionales alternativas más allá del ámbito del deporte. Objetivo: En consecuencia, el objetivo de la presente investigación fue examinar la eficacia del Yoga para mejorar los niveles de estrés experimentados por los estudiantes-atletas. Metodología: Se seleccionó una cohorte de 50 atletas de doble carrera con edades comprendidas entre los 18 y los 25 años, de cinco universidades. Los participantes del grupo experimental participaron en un régimen de yoga además de su protocolo de entrenamiento estándar. Por el contrario, los participantes del grupo de control continuaron participando en el entrenamiento convencional específico del deporte. Antes y después de la intervención de Yoga, los estudiantes se sometieron a evaluaciones psicofisiológicas, incluida la Escala Estatal de Mindfulness (SMS) y la variabilidad de la frecuencia cardíaca (VFC) mediada por el vago. Resultados: Los resultados indicaron un efecto significativo de la interacción Tiempo x Grupo tanto para el SMS como para la VFC, lo que sugiere una mejora sustancial en los grupos de tratamiento. Discusión: Este estudio confirmó que la práctica meditativa a través del Yoga puede ser una fuente de mejora de los parámetros psicofisiológicos en el contexto de intervenciones dirigidas a mejorar el bienestar de los estudiantes de doble carrera Conclusiones: En conclusión, existe la necesidad de apoyar e incrementar la investigación en esta área para disponer de nueva y adecuada información sobre la realidad de la Carrera Dual y poder ayudar a los estudiantes-deportistas a conciliar los caminos escolar y deportivo.

Palabras clave

Actividad cardíaca; deporte; estrés; fisiología; rendimiento académico.

Introduction

The development of a high-level sports career requires enormous dedication, in which the athlete acquires the necessary skills and experience to be able to compete at the highest level and turn this sport into a profession (Latino et al., 2019; Stambulova et al., 2015). However, these sports careers end much earlier than others and sometimes, despite the efforts involved, they do not always take off. For this reason, some athletes also pursue an academic career to prepare for an alternative working life outside the sporting world. As a result of this combination of careers, the concept of Dual Career (DC) was born (Aidar et al., 2022; Ryba et al., 2015).

Dual *Career* is defined as "the combination of elite sports and education". At the European level, the term "dual career" has recently been introduced to identify the specific challenges that elite athletes face when combining sports practice and educational-vocational training. In particular, the term "dual career" appeared officially in the European Commission's White Paper on Sport only in 2007 (de Subijana et al., 2015; Farì et al., 2023; Cataldi et al., 2019). The Commission created the EU Guidelines on Dual Careers for Athletes in 2012. They constitute a framework of reference in this reality, which contributes to the general well-being of the athlete and to the achievement of the maximum in his sporting and academic career (Lupo et al., 2015). It can therefore be said that the reality of DC is relatively new and still needs adequate conceptualization and systematization. Furthermore, from a research point of view, it is necessary to investigate more the challenges of student-athletes when combining sport with academic/professional training. This is to outline increasingly specific and satisfactory guidelines and also to help athletes as much as possible in this path (Tessitore et al., 2021).

Precisely for this reason, several studies have focused on analyzing the specific sources of stress for student-athletes, identifying as crucial key factors: time management, fatigue due to lack of sleep, financial worries, overlaps between study program and training (Debois et al., 2015; Geraniosova, & Ronkainen, 2015; Li, & Sum, 2017). In addition, the balance of double demands can cause fatigue, decreased motivation, limited life experience outside of sports and education, increased overload, and a higher risk of injury (Guidotti et al., 2015; Tafuri et al. 2024). An additional stressor could include balancing academic deadlines with competition schedules. Therefore, interventions aimed at reducing stress, improving well-being, and coping resources can be beneficial to dual-career athletes. Stress affects the physical, mental, social, and intellectual health of student-athletes. They do not always possess the necessary stress management skills and coping strategies. Despite the experience of these many stressors, student-athletes present few, and mostly maladaptive, strategies to overcome them (Condello et al., 2019; Greco et al., 2019). In fact, many of them have chosen to accept a lower quality in academic career as a means of managing the stress of combining sports and education. This is because they report that success in one of the two activities comes at the expense of success in the other, and they often decide to sacrifice academic achievements to prioritize sporting success. Unfortunately, such sacrifice has implications for the future careers of athletes, leaving them without a clear path once their sporting career is over. This uncertainty, along with the resulting financial pressure, make student-athletes even more vulnerable to anxiety and stress (Vidal-Vilaplana et al. 2022).

The current study aims to investigate the efficacy of Yoga as an easy-to-administer and accessible relaxation method in this context. Physical activity such as yoga is a key element in health promotion. Hatha yoga practices, encompassing asanas (i.e., physical postures), pranayama (breathing exercises designed to modulate vital energies), kriya (purificatory techniques), mudras (specific hand gestures), and bandhans (neuromuscular contractions), are intended to foster a particular form of self-awareness, which consequently engenders alterations in emotional and physiological functions, thereby instigating transformations in both cognitive and bodily processes of the individual. This research is based on the integrative application of asana and pranayama methodologies to evoke a state of concurrent psycho-physiological relaxation of both the corporeal and mental domains (Wehrmann et al., 2024).

Yoga mitigates stress by attenuating sympathetic nervous system activity, and concurrently enhancing a sense of overall well-being. Yoga-centered respiratory practices are acknowledged as efficacious stress management strategies for athletes (Cadieux et al., 2022; Corvino et al., 2020). The advantageous outcomes are ascribed to the impact of controlled, deep respiration on the Autonomic Nervous System (ANS), which plays a crucial role in the adaptation to stress (Kim et al., 2018; Messina et al., 2015; Muscogiuri et al., 2016). More precisely, slow and deep breathing promotes activity within the

parasympathetic division of the ANS through the stimulation of the vagus nerve, which is subsequently manifested in Augmented Vagus-Mediated Heart Rate Variability (HRV) (Schiweck et al., 2019). Vagus-mediated heart rate variability holds significant relevance in the field of sports physiology due to its involvement in various self-regulatory processes, including anxiety and stress management (Kaur et al., 2014). In a more specific context, elevated HRV has been shown to correlate with both psychological and physiological well-being (Järvelin-Pasanen et al., 2018). This phenomenon is particularly pertinent to the dual-career athlete demographic, who may experience diminished well-being as a result of heightened demands and, as a consequence, reduced HRV.

