

Evolution of wellness markers and quality of life during the first two years of a pediatric residency

Evolución de marcadores de bienestar y calidad de vida en los dos primeros años de una residencia de pediatría

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What do we know about the subject matter of this study?

Burnout is highly prevalent among medical residents and is associated with a higher number of incidents related to patient safety and with depression, anxiety, and suicide among residents.

What does this study contribute to what is already known?

This study shows the evolution of markers of well-being in pediatric residents in a Chilean training center for the first time. The experience with this cohort suggests that pediatric residents have a high prevalence of burnout, which is associated with increased sleepiness and lower quality of life.

Abstract

Medical residency is a training phase associated with changes in well-being indicators such as sleepiness, physical activity, quality of life, and burnout. **Objective:** To determine the evolution of well-being aspects in pediatric residents during the first two years of residency. **Subjects and Method:** An online survey was administered to pediatric residents at the Pontifical Catholic University of Chile who entered the program in 2022, at 2, 6, 12, and 24 months after starting the program. The survey included the Maslach Burnout Inventory, the Epworth Sleepiness Scale, the Global Physical Activity Questionnaire, and a quality-of-life questionnaire (WHOQoL-BREF). **Results:** 19 residents were included in this study. 15, 14, 13, and 9 residents completed the survey at each respective time point. The prevalence of burnout reached up to 67%, with a significant upward trend over time. Burnout was associated with lower levels of satisfaction with health, excessive daytime sleepiness, poorer overall quality of life, and lower scores in the physical, psychological, and environmental domains of quality of life. **Conclusions:** Pediatric residents have a high prevalence of burnout, which is associated with sleepiness and lower quality of life. Monitoring residents using these tools can contribute to designing interventions within residency programs to mitigate burnout.

Keywords:

Pediatrics;
Residents;
Burnout;
Quality of Life;
Sleepiness;
Physical Activity

Introduction

Medical residency (a training program to obtain a specialist degree, also called a “fellowship” in Chile) is a formative stage in which knowledge is consolidated in daily clinical practice to achieve specialist medical competencies. It is associated with a demanding work environment, high clinical workload, increasing responsibility, long hours on call, and complicated relationships with patients or family members¹. It is a period where training is combined with patient care, which can lead residents to prioritize work and learning over their personal health and well-being². Furthermore, this period has been associated with a reduction in markers of well-being, such as hours of sleep, physical activity, and family interactions, such as frequent missed life events³ and burnout.

Burnout is a syndrome related to work stress, characterized by emotional exhaustion (feelings of being overwhelmed and physically and emotionally exhausted), depersonalization (negative, insensitive, or detached response to work), and decreased personal fulfillment (feelings of incompetence, inadequate achievement, and/or low productivity at work)⁴. This syndrome is common among healthcare personnel. Among physicians, a series of studies in the US reported a burnout prevalence of 45.5% in 2011, 54.4% in 2014, 43.9% in 2017, and 38.2% in 2020⁵. The 2019 and 2020 Medscape Physician Burnout & Depression Report showed that physicians burnout prevalence was 44% and 41%, respectively. Subsequently, a progressive increase to 53% in 2023 was reported, mediated by the effect of the COVID-19 pandemic, followed by a drop to 49% in 2024^{6,7}.

Burnout has been reported to have a negative impact on the quality of patient care. A meta-analysis of data from 170 studies involving a total of 239,246 physicians found that burnout was associated with patient dissatisfaction and doubled the likelihood of safety incidents⁴. In addition, a systematic review of 61 articles suggests that burnout in physicians is associated with depression, anxiety, and suicide⁸.

Among medical residents, the overall prevalence of burnout reported ranges from 35.7% to as high as 69.4%^{9,10}. In pediatrics, the Pediatric Resident Burnout-Resilience Study Consortium in the US conducted surveys between 2016 and 2018 in 34, 43, and 49 pediatric programs, respectively. The prevalence of burnout among these residents ranged from 54% to 56%¹¹.

Medical residency programs have the role of providing high-quality clinical training. It has been postulated in the literature that well-being promotes learning by improving concentration, critical thinking, and information retention¹². In contrast, burnout negatively affects learning and academic and clinical en-

agement. It has even been documented that chronic stress during medical residency may be associated with markers of cellular aging, such as telomere shortening¹³. Therefore, it is essential to monitor the physical and mental health of residents, as well as changes over time, in order to implement effective preventive strategies.

A medical specialty program in pediatrics aims to train pediatricians to provide comprehensive care for healthy and sick children, from birth to adolescence, in outpatient and inpatient settings. Our program lasts three years and includes participation in clinical activities, theoretical and practical courses, teaching, and the development of an independent research project resulting in publication in peer-reviewed journals.

The aim of this study was to describe the evolution of different markers of well-being, including the presence of burnout and its relationship with quality of life, in pediatric residents of the Pontifical Catholic University of Chile Program during their first two years of training.

Subjects and Method

Study design

Observational, prospective cohort study that tracked changes in markers of well-being through a survey of pediatric residents at the Pontifical Catholic University of Chile (PUC) at 2, 6, 12, and 24 months after entering the program. This study was conducted following the principles of the Declaration of Helsinki and was approved by the Scientific Ethics Committee for Health Sciences of the Pontifical Catholic University of Chile (EEC-Salud UC).

Context and Participants

First-year residents who entered the PUC pediatrics program in June 2022 were invited to participate. Residents in subspecialties with direct programs (four years of residency, where the first years are in the pediatrics program) were excluded, as some of their rotations are different.

The survey was sent by email at 2, 6, 12, and 24 months after admission (M/AA) to the program.

The blind design of the study and survey does not allow for temporal follow-up of each subject but rather considers respondents as an independent group in each application of the questionnaire.

Instrument, variables, and definitions

The survey consisted of 82 questions, administered using a self-hosted version of LimeSurvey EE⁽¹⁴⁾. It included sociodemographic and anthropometric data and the following instruments:

1) *Global Physical Activity Questionnaire (GPAQ)*

Composed of 16 questions, it assesses the time spent on sedentary activities and physical activity (PA) during work, commuting, and recreation. Work and recreation activities were divided into “vigorous PA” (great acceleration of breathing or heart rate) and “moderate PA” (slight acceleration of breathing or heart rate). This questionnaire has been validated in the Chilean population and has been used in the last two National Health Surveys^{15,16}.