Previous interventions of this nature have frequently employed a training regimen predicated on respiratory techniques, including biofeedback mechanisms and computerized breath assessment systems (Perciavalle et al., 2017). A limited number of studies have concentrated on exercise regimens derived from practices such as yoga, which are capable of fostering a state of concurrent psycho-physiological relaxation for both the body and mind (Latino et al., 2021). Specifically, the psychophysiological transformations that delineate the efficacy of yoga in enhancing stress management among dual-career university students have not been sufficiently explored. Consequently, the aim of the present study was to investigate the effectiveness of Yoga in improving the stress state of student-athletes.

Method

Study Design

This empirical investigation employed a two-arm randomized, parallel-group design to examine the impact of a Yoga intervention on the alleviation of stress levels among student-athletes.

The study spanned a period of 16 weeks, during which participants were randomly assigned to either the experimental group or the control group. Following this random assignment, the researchers conducted an evaluation of the initial equivalence between the groups, utilizing a double-blind methodology to guarantee that both participants and researchers remained uninformed about the allocation of groups. Over the 16-week period, members of the experimental group participated in a Yoga program alongside their standard training regimen. Conversely, participants in the control group continued with traditional sport-specific training. Throughout the 16-week duration, the experimental group engaged in the Yoga program on a biweekly basis. The investigation was carried out from January 2024 to May 2024, in compliance with the ethical guidelines delineated in the Helsinki Declaration and its subsequent amendments. The study protocol received review and approval from the Department of Medical Science, Exercise and Wellbeing – University of Naples “Parthenope” (DiSMMeB Prot. N. 88592/2024).

Participants

Fifty participants, aged between 18 and 25 years (mean age = 20.70, SD = ± 1.76), were recruited from five universities. Participation in the research study was entirely voluntary, and all dual-career students enrolled at the five selected universities were deemed eligible for involvement in this investigation. The criteria for inclusion encompassed individuals currently registered as students at one of the five designated universities, who were also members of the institutions' high-performance athlete programs, competing as dual-career athletes at either the national or international level. The exclusion criteria pertained to any health conditions that could adversely affect the functionality of the heart or lungs in daily activities.

Fifty individuals met the inclusion criteria and were subsequently invited to partake in the study. Among those recruited, all individuals consented to participate in the research study and completed the baseline survey. As a result, the final sample comprised 50 participants, including 23 females and 27 males, who successfully completed the assessments at both baseline and post-intervention stages. The participants engaged in a variety of sports, including wheelchair basketball, athletics, basketball, soccer, and tennis. The attendees received an email containing detailed information about the study two weeks prior to the commencement of the program. It is important to emphasize that participation in the research was completely voluntary, and the researchers assured the confidentiality of the participants.

Procedures

The Yoga program was conducted in a spacious University conference hall, under meticulously monitored and controlled conditions. The training sessions were predominantly organized in the afternoon (twice weekly - 60 minutes), specifically scheduled from 5 p.m. to 6 p.m., aligning with the preferences of the participants.

Prior to the initiation of the first training session, an intake assessment was conducted, during which the content of the exercise training was elucidated, and the motivation of each individual was ascertained. With respect to the intervention yoga program, each session commenced with 5 minutes dedicated to breathing exercises, followed by a guided 10-minute gentle warm-up sequence, then proceeded with 40 minutes allocated to the performance of primary exercises, and concluded with a 5-minute cool-down sequence and deep relaxation. Notably, the warm-up comprised low to moderate-intensity aerobic activities, whilst the primary exercise stage was specifically designed to attain and underscore the physical and mental benefits associated with yoga practice.

At least two days before the intervention, participants engaged in two assessments. The first assessment was focused on measuring psychological functioning, specifically utilizing the State Mindfulness Scale (SMS) to investigate the participants' perceived level of awareness. The second assessment involved a physiological test (HRV) conducted to evaluate the stress levels experienced by the dual career students. The participants completed the psychophysiological assessments immediately prior to and following the intervention, facilitating the connection of pre- and post-testing data and enabling the evaluation of the intervention program's effects. Initial and final examinations were administered at the same time of day and under consistent experimental conditions.

Due to the sensitive nature of these assessments, the respondents were made to feel comfortable to facilitate the authentic expression of their true feelings. The dual career students were assessed individually, and each task item was clarified to the participants prior to their engagement. To mitigate the reactive effect concerning personal beliefs about stress, the respondents were not informed that the SMS was correlated with stress levels, and they had not been sensitized to the overarching issue of stress. The scale was presented as a survey examining dual career-related attitudes and was not associated with stress in any capacity.

The participants wore clothing suitable for physical activity and sports footwear throughout the intervention program. The yoga program was conducted by a qualified yoga instructor, and all measurements for testing were executed by a seasoned researcher. All trials were carried out utilizing a standardized testing protocol, ensuring the maintenance of identical conditions.

Yoga training intervention

Drawing upon the psycho-physiological impacts of Yoga among University students, the empirically supported Yoga regimen proposed for this demographic encompasses the subsequent methodologies (Brems, 2015; Ganpat, Nagendra, & Selvi, 2013; Lemay, Hoolahan, & Buchanan, 2019):

Table 1. Example of a session of the Yoga program.