2) *Epworth Sleepiness Scale*

An 8-question questionnaire that measures the likelihood of falling asleep in different situations. It has been adapted and validated for the Chilean population¹⁷. There are several ways to interpret this questionnaire in the literature, of which we use three: the mean score on the scale, the classification of degrees of sleepiness from the original instrument, and the presence or absence of excessive daytime sleepiness. For severity levels, we consider a score of 0 to 10 points as normal daytime sleepiness, 11 to 12 points as mild-excessive daytime sleepiness, 13-15 points as moderate, and 16-24 points as severe¹⁸. To define excessive daytime sleepiness, a value of ≥ 11 was used, which, according to the evidence, is consistent with other clinical tools¹⁹.

3) *Maslach Burnout Inventory (MBI)*

Assesses burnout in three dimensions: emotional exhaustion (EE), depersonalization (DP), and personal fulfilment (PF), using 22 questions. It has been validated in Spanish-speaking residents of specialties and subspecialties²⁰ and in Chilean professionals²¹. A score of ≥ 27 points in EE and/or ≥ 10 points in DP was considered suggestive of burnout^{22,23}. PF is analyzed separately, considering a score of ≤ 33 points as low^{24,25}.

4) *WHOQoL-BREF*

Measures quality of life using 26 items grouped into four domains: physical, psychological, interpersonal relationships, and environmental. Scores are expressed on a scale from 0 to 100, where higher values indicate a better quality of life. It also includes two questions that are analyzed separately: 1. How would you rate your quality of life? and 2. Are you satisfied with your health? Both are answered using a 5-point Likert scale. We use the validated Chilean adaptation²⁶⁻²⁸.

Additionally, we added seven questions developed by the research team, aimed at characterizing lifestyles and mental health needs to the third and fourth surveys (12 and 24 M/AA). These have not been validated.

Statistical methods

Categorical data are presented as frequencies and percentages and were analyzed by chi-square with Fisher's correction when necessary. To evaluate evolution over time and/or severity scores, we used the linear trend test.

Continuous data are presented as means plus standard deviation. For continuous data from two groups, we used the T-test. The analysis of three or more categories was performed using one-way ANOVA with an FDR as a post-test.

Results

Sociodemographic characteristics of residents in the pediatrics program

26 first-year residents entered the pediatrics program rotations in 2022. Six residents were excluded because they belonged to other programs, and one because they withdrew during the first month, leaving 19 residents selected for inclusion in this study. The survey was completed by 15 residents at 2 M/AA, 14 at 6 M/AA, 13 at 12 M/AA, and 9 at 24 M/AA (Figure 1). The cohort was predominantly female, with $> 70\%$ of residents in all four surveys. At 2, 6, and 24 M/AA, single marital status predominated, while at 12 M/AA, most had a partner with whom they did not live. A significant trend was found toward cooking less due to fatigue as the fellowship progressed (Table 1).

Evolution of physical activity, sleepiness, and burnout during residency

To determine the evolution of PA levels, we analyzed recreational and vigorous PA, daily sedentary time, total weekly PA time, and compliance with WHO recommendations⁽²⁹⁾. We found no significant differences during residency in any of the parameters analyzed (Table 1).

Regarding sleepiness, we found no significant changes for any of the three interpretations over time, but we observed that the mean score for each survey exceeded the limit of ≥ 11 points, which would correspond to excessive daytime sleepiness. When analyzing the variable dichotomously, we observed that more than two-thirds of residents had this diagnosis (Table 1).

To determine the presence of burnout, we first analyzed the scores of the three components of the MBI over time (Figure 2A-C). We found a significant increase between the EE score at 2 M/AA compared to 12 M/AA (22.4 ± 7.98 vs. 30.5 ± 8.2 ; $p = 0.035$) and 24 M/AA (22.4 ± 8.0 vs. 31.7 ± 9.6 ; $p = 0.035$). We found no

significant differences over time for DP or PF. Finally, burnout levels showed a tendency to increase over time, with 27% burnout at 2 M/AA, 57% at 6 M/AA, 62% at 12 M/AA, and 67% at 24 M/AA ($p = 0.043$) (Figure 2D).

Association between burnout, physical activity, and sleepiness

We found that most of the residents with burnout engaged in vigorous PA compared to those without burnout (Table 2). We observed no significant differences in the other PA variables.

There is a significant trend toward increased severity of sleepiness in the presence of burnout (Table 2). When analyzing the components of the MBI (Supplementary Table 1, available *online*), 65.2% of residents with high EE reported severe excessive sleepiness ($p = 0.01$).

Quality of life and its relationship with well-being factors

We analyzed the evolution of the score over time and its relationship with the presence of burnout for each domain of the WHOQoL-BRIEF. We found no significant differences between the scores of all the domains over time (Figure 3A-D); however, burnout was associated with lower scores in the following domains: physical (65.7 ± 15.0 vs. 53.8 ± 13.7 ; $p = 0.005$), psychological (67.0 ± 11.0 vs. 53.4 ± 16.8 ; $p = 0.001$), and

environmental (74.5 ± 13.4 vs. 58.5 ± 18.3 ; $p = 0.0009$) (Figure 3E-H).

When analyzing the individual components of the MBI, both high EE and low PF were significantly associated with lower scores in the physical, psychological, and environmental domains. On the other hand, high DP was associated with lower scores in the psychological, environmental, and interpersonal domains (Supplementary Table 2, available *online*).

In response to the question, “How would you rate your quality of life?”, no significant differences were found over time, but it is noteworthy that at 24 months/AA, one-third of residents rated their quality of life as poor (Figure 3I). When correlating responses with the presence of burnout, it was significantly associated with a poorer quality of life (Figure 3J; $p = 0.02$). This association continued to be observed in the high EE and low PF components (Supplementary Table 2, available *online*).

When analyzing the question “Are you satisfied with your health?”, no significant differences were found during the residency periods ($p = 0.06$), but it is noteworthy that almost half of the residents reported being dissatisfied with their health at 12 M/AA (Figure 3K). Residents with burnout showed a significant tendency to be more dissatisfied with their health (Figure 3L; $p = 0.02$). High EE and low PF were significantly associated with a decrease in health satisfaction (Supplementary Table 2, available *online*).