WARM-UP	Paschimottanasana (Seated Forward Bend Pose); Nauka Sanchalanasana (Rowing the boat); Sukhasana (easy pose); Surya Namaskar (Sun Salutation); Virabhadrasana I (Warrior Pose I); Garudasana (Eagle Pose)
CORE	– Beginning Prayer – Kapalbhati Kriya (frontal cleansing of the brain), Agnisar Kriya (activation of the digestive fire) – Breathing with hands in and out, breathing with hand stretching, breathing with ankle stretch – Jogging, forward and backward flexion, lateral flexion, twisting – Surya namaskara (sun practice greetings) – Tadasan (Palm Tree Pose), Vrikshasana (Tree Pose), Padahastasan (Hands to Feet Pose), Ardha Chakrasana (Half Wheel Pose), Bhujangasana (Cobra Pose), Shalabhasana (Locust Pose) – Rapid relaxation technique – Nadi Shuddhi Pranayama (purification of the psychic network), Sheetali Pranayama (refreshing breath), Seetkari Pranayama (wheezing), Bhramari Pranayama (breath of the buzzing bee) – Om Meditation – Closing prayer.
COOL-DOWN	Warrior Pose, Side Angle Variation, Low Lunge, Calf Stretch, Downward Dog, Toe Touch Stretch, Quadriceps Stretch, Standing Full Body Stretch, Downward Dog, Modified Pigeon, Leg Pull, Cobra Stretch, Child's Pose.

Measures

Hearth Rate Variability

Heart rate variability (HRV) serves as an important quantitative measure of the temporal fluctuations between consecutive heartbeats, commonly referred to as R-R intervals (Kiran kumar et al., 2021). HRV constitutes a significant biomarker that exhibits sensitivity to the operational levels of both physiological and psychological systems (Yoo et al., 2021). A consistently elevated HRV indicates the adaptability of the autonomic nervous system (ANS) to various stressors, correlating with optimal health and enhanced executive functioning capabilities. Conversely, diminished HRV is unfavorable, as it denotes compromised ANS adaptability and has been linked to experiences of fatigue, stress, and overtraining (Tripska et al., 2022).

For the purposes of this investigation, HRV was evaluated utilizing the Polar H10 chest strap, chosen for its practicality and accessibility. This device presents a distinct advantage for deployment in field settings where conventional ECG devices may prove unsuitable (Schaffarczyk et al., 2022). Gilgen-Ammann et al. (2019) substantiate its efficacy both at rest and during physical exertion. The researchers conducted a comparative analysis of the Polar H10 against a three-lead ECG Holter monitor, revealing an average discrepancy of 0.23 ± 26.8 ms in R-R intervals. Notably, the Polar H10 demonstrated excellent signal quality in 99.6% of its data, coupled with a high correlation ($r = 0.997$) between the two measurement methodologies. Furthermore, statistical analysis indicated no significant differences between the two systems ($p = 0.208$). The signal quality assessment of the R-R interval was predicated on the frequency of missing R-R intervals and detection inaccuracies. During low to moderate intensity activities, the Polar H10 exhibited signal quality comparable to that of the Holter, whereas, during high-intensity activities, the Polar H10 outperformed the Holter by detecting merely 74 errors in the R-R range (99.4% signal quality) in contrast to 1332 errors noted in the Holter R-R range (89.9% signal quality). The authors ultimately posit that the Polar H10 may be advocated as the benchmark for R-R range evaluations within sports contexts.

State Mindfulness Scale (SMS)

The State Mindfulness Scale constitutes a rigorously validated instrument designed to quantify the construct of state mindfulness, thereby facilitating the examination of participants' perceived levels of awareness and attentiveness to their immediate experiences within a designated temporal framework (in the current study, we utilized the duration of the intervention as a temporal reference) and contextual parameters (in this instance, mindfulness as it relates to yoga practice and meditation) (Tanay & Bernstein, 2013). The extant literature delineates a correlation between mindfulness and diminished levels of stress (Clarke, 2022; Roeser et al., 2013; Tran et al., 2024).

The scale comprises a total of 21 items which are systematically categorized into two distinct subscales: the state mindfulness pertaining to bodily sensations (6 items) and the state mindfulness associated with cognitive events (15 items). The response format utilized was a five-point Likert scale, which ranged from 1 (not at all) to 5 (very well), reflecting the extent to which the statements accurately represented the participants' experiences.

An increase in the respondents' state of mindfulness would indicate a heightened and more pleasurable awareness of both their bodily and cognitive states. The duration for testing was established to be between 10 to 15 minutes, encompassing both instructional and practice phases. The assessment protocol was implemented prior to the initiation of the observational phase and subsequently at the conclusion of the intervention, with the aim of evaluating any alterations in the state of mindfulness.

Statistical Analysis

Statistical evaluations were performed employing IBM SPSS software version 25.0 (IBM, Armonk, NY, USA). The dataset was represented as group mean (M) values alongside standard deviations (SD), and was scrutinized for adherence to the assumptions of normality, particularly through the application of the Shapiro-Wilk test, as well as for homogeneity of variances, which was assessed using the Levene test, within the data distributions. An independent sample t-test was implemented to examine group differences at baseline, whereas a two-way ANOVA (group (experimental/control) × time (pre/post-intervention)), with repeated measures on the temporal dimension, was conducted to investigate the effects of the intervention on all dependent variables. In instances where the interactions of 'Group x

Time' reached statistical significance, subsequent pairwise comparisons were performed utilizing group-specific post hoc tests, specifically paired t-tests. The magnitude of the significant 'Time x Group' interaction was quantified through partial eta squared (η2p), and was evaluated against the predefined thresholds: small (η2p < 0.06), medium (0.06 ≤ η2p < 0.14), and large (η2p ≥ 0.14). Effect sizes for the comparisons were assessed using Cohen's d, with values categorized as small (0.20 ≤ d < 0.50), moderate (0.50 ≤ d < 0.79), and large (d ≥ 0.80) in accordance with Cohen (1992). The threshold for statistical significance was established at p < 0.05.

Results

Baseline characteristics were well balanced between the participants, with no significant differences regarding age, anthropometric characteristics, and psychological evaluations (p > 0.05). The results obtained prior to and subsequent to the intervention for all pertinent variables are illustrated in Table 1. It shows changes in HRV and emotional well-being and state mindfulness after 16-weeks of Yoga training (values are presented as mean ± SD).

Table 1. Changes in emotional well-being and state mindfulness after 16-weeks of Yoga training.