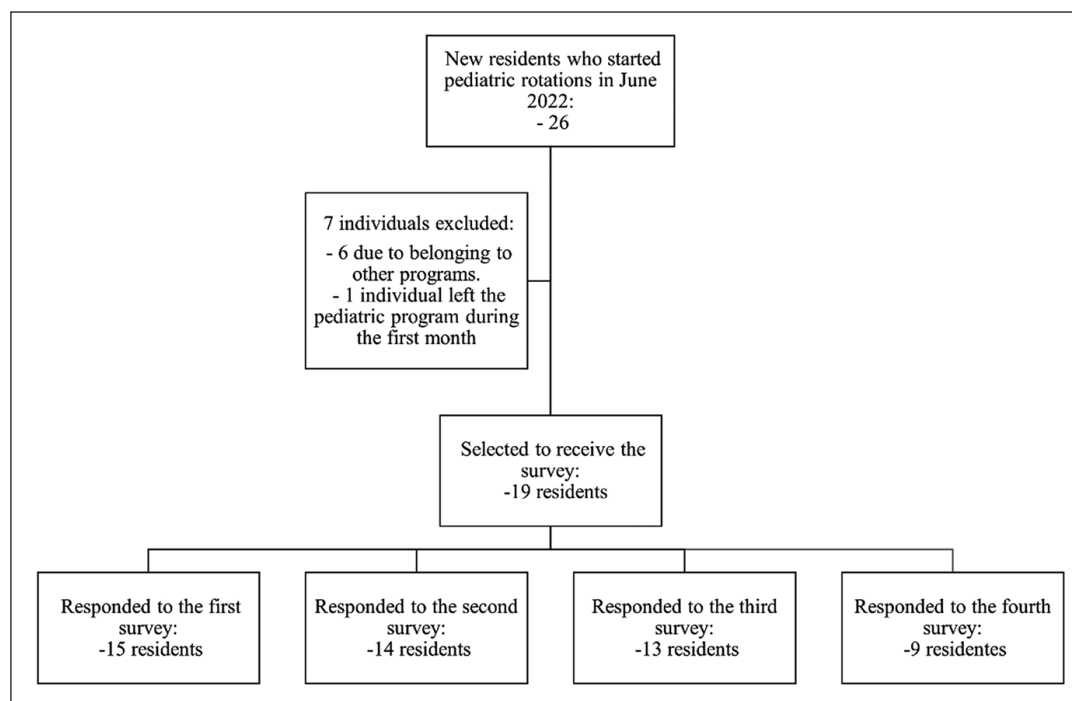


Figure 1. Study recruitment flowchart.

Table 1. Sociodemographic characteristics of the participants included in this study

	2M/AA n = 15	6M/AA n = 14	12M/AA n = 13	24M/AA n = 9	p
Sex n (%)					
• Female	12 (80)	13 (92.8)	10 (77)	8 (89)	0.86
• Male	3 (20)	1 (7.2)	3 (23)	1 (11)	
Age in years $\bar{x} \pm SD$	27.3 \pm 2.6	28.4 \pm 2.2	28.4 \pm 2.6	29.8 \pm 2.8	0.15
Marital status n (%)					
• Single	9 (60)	5 (35.7)	4 (30.8)	3 (33.3)	0.07
• Married	4 (26.6)	3 (21.4)	3 (23.1)	2 (22.2)	
• Widowed	0 (0)	0 (0)	0 (0)	0 (0)	
• Cohabiting partner	0 (0)	2 (14.3)	1 (7.7)	1 (11.1)	
• Non-cohabiting partner	2 (13.3)	4 (28.6)	5 (38.5)	2 (22.2)	
• Separated	0 (0)	0 (0)	0 (0)	1 (11.1)	
• Divorced	0 (0)	0 (0)	0 (0)	0 (0)	
Number of children $\bar{x} \pm SD$ (min. - max.)	0.13 (0-1)	0.07 (0-1)	0.15 (0-1)	0.22 (0-1)	0.79
BMI in kg/m ² $\bar{x} \pm SD$	24.9 \pm 3.5	24.9 \pm 4.8	25.7 \pm 5	26.1 \pm 4.1	0.87
Meets WHO PA recommendations n (%)	10 (71.4)	9 (64.3)	10 (76.9)	3 (37.5)	0.28
Performs RPA n (%)	8 (57.1)	11 (78.6)	9 (69.2)	4 (50)	0.82
Performs VPA n (%)	9 (69.2)	9 (64.3)	8 (61.5)	4 (50)	0.55
ST on a typical day (min) $\bar{x} \pm SD$	438 \pm 181	485 \pm 334	410 \pm 235	343 \pm 186	0.66
TPAT (min/week) $\bar{x} \pm SD$	276 \pm 276	336 \pm 391	252 \pm 213	95 \pm 74	0.29
Sleepiness scale score $\bar{x} \pm SD$	13.1 \pm 4	15.4 \pm 5	14.8 \pm 5.4	14.2 \pm 7.1	0.66
EDS n (%)					
• Yes	11 (73.3)	11 (78.6)	11 (84.6)	6 (66.7)	0.94
• No	4 (26.7)	3 (21.4)	2 (15.4)	3 (33.3)	
Sleepiness by degree n (%)					
• Normal daytime sleepiness	4 (26.7)	3 (21.4)	2 (15.4)	3 (33.3)	0.82
• Mild EDS	2 (13.3)	1 (7.1)	3 (23.1)	1 (11.1)	
• Moderate EDS	5 (33.3)	3 (21.4)	2 (15.4)	1 (11.1)	
• Severe EDS	4 (26.7)	7 (50)	6 (46.1)	4 (44.4)	
How often do you socialize with friends?* n (%)					
• Never / once a year or less	1 (6.7)	1 (7.1)	3 (23.1)	1 (11.1)	0.25
• Once or less / few times a month	8 (53.3)	7 (50)	6 (46.1)	6 (66.7)	
• Once / several times a week	6 (40)	6 (42.9)	4 (30.8)	2 (22.2)	
• Daily	0 (0)	0 (0)	0 (0)	0 (0)	
How often do you order food delivery?* n (%)					
• Never / once a year or less	1 (6.7)	1 (7.1)	0 (0)	0 (0)	0.64
• Once or less / few times a month	2 (13.3)	2 (14.3)	5 (38.5)	3 (33.3)	
• Once / several times a week	12 (80)	11 (78.6)	8 (61.5)	6 (66.7)	
• Daily	0 (0)	0 (0)	0 (0)	0 (0)	
How often do you skip cooking due to fatigue?* n (%)					
• Never / once a year or less	1 (6.7)	1 (7.1)	0 (0)	0 (0)	0.03
• Once or less / few times a month	4 (26.7)	4 (28.6)	3 (23.1)	2 (22.2)	
• Once / several times a week	10 (66.7)	9 (64.3)	7 (53.9)	4 (44.4)	
• Daily	0 (0)	0 (0)	3 (23.1)	3 (33.3)	
Residents with psychiatry consultations during that year* n (%)	-	-	4 (30.8)	6 (66.7)	0.1
Residents with psychology consultations during that year * n (%)	-	-	4 (30.8)	4 (44.4)	0.52
Residents who initiated psychotropic medication treatment during that year * n (%)	-	-	4 (30.8)	6 (66.7)	0.1
Residents with mental health leave during that year * n (%)	-	-	2 (15.4)	3 (33.3)	0.33

M/AA: months after admission; \bar{x} : mean; SD: standard deviation; BMI: body mass index; WHO: World Health Organization; PA: physical activity; RPA: recreational physical activity, VPA: vigorous physical activity; ST: sedentary time; TPAT: total physical activity time; EDS: Excessive Daytime Sleepiness. *These questions were added by the research team and have not been formally validated. Categorical data are presented as frequencies and percentages and were analyzed by using linear trend test. Continuous data are presented as means plus standard deviation and were analyzed by using one-way ANOVA with FDR as a post-test.

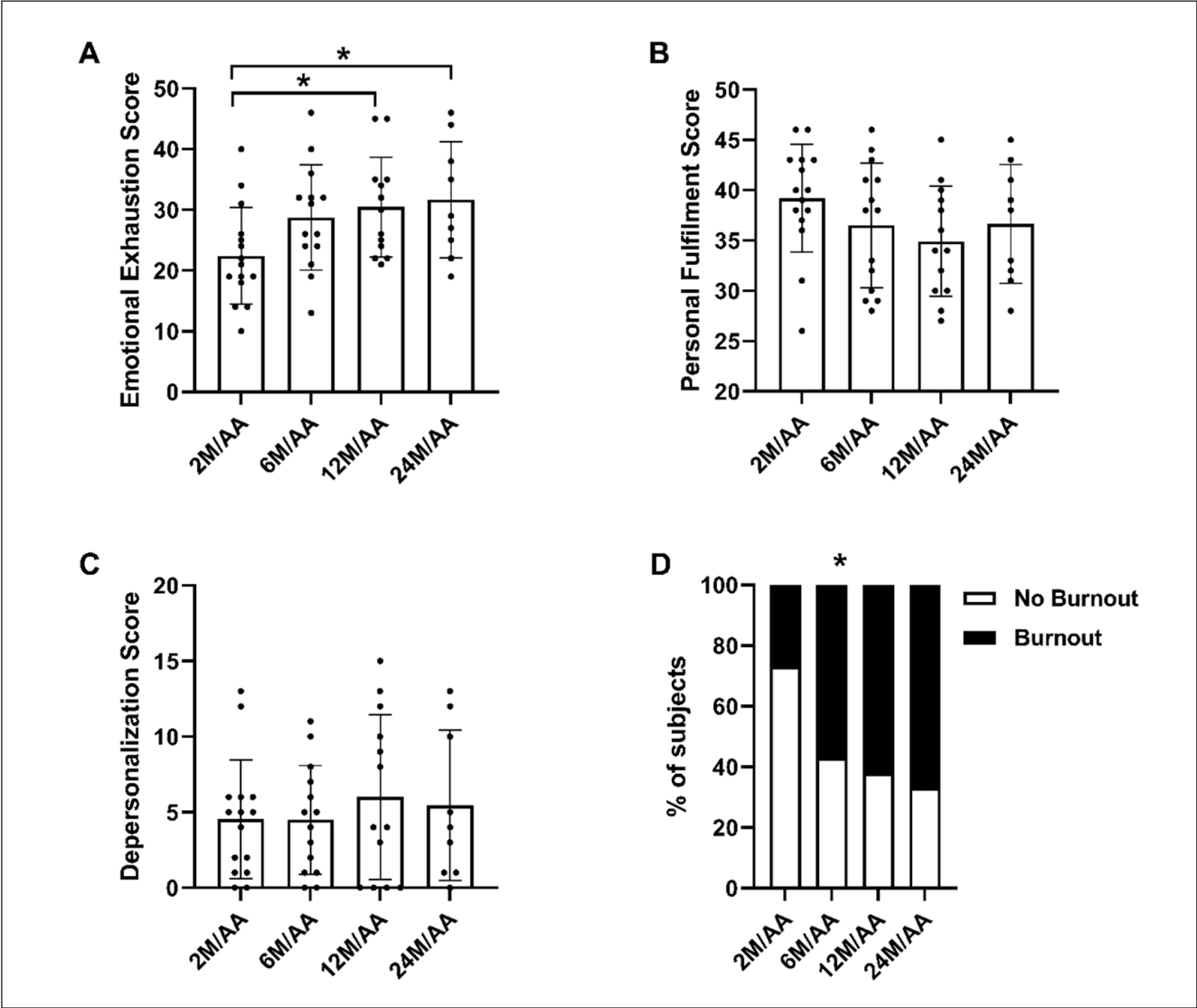


Figure 2. Burnout during residency. **(A)** Changes in emotional exhaustion scores over time. **(B)** Changes in personal fulfillment scores over time. **(C)** Changes in depersonalization scores over time. Data are presented as individual points, mean, and SD and were analyzed using one-way ANOVA with FDR as a post-test. **(D)** Changes in the percentage of residents with burnout over time. Data are presented as percentages and were analyzed using a linear trend test. Abbreviations: M/AA: months after admission.