	Experimental Group (n = 25)			Control Group (n = 25)		
	Baseline	Post-test	Δ	Baseline	Post-test	Δ
HRV						
HR	73.64 (9.58)	62.08 (1.84)†*	-11.6 (10.86)	76.16 (11.29)	79.76 (8.84)	3.60 (5.19)
R-R	681.04 (23.40)	984.91 (103.33)†*	303.87 (106.18)	696.40 (53.19)	656.62 (82.18)	-39.77 (83.72)
SMS						
SM of bodily sensations	5.74 (2.08)	14.76 (3.53)†*	9.01 (4.28)	6.26 (2.13)	5.34 (2.46)	-0.92 (1.99)
SM of mental events	14.83 (1.85)	29.60 (1.89)†*	14.76 (0.84)	16.51 (3.96)	15.67 (3.51)	-0.84 (1.67)

Note: values are presented as mean (± SD); Δ: pre- to post-training changes; †Significant 'Group x Time' interaction: significant effect of the intervention ($p < 0.001$). *Significantly different from pre-test ($p < 0.001$).

Hearth Rate Variability (HRV)

The HRV was calculated from the heart rate (HR) and the temporal fluctuations between consecutive heartbeats (commonly referred to as R-R intervals), Since the average heart rate reflects the balance of autonomic nervous function. Using a two-factor repeated measures ANOVA we found a significant 'Time x Group' interaction was also found for *HR* ($F_{1,48}$= 39.60, $p < 0.001$, $\eta^2_p = 0.85$, large effect size) and *R-R* ($F_{1,48} = 161.45$, $p < 0.001$, $\eta^2_p = 0.87$, large effect size). Moreover, post hoc analysis revealed that the experimental group made significant improvements in both HR ($t = -5.31$, $p < 0.001$, $d = 1.06$, large effect size) and R-R ($t = 14.30$, $p < 0.001$, $d = 2.86$, large effect size). No significant changes were found for the control group (p > 0.05).

State Mindfulness Scale (SMS)

Regarding the perceived level of stress, it was calculated through the SMS scale, since mindfulness correlates strongly with lower perceived stress. Using a two-factor repeated measures ANOVA a significant 'Time x Group' interaction was also found for *SMS of Bodily Sensations* ($F_{1,48}$= 110.38, $p < 0.001$, $\eta^2_p = 0.89$, large effect size) and *SMS of Mental Events* ($F_{1438} = 1730.70$, $p < 0.001$, $\eta^2_p = 0.97$, large effect size). Moreover, post hoc analysis revealed that the experimental group made significant improvements in both Bodily Sensations ($t = 10.51$, $p < 0.001$, $d = 2.10$, large effect size) and Mental Events ($t = 87.49$, $p < 0.001$, $d = 1.49$, large effect size). No significant changes were found for the control group (p > 0.05).

Discussion

The aim of this research was to evaluate the impact of Yoga training on stress level of dual career athletes. In the framework of this analysis, the findings indicate that Yoga has the potential to be a non-pharmacological method of self-empowerment to improve stress management and well-being in dual-career college students.

A primary finding of the present investigation was the significant improvement in physiological parameters related to cardiac activity in terms of cardiac variability (HRV) and its components such as heart rate, and R-R interval. This is plausibly a symptom of the fact that following the physical and mental relaxation induced by Yoga training, students were able to perceive less stress. In fact, HRV is an indicator of the activity of the sympathetic and parasympathetic nervous systems (Bernston et al., 1997; Shaffer et al., 2014; Thayer et al., 2009). Several studies have verified an increase in HRV index activity following meditation training (Ditto et al., 2006; Tang et al., 2009). This same increase could also occur in long-term meditation studies (Delgado-Pastor et al., 2013; Krygier et al., 2013). Increased HRV following meditation intervention appears to be associated with parasympathetic activity of the nervous system. This increase in parasympathetic activity seems to be caused in turn by the modification in the subject's breathing, which is closely related to the activity of the vagus nerve, which occurs during meditation (Shaffer et al., 2014; Grossman et al., 2007; Malik et al., 1996). In a study by Mankus et al. (2013) the authors report an association between the level of mindfulness and HRV in people who have a high stress and anxiety disorder. Consequently, it emerged that stress and anxiety disorder is a moderator of the relationship between mindfulness and HRV. This finding underscores the importance of implementing the study of cardiac variability also in meditation studies investigating mental well-being. In a recent study, the impact of meditation on the ability to reduce stress and lead to improved sleep quality was evaluated (Kirk & Axelsen, 2020). This study is a randomized controlled trial involving ten days of online meditation. The experimental design involved the presence of three groups, a first group of subjects undergoing treatment, who participated in a ten-day mindfulness training, a second active control group, who were made to listen to music for ten days and a final passive control group. The results show an increase in HRV both in the acute phase, i.e. during the days of meditative practice, both in the treated group and in the active control group. In addition, it was observed in the study that the same intervention leads to a reduction in stress. Finally, in the study, the increase in HRV was also demonstrated in the chronic phase, which also led to an improvement in sleep quality, especially in the treated group. Pranayama training has been reported to decrease sympathetic activity, resulting in mental relaxation and decreased self-arousal (Nakayama et al., 2024). In a study aimed at investigating the effect of integrated yoga on autonomic parameters and psychological well-being during the pre- and post-menstrual phases in healthy young control women, it was observed that there was a significant alteration of autonomic functions and psychological status in the premenstrual phase compared to the post-menstrual phase in healthy young women. In addition, it has been revealed that regular yoga practice has beneficial effects on both phases of the menstrual cycle by bringing parasympathetic dominance and psychological well-being, probably balancing the neuro-endocrine axis (Kanchibhotla et al., 2023).

The results of this work show that following the Yoga intervention there was an increase in *mindfulness* in the subjects belonging to the experimental group, measured through the SMS questionnaire. This is in agreement with previous studies which observed that yoga practice was effective in leading to dispositions of physical relaxation, mental quiet, ease/peace, rest, awareness and joy, reduction of sleepiness, reduction of somatic stress and negative emotions (Akdeniz, & Kaştan, 2023; Latino et al., 2023; Farì, et al., 2021; Sharma, & Sharma, 2024; Smith, 2021). This supports the initial hypothesis that yogic practices play an important role in improving perceived stress and, consequently, emotional sensitivity, sustained attention, and mental performance, among dual career students, thus paving the way for their academic and professional excellence (Latino et al., 2023, 2021; La Torre et al., 2023; Thomas, & Centeio, 2020).