Discussion

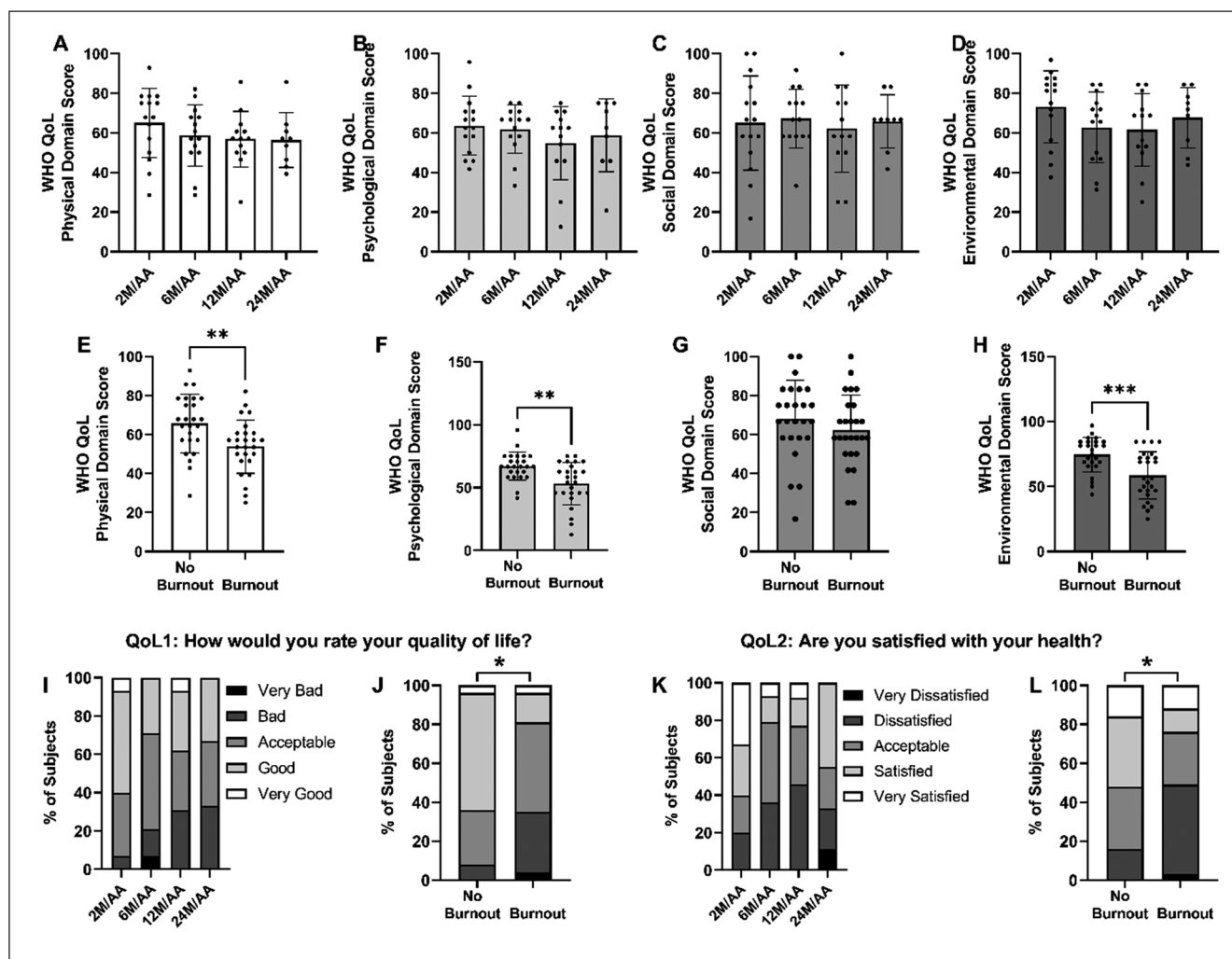
Residency programs involve complexities arising from the balance between academic and personal activities. Regardless of the program, it is a period that involves high levels of stress and burnout in those who participate in it. The meta-analysis by Low et al.³⁰ describes a burnout prevalence of 53.27% in surgical residents and 50.13% in medical residents. Although they found no significant differences between different residency programs, they reported that the three specialties with the highest prevalence of burnout were radiology (77.16%), neurology

(71.93%), and general surgery (58.39%). Pediatrics had a prevalence of 43.7%. The results of our study suggest a significant trend toward increased burnout over time, with 67% of residents at 24 M/AA meeting burnout criteria. It is important to note that it was measured only during the first two years of residency. Given the design of this study, it was not possible to perform paired analyses, which limits the interpretation of the results. In addition, 27% of residents already had burnout at 2 M/AA, raising questions about whether these cases reflect a problem adapting to the fellowship or a preexisting condition. Finally, it should also be considered that a significant

Table 2. Relation between sociodemographic characteristics and presence of burnout

	Burnout	No Burnout	p
Sex n (%)			
• Female	21 (80.8)	22(88)	0.48
• Male	5 (19.2)	3 (12)	
Age in years $\bar{x} \pm SD$	28.3 \pm 2.4	28.3 \pm 2.8	0.93
Marital status n (%)			
• Single	9 (34.6)	12 (48)	0.5
• Married	6 (23.1)	6 (24)	
• Widowed	0 (0)	0 (0)	
• Cohabiting partner	2 (7.7)	2 (8)	
• Non-cohabiting partner	9 (34.6)	4 (16)	
• Separated	0 (0)	1 (4)	
• Divorced	0 (0)	0 (0)	
Number of children $\bar{x} \pm SD$ (min. - max.)	0.08 (0-1)	0.2 (0-1)	0.21
BMI in kg/m ² $\bar{x} \pm SD$	25.9 \pm 5.1	24.7 \pm 3.1	0.32
Meets WHO PA recommendations n (%)	19 (76)	13 (54.2)	0.11
Performs RPA n (%)	17 (68)	15 (62.5)	0.69
Performs VPA n (%)	19 (76)	11 (45.8)	0.03
ST on a typical day (min) $\bar{x} \pm SD$	415 \pm 292	447 \pm 192	0.67
TPAT (min/week) $\bar{x} \pm SD$	245 \pm 187	271 \pm 362	0.75
Sleepiness scale score $\bar{x} \pm SD$	16.4 \pm 5	12.2 \pm 4.5	0.003
EDS n (%)			
• Yes	23 (88.5)	16 (64)	0.04
• No	3 (11.5)	9 (36)	
Sleepiness by degree n (%)			
• Normal daytime sleepiness	3 (11.5)	9 (36)	0.01 ¹
• Mild EDS	3 (11.5)	4 (16)	
• Moderate EDS	5 (19.2)	6 (24)	
• Severe EDS	15 (57.7)	6 (24)	
¿Cuánto se junta con amigos?* n (%)			
• Never / once a year or less	1 (3.9)	5 (20)	0.16
• Once or less / few times a month	14 (53.9)	13 (52)	
• Once / several times a week	11 (42.3)	7 (28)	
• Daily	0 (0)	0 (0)	
¿Cuánto pide comida por delivery?* n (%)			
• Never / once a year or less	1 (3.9)	1 (4)	0.76
• Once or less / few times a month	5 (19.2)	7 (28)	
• Once / several times a week	20 (76.9)	17 (68)	
• Daily	0 (0)	0 (0)	
¿Cuánto no cocina por cansancio?* n (%)			
• Never / once a year or less	1 (3.9)	1 (4)	0.47
• Once or less / few times a month	5 (19.2)	8 (32)	
• Once / several times a week	18 (69.2)	12 (48)	
• Daily	2 (7.7)	4 (16)	

M/AA: months after admission; \bar{x} : mean; SD: standard deviation; BMI: body mass index; WHO: World Health Organization; PA: physical activity; RPA: recreational physical activity, VPA: vigorous physical activity; ST: sedentary time; TPAT: total physical activity time. EDS: Excessive Daytime Sleepiness. *These questions were added by the research team and have not been formally validated. Categorical data are presented as frequencies and percentages and were analyzed by using chi-square test, ¹Analysis using linear trend test. P<0.05 Statistically significant.



percentage of residents did not respond to the various surveys (21%, 26%, 32%, and 53% at 2, 6, 12, and 24 M/AA, respectively), which could suggest a selection bias. Residents with greater impairment in their well-being may have been more motivated to respond to the surveys, which could overestimate the prevalence of burnout. On the contrary, it is also possible that those who felt more overworked were less willing to respond, pointing to the opposite result. This duality makes it difficult to determine the actual magnitude of the bias.