Previous research has elucidated that engagement in yoga practices, encompassing meditation, asana, and pranayama, yields a sensation of well-being, facilitates a decrease in body mass, enhances vital capacity, accelerates endocrine activities, and contributes positively to cognitive memory (Qi et al., 2020). Udupa et al. (2022) have indicated that yoga possesses the capacity to modulate stress-related

disorders, thereby assisting individuals in attaining both physical and metabolic equilibrium. Sahasi (2015) substantiated the efficacy of yoga methodologies in the management of anxiety, further reporting an enhancement in attention and concentration. In a particular investigation, a four-week yoga intervention was identified as effective in diminishing aggressive behaviors among students. Another research effort indicated that meditation mitigates issues associated with maladaptive behaviors, promotes emotional and physical health alongside psychological well-being, decreases the prevalence of intrusive thoughts, reduces substance dependence, and broadly enhances overall quality of life. Investigations conducted by the Mind/Body Institute at Harvard Medical School, alongside Bhargav and colleagues (2022) at the University of Kentucky in Lexington, have revealed a beneficial impact of meditation on cerebral function and performance.

Notwithstanding the valuable insights regarding the substantial association among stress, burnout symptoms, Yoga, and Meditation, certain limitations were evident within the scope of this investigation. The primary limitation pertained to the modest sample size (N=50), which was a consequence of the challenges encountered in recruiting sufficiently motivated dual career students for participation. Furthermore, the sample was exclusively drawn from a demographic of students enrolled in local public universities situated within a single geographic region. Consequently, the findings may lack generalizability to students attending other institutions or those belonging to different demographic groups. A secondary limitation was associated with the omission of an assessment of the long-term impacts of Yoga on well-being and resilience in the face of stress. Subsequent research endeavors would be imperative to explore these dimensions in order to elucidate these variables. Nevertheless, the findings yielded could furnish significant insights for forthcoming studies. Indeed, the merits of this research were underscored by the transformative potential that this straightforward, yet effective intervention offers for safeguarding the well-being of the educational workforce. Therefore, Educational Institutions should recognize the significance of this advantageous approach, acknowledging that the practice of Yoga may constitute an efficacious strategy for promoting health among dual career students.

Conclusions

This study confirmed that meditative practice through Yoga can be a source of improvement of psycho-physiological parameters in the context of interventions aimed at improving the well-being of dual career students. In conclusion, there is an increasing need to support and increase research in this area in order to have new and adequate information about this reality of the Dual Career and to be able to help student-athletes to reconcile school and sports paths, overcoming the critical issues that can be encountered both psychologically and physically. This study has the potential to pave the way for future research with the aim of investigating the effects of meditation on our minds and bodies. Future investigations ought to aim to reproduce a comparable intervention within athletic cohorts on a broader scale to ascertain the long-term effects of Yoga.

Author Contributions

Conceptualization F.L.; methodology, F.L. and F.T.; software, F.L. and F.T; validation, F.L.; formal analysis, F.L.; investigation, F.L.; resources, P.L. and F.P.C.; data curation, F.L. and R.M.R.; Bibliographical research, G.A.; writing—original draft preparation, F.L.; writing—review and editing, F.L.; supervision, P.L. and F.P.C.; funding acquisition, F.T. All authors have read and agreed to the published version of the manuscript.

Financing

This research received no external funding.

References

Aidar, F. J., Cataldi, S., Badicu, G., Silva, A. F., Clemente, F. M., Latino, F., Greco, G., & Fischetti, F. (2022). Paralympic powerlifting as a sustainable way to improve strength in athletes with spinal cord Injury and other disabilities. *Sustainability*, *14*(4), 2017. https://doi.org/10.3390/su14042017

Akdeniz, Ş., & Kaştan, Ö. (2023). Perceived benefit of yoga among adults who have practiced yoga for a long time: a qualitative study. *BioPsychoSocial Medicine*, *17*(1), 19. https://doi.org/10.1186/s13030-023-00276-3

Bernston, G.G., Bigger, J.T., Eckberg, D.L., Grossman, P., Kaufmann, P.G., Malik, M., Nagaraja, H.N., Porges, S.W., Saul, J.P., Stone, P.H. & Van Der Molen, M.W. (1997). Heart rate variability: origins, methods, and interpretive caveats. *Psychophysiology*; 34:623–48. https://doi.org/10. 1111/j.1469-8986.1997.tb02140.x

Bhargav, H., Holla, B., Ramakrishna, K. K., Shivakumar, V., Gokulakrishnan, K., Varambally, S., & Gangadhar, B. N. (2022). Yoga and integrative healthcare: Lessons from the national institute of mental health and neurosciences (NIMHANS) in India. *International Journal of Yoga*, *15*(2), 150-157. https://doi.org/10.4103/ijoy.ijoy_56_22

Brems, C. (2015). A yoga stress reduction intervention for university faculty, staff, and graduate students. *International Journal of Yoga Therapy*, *25*(1), 61-77. https://doi.org/10.17761/1531-2054-25.1.61

Cadieux, E. G., Richard, V., & Dupuis, G. (2022). Effects of Bali yoga program for athletes (BYP-A) on psychological state related to performance of circus artists. *International Journal of Yogic, Human Movement and Sports Sciences, 7(1): 23-33*. https://doi.org/10.22271/yogic.2022.v7.i1a.1249

Cataldi, S., Latino, F., Greco, G., & Fischetti, F. (2019). Multilateral training improves physical fitness and fatigue perception in cancer patients. *Journal of Human Sport and Exercise*, *14(4proc), S910-S920.* https://doi.org/10.14198/jhse.2019.14.Proc4.54

Clarke, B. J. (2022). *The role of mindfulness in addressing counseling students' self-efficacy and stress* (Doctoral dissertation, The University of Arizona ProQuest Dissertations & Theses, 2022. 28774491).

Condello, G., Capranica, L., Doupona, M., Varga, K., & Burk, V. (2019). Dual-career through the elite university student-athletes' lenses: The international FISU-EAS survey. *PloS one*, *14*(10), e0223278. https://doi.org/10.1371/journal.pone.0223278

Corvino, A., Pignata, S., Campanino, M. R., Corvino, F., Giurazza, F., Tafuri, D., Pinto, F., & Catalano, O. (2020). Thyroglossal duct cysts and site-specific differential diagnoses: imaging findings with emphasis on ultrasound assessment. *Journal of Ultrasound*, *23*, 139-149. https://doi.org/10.1007/s40477-020-00433-2

de Subijana, C. L., Barriopedro, M., & Conde, E. (2015). Supporting dual career in Spain: Elite athletes' barriers to study. *Psychology of Sport and Exercise*, *21*, 57-64. https://doi.org/10.1016/j.psychsport.2015.04.012

Debois, N., Ledon, A., & Wylleman, P. (2015). A lifespan perspective on the dual career of elite male athletes. *Psychology of Sport and Exercise*, *21*, 15-26. https://doi.org/10.1016/j.psychsport.2014.07.011

Delgado-Pastor, L.C., Perakakis, P., Subramanya, P., Telles S., & Vila, J. (2013). Mindfulness (vipassana) meditation: Effects on P3b event-related potential and heart rate variability. *International Journal of Psychophysiol- ogy*., 90(2):207–14. https://doi.org/10.1016/j.ijpsycho.2013.07.006

Ditto, B., Eclache, M., & Goldman, N. (2006). Short-term autonomic and cardiovascular effects of mindfulness body scan meditation. *Annals of Behavioral Medicine*; 32(3):227–34. https://doi.org/10.1207/s15324796abm3203_9

Farì, G., Di Paolo, S., Ungaro, D., Luperto, G., Farì, E., & Latino, F. (2021). The impact of COVID-19 on sport and daily activities in an Italian cohort of football school children. *International Journal of Athletic Therapy and Training*, *26*(5), 274-278. https://doi.org/10.1123/ijatt.2020-0066

Farì, G., Latino, F., Tafuri, F., Dell'Anna, L., Raele, M. V., Fai, A., De Serio, C., Intonti, G., De Salvo, A. L., Ricci, V., Saraiello, E., Bonavolontà, V., Bernetti, A., Fiore, S., Megna, M., & Ranieri, M. (2023). Shoulder Pain Biomechanics, Rehabilitation and Prevention in Wheelchair Basketball Players: A Narrative Review. *Biomechanics*, *3*(3), 362-376. https://doi.org/10.3390/biomechanics3030030

Ganpat, T. S., Nagendra, H. R., & Selvi, V. (2013). Efficacy of yoga for mental performance in university students. *Indian journal of psychiatry*, *55*(4), 349-352. https://doi.org/10.4103/0019-5545.120550

Geraniosova, K., & Ronkainen, N. (2015). The experience of dual career through Slovak athletes' eyes. *Physical Culture and Sport. Studies and Research*, *66*(1), 53-64. https://doi.org/10.1515/pcssr -2015-0005

Gilgen-Ammann R, Schweizer T, & Wyss T. (2019). RR interval signal quality of a heart rate monitor and an ECG Holter at rest and during exercise. *European Journal of Applied Physiology*; 119(7): 1525–1532. https://doi.org/10.1007/s00421-019-04142-5

Greco, G., Fischetti, F., Cataldi, S., & Latino, F. (2019). Effects of Shotokan Karate on resilience to bullying in adolescents. *Journal of Human Sport and Exercise*, 14(Proc. 4), S890-S899. https://doi.org/10.14198/jhse.2019.14.Proc4.52

Grossman, P., & Taylor, E.W. (2007). Toward understanding respiratory sinus arrhythmia: relations to cardiac vagal tone, evolution and biobehavioral functions. *Biol Psychol*.; 74(2):236–85. https://doi.org/10.1016/j. biopsycho.2005.11.014

Guidotti, F., Cortis, C., & Capranica, L. (2015). Dual career of European student athletes: a systematic literature review. *Kinesiologia Slovenica*, *21*(3).

Järvelin-Pasanen, S., Sinikallio, S., & Tarvainen, M. P. (2018). Heart rate variability and occupational stress—systematic review. *Industrial health*, *56*(6), 500-511. https://doi.org/10.2486/indhealth.2017-0190

Kanchibhotla, D., Subramanian, S., & Singh, D. (2023). Management of dysmenorrhea through yoga: A narrative review. *Frontiers in Pain Research*, *4*, 1107669. https://doi.org/10.3389/fpain.2023.1107669

Kaur, B., Durek, J. J., O'Kane, B. L., Tran, N., Moses, S., Luthra, M., & Ikonomidou, V. N. (2014, May). Heart rate variability (HRV): an indicator of stress. *SPIE,* Proceedings Volume 9118, Independent Component Analyses, Compressive Sampling, Wavelets, Neural Net, Biosystems, and Nanoengineering XII; 91180V. https://doi.org/10.1117/12.2051148

Kim, H. G., Cheon, E. J., Bai, D. S., Lee, Y. H., & Koo, B. H. (2018). Stress and heart rate variability: a meta-analysis and review of the literature. *Psychiatry investigation*, *15*(3), 235. https://doi.org/10.30773/pi.2017.08.17.