In addition to burnout, multiple studies show that

the residency period is also associated with alterations in PA and the sleep cycle, leading to alterations in daytime sleepiness and residents' quality of life³¹⁻³⁵. Regarding PA, it is noteworthy that a high frequency of residents complied with the WHO PA recommendations in the first three surveys (2, 6, and 12 M/AA), followed by a significant decrease at 24 M/AA. Although the change over time was not statistically significant, it suggests that changes in PA may be more related to the specific activities of the year of residency than to the time since admission. This is due to the presence of intensive rotations (such as ICU and neonatology)

that tend to be more demanding, making it difficult to maintain these recommendations.

There is some discrepancy in the interpretation of the Epworth Scale in the literature. Although the most consistent approach is to use a cut-off point of ≥ 11 to define excessive daytime sleepiness, the degrees of severity vary between publications; therefore, the original scale classification was chosen. Our data did not show significant changes over time in any of the interpretations used, but it is noteworthy that 84.6% of residents at 12 M/AA reported having excessive (severe) daytime sleepiness. These data are consistent with the study by Mul Fedele et al.³⁶, who reported a prevalence of excessive daytime sleepiness of 77.7% in residents of medical and surgical programs at 19 Argentinian hospitals.

In our residents, we found a significant association between burnout and excessive daytime sleepiness. These levels are higher than those reported by Kemper et al.¹¹ in US pediatric residents from multiple programs studied between 2016 and 2018. Specific program factors and sociodemographic characteristics of residents may influence sleepiness scores; however, it is important to note that Kemper et al.¹¹ similarly described a statistically significant increase in sleepiness scores in residents with burnout.

When analyzing the relationship between burnout and PA, most residents with burnout engaged in vigorous PA. We must be careful when interpreting this finding because, as in the case of daytime sleepiness, we do not know the causality and directionality between the two variables. The literature has been consistent in showing that PA is associated with a lower risk of burnout³⁷⁻³⁹ and has been one of the measures considered effective in reducing it⁴⁰⁻⁴². This suggests that residents with burnout may incorporate vigorous PA as a compensatory strategy to alleviate their symptoms. The study by Morgan et al.⁴³ in 141 first- to fourth-year Canadian medical students reports that light PA was a negative predictor of burnout, while vigorous PA was not a significant predictor, reinforcing the idea that it is a reactive behavior to burnout and stress.

The presence of burnout, rather than the length of time since entering residency, impacts the quality of life of residents. Burnout was associated with lower scores in the physical, psychological, and environmental domains of the quality of life questionnaire. Additionally, it was associated with a worse rating of their quality of life by the residents themselves. These results suggest that it is the presence of burnout that affects quality of life regardless of the time spent in residency, affecting not only the work environment but also overall quality of life and its domains.

Various strategies have been attempted to mitigate the impact of residency on the well-being of fellows

and patients, including limiting working hours. This point is highly relevant, as the study by Ridout et al.¹³ observed a telomere shortening 6 times greater than expected during the first year of residency, with a direct relationship between the number of hours worked and the magnitude of this shortening. In the US, the AC-GME restricts work to 80 hours per week, with a maximum of 24 continuous hours of clinical activity, with up to 4 additional hours for educational or patient care transition tasks, but not for additional responsibilities or care of new patients. Japan also sets a limit of 80 hours per week, while in Europe the maximum is 48 hours, as in England, where shifts of up to 13 hours have also been established⁴⁴⁻⁴⁵. There is evidence published in our own center where 22.6% of programs, mostly surgical, exceeded the recommended limit of 80 hours per week of on-site work⁴⁶. Our pediatrics program limits work to 80 hours per week, with a maximum of 30 hours of continuous work, which is above the recommended limit in developed countries.

Evidence on the effectiveness of reducing working hours has shown mixed results. Most studies agree that, on their own, it is not enough to combat burnout. It has been reported that this measure did not lead to a reduction in the workload, but rather to the same tasks being performed in less time. For this reason, other complementary strategies have been proposed, such as allocating protected time for study, research, and administrative activities; reducing the workload; and constantly evaluating residents' clinical activities and their relevance⁴⁷.

Our results show that residency is associated with an increase in burnout, which is consistent with the international literature. In addition, we observed a higher proportion of burnout than that described for pediatricians in training at other centers, and higher than that reported in medical residencies at our own center^{11,25}. It is important to note that the previous studies were conducted before the COVID-19 pandemic, which may have contributed to the overall increase in burnout levels.

This study provides a baseline for a new design that includes different programs, longer follow-up periods, and a more comprehensive characterization of residents' lifestyles, such as working hours, rotations, time spent studying, and personal activities outside the fellowship. Local research on this topic will generate key elements for program directors to put into practice. They will be able to develop group preventive interventions and individual support in cases of burnout, leading to standardized protocols for the detection and management of burnout, improving residents' quality of life and academic performance, and reducing medical errors. Finally, this is not only a problem in the medical field, but also a national issue: every health-

care worker with untreated burnout will form part of a workforce with burnout, which directly influences the health of the population.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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References

- Ovejas-López A, Deck G, Santelices P, et al. Burnout y malestar psicológico en los residentes de Medicina Familiar y Comunitaria. *Aten Primaria*. 2020;52(9):608-16. doi: 10.1016/j.aprim.2020.02.014. PMID: 32586629; PMCID: PMC7713465.
- Poonja Z, O'Brien P, Cross E, et al. Sleep and exercise in emergency medicine residents: an observational pilot study exploring the utility of wearable activity monitors for monitoring wellness. *Cureus*. 2018;10(7):e2973. doi: 10.7759/cureus.2973. PMID: 30237937; PMCID: PMC6141139.
- Perry MY, Osborne WE. Health and wellness in residents who matriculate into physician training programs. *Am J Obstet Gynecol*. 2003;189(3):679-83. doi: 10.1067/s0002-9378(03)00889-5. PMID: 14526292.
- Hodkinson A, Zhou A, Johnson J, et al. Associations of physician burnout with career engagement and quality of patient care: systematic review and meta-analysis. *BMJ*. 2022;378:e070442. doi: 10.1136/bmj-2022-070442. PMID: 36104064; PMCID: PMC9472104.
- Shanafelt TD, West CP, Sinsky C, et al. Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2020. *Mayo Clin Proc*. 2022;97(3):491-506. doi: 10.1016/j.mayocp.2021.11.021. PMID: 35246286.
- Kane L. Medscape National Physician Burnout & Suicide Report 2020: The Generational Divide [Internet]. Medscape; 2020 [citado 2025 Abr 3]. Disponible en: <https://www.medscape.com/slideshow/2020-lifestyle-burnout-6012460>
- McKenna J. Medscape Physician Burnout & Depression Report 2024: "We Have Much Work to Do" [Internet]. Medscape; 2024 [citado 2025 Mar 3]. Disponible en: <https://www.medscape.com/slideshow/2024-lifestyle-burnout-6016865>
- Ryan E, Hore K, Power J, Jackson T. The relationship between physician burnout and depression, anxiety, suicidality and substance abuse: a mixed methods systematic review. *Front Public Health*. 2023;11:1133484. doi: 10.3389/fpubh.2023.1133484. PMID: 37064688; PMCID: PMC10098100.
- Rodrigues H, Cobucci R, Oliveira A, et al. Burnout syndrome among medical residents: a systematic review and meta-analysis. *PLoS One*. 2018;13(11):e0206840. doi: 10.1371/journal.pone.0206840. PMID: 30418984; PMCID: PMC6231624.
- Ferguson C, Low G, Shiau G. Resident physician burnout: insights from a Canadian multispecialty survey. *Postgrad Med J*. 2020;96(1136):331-8. doi: 10.1136/postgradmedj-2019-137314. Epub 2020 Mar 2. PMID: 32123129.
- Kemper KJ, Schwartz A, Wilson PM, et al; Pediatric Resident Burnout-Resilience Study Consortium. Burnout in pediatric residents: three years of national survey data. *Pediatrics*. 2020;145(1):e20191030. doi: 10.1542/peds.2019-1030. Epub 2019 Dec 16. PMID: 31843859.
- Shrivastava SR, Shrivastava PS. Embracing well-being: strategies to cultivate and prioritize wellness and resilience in undergraduate medical students. *J Mar Med Soc*. 2024;26(2):338-41. doi: 10.4103/jmms.jmms_111_23.
- Ridout KK, Ridout SJ, Guille C, Mata DA, Akil H, Sen S. Physician-training stress and accelerated cellular aging. *Biol Psychiatry*. 2019;86(9):725-35. doi: 10.1016/j.biopsych.2019.05.014. PMID: 31230727; PMCID: PMC6788968.
- LimeSurvey Community [Internet]. Hamburg: LimeSurvey GmbH; [actualizado 2024 Apr 26; citado 2025 Apr 13]. Disponible en: <https://community.limesurvey.org/>
- Leppé J, Margozzini P, Villarroel L, Sarmiento O, Guthold R, Bull F. Validity of the global physical activity questionnaire in the National Health Survey-Chile 2009-10. *J Sci Med Sport*. 2012;15(Suppl 1):S297. doi: 10.1016/j.jsams.2012.11.723.
- Matus-Castillo C, Garrido-Méndez A, Concha-Cisternas Y, et al. Niveles de actividad física y tiempo sedente según nivel socioeconómico en Chile: resultados de la Encuesta Nacional de Salud 2016-2017. *Rev Med Chil*. 2021;149(10):1453-63. doi: 10.4067/s0034-98872021001001450.
- Gómez GM, Deck GB, Santelices BP, Cavada CG, Volpi AC, Serra ML. Adaptación transcultural y validación de la escala de somnolencia de Epworth en la población chilena. *Rev Otorrinolaringol Cir Cabeza Cuello*. 2020;80(4):434-41. doi: 10.4067/S0718-48162020000400434.
- Johns MW. Epworth Sleepiness Scale [Internet]. [citado 2025 Mar 15]. Disponible en: <https://epworthsleepinessscale.com/about-the-ess/>
- Scharf MT. Reliability and efficacy of the Epworth Sleepiness Scale: is there still a place for it? *Nat Sci Sleep*. 2022;14:2151-6. doi: 10.2147/NSS.S340950. PMID: 36536636; PMCID: PMC9759004.
- Rivera-Ávila DA, Rivera-Hermosillo JC, González-Galindo C. Validación