Kiran Kumar, C., Manaswini, M., Maruthy, K. N., Siva Kumar, A. V., & Mahesh Kumar, K. (2021). Association of heart rate variability measured by RR interval from ECG and pulse to pulse interval from photoplethysmography. *Clinical Epidemiology and Global Health*, 10, 100698. https://doi.org/10.1016/j.cegh.2021.100698

Kirk, U., & Axelsen, J.L. (2020) Heart rate variability is enhanced during mindfulness practice: A randomized controlled trial involving a 10-day online-based mindfulness intervention. *Plos One* 15(12): e0243488. https://doi.org/10.1371/journal. pone.0243488

Krygier, J.R., Heathers, J.A., Shahrestani, S., Abbott, M., Gross, J.J., Kemp, A.H. (2013). Mindfulness meditation, well- being, and heart rate variability: A preliminary investigation into the impact of intensive Vipassana meditation. *International Journal of Psychophysiology.* 89(3):305–13. https://doi.org/10.1016/j.ijpsycho.2013.06.017

Latino, F., & Tafuri, F. (2024). Physical Activity and Cognitive Functioning. *Medicina*, *60*(2), 216. https://doi.org/10.3390/medicina60020216

Latino, F., Cataldi, S., & Fischetti, F. (2021). Effects of a coordinative ability training program on adolescents' cognitive functioning. *Frontiers in Psychology*, *12*, 620440. https://doi.org/10.3389/fpsyg.2021.620440

Latino, F., Saraiello, E., & Tafuri, F. (2023). Outdoor Physical Activity: A Training Method for Learning in an Experiential and Innovative Way. *Journal of Physical Education and Sport*, *23*(7), 1852-1860. https://doi.org/10.7752/jpes.2023.07225

Latino, F., Tafuri, F., Saraiello, E., & Tafuri, D. (2023). Classroom-Based Physical Activity as a Means to Improve Self-Efficacy and Academic Achievement among Normal-Weight and Overweight Youth. *Nutrients*, *15*(9), 2061. https://doi.org/10.3390/nu15092061

Latino, F., Greco, G., Fischetti, F., & Cataldi, S. (2019). Multilateral training improves body image perception in female adolescents. Journal of Human Sport and Exercise, 14(4proc), S927-S936. https://doi.org/10.14198/jhse.2019.14.Proc4.55

Latino, F., Fischetti, F., Cataldi, S., Monacis, D., & Colella, D. (2021). The Impact of an 8-Weeks At-Home Physical Activity Plan on Academic Achievement at the Time of COVID-19 Lock-Down in Italian School. *Sustainability*, *13*(11), 5812. https://doi.org/10.3390/su13115812

La Torre, M. E., Monda, A., Messina, A., de Stefano, M. I., Monda, V., Moscatelli, F., Tafuri, F., Saraiello, E., Latino, F., Monda, M., Messina, G., Polito, R., & Tafuri, D. (2023). The Potential Role of Nutrition in Overtraining Syndrome: A Narrative Review. *Nutrients*, *15*(23), 4916. https://doi.org/10.3390/nu15234916

Lemay, V., Hoolahan, J., & Buchanan, A. (2019). Impact of a yoga and meditation intervention on students' stress and anxiety levels. *American journal of pharmaceutical education*, *83*(5), 7001. https://doi.org/https://doi.org/10.5688/ajpe7001

Li, M., & Sum, R. K. W. (2017). A meta-synthesis of elite athletes' experiences in dual career development. *Asia Pacific Journal of Sport and Social Science*, *6*(2), 99-117. https://doi.org/10.1080/21640599.2017.1317481

Lupo, C., Guidotti, F., Goncalves, C. E., Moreira, L., Doupona Topic, M., Bellardini, H., Tonkonogi, M., Colin, A., & Capranica, L. (2015). Motivation towards dual career of European student-athletes. *European journal of sport science*, *15*(2), 151-160. https://doi.org/10.1080/17461391.2014.940557

Malik, M., Bigger, J. T., Camm, A. J., Kleiger, R. E., Malliani, A., Moss, A. J., & Schwartz, P. J. (1996). Heart rate variability: Standards of measurement, physiological interpretation, and clinical use. *European heart journal, 17*(3), 354-381. https://dx.doi.org/10.1161/01.CIR.93.5.1043

Mankus, A.M., Aldao. A., Kerns. C., Mayville. E.W., Douglas. S., Mennin, D.S. (2013). Mindfulness and heart rate variability in individuals with high and low generalized anxiety symptoms, *Behaviour Research and Therapy,* 51(7):386-391. https://doi.org/10.1016/j.brat.2013.03.005.

Messina, G., Valenzano, A., Moscatelli, F., Triggiani, A. I., & Capranica, L. (2015). Effects of emotional stress on neuroendocrine and autonomic functions in skydiving. *J Psychiatry*, *18*(280), 2. https://doi.org/10.4172/2378-5756.100028

Muscogiuri, G., Palomba, S., Caggiano, M., Tafuri, D., Colao, A., & Orio, F. (2016). Low 25 (OH) vitamin D levels are associated with autoimmune thyroid disease in polycystic ovary syndrome. *Endocrine*, *53*, 538-542. https://doi.org/10.1007/s12020-015-0745-0

Nakayama, N., Kono, A., Moriwaki, Y., Niihara, M., Aizawa, R., Ookabe, S., Sota R.N., M.N.; Kita, Etsuko RN, MN; & Kaneko, H. (2024). Improved Sympathetic Activity with Short-Term Effects of Yoga in Young Adults. *Holistic Nursing Practice*, 10-1097. https://doi.org/10.1097/HNP.0000000000000675

Perciavalle, V., Blandini, M., Fecarotta, P., Buscemi, A., Di Corrado, D., Bertolo, L., ... & Coco, M. (2017). The role of deep breathing on stress. *Neurological Sciences*, *38*(3), 451-458. https://doi.org/10.1007/s10072-016-2790-8

Qi, X., Tong, J., Chen, S., He, Z., & Zhu, X. (2020). Comparing the psychological effects of meditation-and breathing-focused yoga practice in undergraduate students. *Frontiers in Psychology*, *11*, 560152. https://doi.org/10.3389/fpsyg.2020.560152

Raiola, G., Lipoma, M., & Tafuri, D. (2015). Postural control in young soccer players: differences between the cognitive approach and ecological-dynamic one. *Journal of Human Sport and Exercise*, proc2021. https://doi.org/10.14198/jhse.2015.10.Proc1.29

Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R., ... & Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology*, *105*(3), 787. https://doi.org/10.1037/a0032093

Ryba, T. V., Stambulova, N. B., Ronkainen, N. J., Bundgaard, J., & Selänne, H. (2015). Dual career pathways of transnational athletes. *Psychology of Sport and Exercise*, *21*, 125-134. https://doi.org/10.1016/j.psychsport.2014.06.002

Sahasi, G. (1984). A replicated study on the effects of yoga on cognitive functions. *Indian Psychological Review, 27*(1-4), 33–35.