- de los cuestionarios CVP-35 y MBI-HSS para calidad de vida profesional y burnout en residentes. *Investig Educ Med.* 2017;6(21):25-34. doi: 10.1016/j.riem.2016.05.010
21. Olivares-Faúndez V, Mena-Miranda L, Macía-Sepúlveda F, Jélvez-Wilke C. Validez factorial del Maslach Burnout Inventory Human Services (MBI-HSS) en profesionales chilenos. *Univ Psychol [Internet].* 2013;13(1):145-60. Disponible en: <https://revistas.javeriana.edu.co/index.php/revPsycho/article/view/2919>
 22. Wang MK, Geen O, Mach ZH, Khalid Z. Resident Burnout on the Internal Medicine Ward. *J Gen Intern Med.* 2024;39(3):366-72. doi: 10.1007/s11606-023-08505-9. PMID: 37946021; PMCID: PMC10897070.
 23. West CP, Dyrbye LN, Sinsky C, et al. Resilience and Burnout Among Physicians and the General US Working Population. *JAMA Netw Open.* 2020;3(7):e209385. doi: 10.1001/jamanetworkopen.2020.9385. PMID: 32614425; PMCID: PMC7333021.
 24. Brady KJS, Ni P, Sheldrick RC, et al. Describing the emotional exhaustion, depersonalization, and low personal accomplishment symptoms associated with Maslach Burnout Inventory subscale scores in US physicians: an item response theory analysis. *J Patient Rep Outcomes.* 2020;4(1):42. doi: 10.1186/s41687-020-00204-x. PMID: 32488344; PMCID: PMC7266903.
 25. Díaz Piga LA, Arab Verdugo JP, Nuñez Palma C, et al. Burnout en médicos residentes de especialidades y subespecialidades: estudio de prevalencia y variables asociadas en un centro universitario. *ARS Med [Internet].* 2017 [citado 2025 Abr 1];42(2):27-33. Disponible en: <https://www.arsmedica.cl/index.php/MED/article/view/541>
 26. Urzúa MA, Caqueo-Urizar A. Estructura factorial y valores de referencia del WHOQoL-Bref en población adulta chilena. *Rev Med Chil [Internet].* 2013 [citado 2025 Abr 1];141(12). Disponible en: <https://www.revistamedicadechile.cl/index.php/rmedica/article/view/3082>
 27. World Health Organization. Programme on mental health: WHOQOL user manual. 2012 revision. Geneva: WHO; 2012 [citado 2025 Feb 5]. Disponible en: <https://www.who.int/publications/i/item/WHO-HIS-HSI-Rev.2012-3>
 28. Hidalgo-Rasmussen C, Morales G, Ortiz MS, et al. Propiedades psicométricas de la versión chilena del WHOQOL-BREF para la calidad de vida. *Behav Psychol.* 2021;29(2):383-98. doi: 10.51668/bp.8321210s.
 29. World Health Organization. Noncommunicable Disease Surveillance, Monitoring and Reporting. GPAQ analysis guide [Internet]. [citado 2025 Feb 25]. Disponible en: <https://www-who-int.translate.goog/teams/noncommunicable-diseases/surveillance/systems-tools/physical-activity-surveillance>
 30. Low ZX, Yeo KA, Sharma VK, et al. Prevalence of Burnout in Medical and Surgical Residents: A Meta-Analysis. *Int J Environ Res Public Health.* 2019;16(9):1479. doi: 10.3390/ijerph16091479. PMID: 31027333; PMCID: PMC6539366.
 31. Jimena-Jácome S, Villalquirán-Hurtado A, Meza-Cabrera MM. Estilo de vida y nivel de actividad física en estudiantes de residencia médica. *CES Med.* 2019;33(2):78-87. doi: 10.21615/cesmedicina.33.2.1.
 32. Alami YZ, Ghanim BT, Zyoud SH. Epworth sleepiness scale in medical residents: quality of sleep and its relationship to quality of life. *J Occup Med Toxicol.* 2018;13:21. doi: 10.1186/s12995-018-0203-z. PMID: 30008792; PMCID: PMC6043987.
 33. Pucci GC, Rech CR, Fermino RC, Reis RS. Association between physical activity and quality of life in adults. *Rev Saude Publica.* 2012;46(1):166-79. doi: 10.1590/s0034-89102012000100021. PMID: 22249758.
 34. Marquez DX, Aguiñaga S, Vásquez PM, et al. A systematic review of physical activity and quality of life and well-being. *Transl Behav Med.* 2020 Oct 12;10(5):1098-1109. doi: 10.1093/tbm/ibz198. PMID: 33044541; PMCID: PMC7752999.
 35. Taylor CE, Scott EJ, Owen K. Physical activity, burnout and quality of life in medical students: A systematic review. *Clin Teach.* 2022;19(6):e13525. doi: 10.1111/tct.13525. PMID: 36052814; PMCID: PMC9826463.
 36. Mul Fedele ML, López Gabeiras MDP, Simonelli G, et al. Multivariate analysis of the impact of sleep and working hours on medical errors: a MICE approach. *BMC Public Health.* 2023;23(1):2317. doi: 10.1186/s12889-023-17130-4. PMID: 37996804; PMCID: PMC10666331.
 37. Verhavert Y, De Martelaer K, Van Hoof E, Van Der Linden E, Zinzen E, Deliens T. The Association between Energy Balance-Related Behavior and Burn-Out in Adults: A Systematic Review. *Nutrients.* 2020 Feb 2;12(2):397. doi: 10.3390/nu12020397. PMID: 32024269; PMCID: PMC7071204.
 38. Wunsch K, Fiedler J, Bachert P, Woll A. The Tridirectional Relationship among Physical Activity, Stress, and Academic Performance in University Students: A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health.* 2021;18(2):739. doi: 10.3390/ijerph18020739. PMID: 33467118; PMCID: PMC7830011.
 39. Mincarone P, Bodini A, Tumolo MR, et al. Association Between Physical Activity and the Risk of Burnout in Health Care Workers: Systematic Review. *JMIR Public Health Surveill.* 2024 Mar 18;10:e49772. doi: 10.2196/49772. PMID: 38498040; PMCID: PMC10985610.
 40. Naczenski LM, Vries JD, Hooff MLMV, Kompier MAJ. Systematic review of the association between physical activity and burnout. *J Occup Health.* 2017 Nov 25;59(6):477-94. doi: 10.1539/joh.17-0050-RA. PMID: 28993574; PMCID: PMC5721270.
 41. Albredy B, Marenus MW, Chen W. The Relationship Between Employee Physical Activity Intensity and Workplace Burnout: A Cross-sectional Study. *J Occup Environ Med.* 2024;66(4):316-20. doi: 10.1097/JOM.0000000000003043. PMID: 38234198.
 42. Rosales-Ricardo Y, Ferreira JP. Effects of Physical Exercise on Burnout Syndrome in University Students. *MEDICC Rev.* 2022;24(1):36-9. doi: 10.37757/MR2022.V24.N1.7. PMID: 35157638.
 43. Morgan TL, McFadden T, Fortier MS, Sweet SN, Tomasone JR. Do physical activity intensity and sedentary behaviour relate to burnout among medical students? Insight from two Canadian medical schools. *Can Med Educ J.* 2024;15(5):54-63. doi: 10.36834/cmef.79169. PMID: 39588026; PMCID: PMC11586019.
 44. Maoz Breuer R, Waitzberg R, Breuer A, Cram P, Bryndova L, Williams GA, et al. Work like a Doc: A comparison of regulations on residents' working hours in 14 high-income countries. *Health Policy.* 2023;130:104753. doi: 10.1016/j.healthpol.2023.104753. PMID: 36827717.
 45. Nagasaki K, Kobayashi H. The effects of resident work hours on well-being, performance, and education: A review from a Japanese perspective. *J Gen Fam Med.* 2023;24(6):323-31. doi: 10.1002/jgf2.649. PMID: 38025934; PMCID: PMC10646297.
 46. Díaz Piga LA, Arab Verdugo JP, Cotoras Viedma P, et al. Evaluación de la carga laboral en residentes chilenos de especialidades y subespecialidades médicas. *ARS Med [Internet].* 2016 Oct 16 [citado 2025 Abr 1];41(2):13-20. Disponible en: <https://www.arsmedica.cl/index.php/MED/article/view/109>
 47. Ng IK, Tham SZ, Chong KM, Teo DB. Looking beyond duty hours: Offering a balanced quantitative-qualitative approach to resident burnout. *J R Coll Physicians Edinb.* 2024;54(3):236-40. doi: 10.1177/14782715241273739. PMID: 39136279.