Schaffarczyk, M., Rogers, B., Reer, R., & Gronwald, T. (2022). Validity of the Polar H10 Sensor for Heart Rate Variability Analysis during Resting State and Incremental Exercise in Recreational Men and Women. *Sensors*, *22*(17), 6536. https://doi.org/10.3390/s22176536

Schiweck, C., Piette, D., Berckmans, D., Claes, S., & Vrieze, E. (2019). Heart rate and high frequency heart rate variability during stress as biomarker for clinical depression. A systematic review. *Psychological medicine*, *49*(2), 200-211. https://doi.org/10.1017/S0033291718001988

Shaffer, F. & Ginsberg, J. P. (2017). An overview of heart rate variability metrics and norms. *Frontiers in public health, 258*. https://doi.org/10.3389/fpubh.2017.00258

Sharma, D., & Sharma, B. R. (2024). The Impact of Yoga and Meditation on Mental and Physical Well-being. *Journal of Ayurveda and Integrated Medical Sciences*, *9*(5), 144-153. https://doi.org/10.21760/jaims.9.5.23

Smith, J. C. (2021). The psychology of relaxation, meditation, and mindfulness. In Leher, P.M, & Woofolk, R.L. (Eds) *Principles and Practice of Stress Management*, p. *39-57*.

Stambulova, N. B., Engström, C., Franck, A., Linnér, L., & Lindahl, K. (2015). Searching for an optimal balance: Dual career experiences of Swedish adolescent athletes. *Psychology of Sport and Exercise*, *21*, 4-14. https://doi.org/10.1016/j.psychsport.2014.08.009

Tafuri, F., Martinez-Roig, R., Susanto, N., Setyawan, H., & Latino, F. (2024). Physically Active Lifestyles within the School context: Morpho-Physiological and Functional Aspects. Retos, *58*, 48-60. https://doi.org/10.47197/retos.v58.106154

Tanay, G., & Bernstein, A. (2013). State Mindfulness Scale (SMS): development and initial validation. *Psychological assessment*, *25*(4), 1286. https://doi.org/10.1037/a0034044

Tang, Y. Y., Ma, Y., Fan, Y., Feng, H., Wang, J., Feng, S., Lu, Q., Hu, B., Lin, Y., Li, J., Zhang, Y., Wang, Y., Zhou, L., & Fan, M. (2009). Central and autonomic nervous system interaction is altered by short-term meditation. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(22), 8865–8870. https://doi.org/10.1073/pnas.0904031106

Tessitore, A., Capranica, L., Pesce, C., De Bois, N., Gjaka, M., Warrington, G., ... & Doupona, M. (2021). Parents about parenting dual career athletes: A systematic literature review. *Psychology of sport and exercise*, *53*, 101833. https://doi.org/10.1016/j.psychsport.2020.101833

Thayer, J.F., Lane, R.D. (2009). Claude Bernard and the heart-brain connection: further elaboration of a model of neurovisceral integration. Neuroscience and Biobehavioural Review; 33(2):81–8. https://doi.org/10.1016/j. neubiorev.2008.08.004

Thomas, E. M., & Centeio, E. E. (2020). The benefits of yoga in the classroom: A mixed-methods approach to the effects of poses and breathing and relaxation techniques. *International journal of yoga*, *13*(3), 250-254. https://doi.org/10.4103/ijoy.IJOY_76_19

Tran, M. A. Q., Vo-Thanh, T., Soliman, M., Ha, A. T., & Van Pham, M. (2024). Could mindfulness diminish mental health disorders? The serial mediating role of self-compassion and psychological well-being. *Current Psychology*, *43*(15), 13909-13922. https://doi.org/10.1007/s12144-022-03421-3

Tripska, K., Draessler, J., & Pokladnikova, J. (2022). Heart rate variability, perceived stress and willingness to seek counselling in undergraduate students. *Journal of Psychosomatic Research*, *160*, 110972. https://doi.org/10.1016/j.jpsychores.2022.110972

Udupa, K., Bhavanani, A. B., & Ramanathan, M. (2022). Stress and the Autonomic Nervous System: Implication of Yoga. In Basu-Ray, I., & Mehta D. (Edts)*The principles and practice of Yoga in cardiovascular medicine* (pp. 105-115). Singapore: Springer Nature Singapore.

Vidal-Vilaplana, A., Valantine, I., Staskeviciute-Butiene, I., González-Serrano, M. H., Capranica, L., & Calabuig, F. (2022). Combining sport and academic career: Exploring the current state of student-athletes' dual career research field. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *31*, 100399. https://doi.org/10.1016/j.jhlste.2022.100399

Wehrmann, R., Dietrich, K. M., & Nguyen-Feng, V. N. (2024). Yoga and Mindfulness Training for Professional Baseball Players: A Narrative Study on Perspectives and Practices. *International Journal of Yoga Therapy*, *34*(2024). https://doi.org/10.17761/2024-D-23-00076

Yoo, H. H., Yune, S. J., Im, S. J., Kam, B. S., & Lee, S. Y. (2021). Heart rate variability-measured stress and academic achievement in medical students. *Medical Principles and Practice*, *30*(2), 193-200. https://doi.org/10.1159/000513781

Authors' and translators' details:

Francesca Latino	francesca.latino@unipegaso.it	Author
Pierpaolo Limone	pierpaolo.limone@unipegaso.it	Author
Francesco Peluso Cassese	francesco.pelusocassese@unipegaso.it	Author
Rosabel Martinez Roig	rosabel.martinez@ua.es	Author
Giulia Amato	giulia.amato@uniparthenope.it	Author
Francesco Tafuri	francesco.tafuri@unicusano.it	Author
Bronwen Hughes	bronwen.hughes@uniparthenope.it	Translator