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ORIGINAL ARTICLE

HEALTH-RELATED QUALITY OF LIFE AMONG TECHNICAL NURSING STUDENTS

CALIDAD DE VIDA RELACIONADA CON LA SALUD EN ESTUDIANTES DE TECNICATURA EN ENFERMERÍA

QUALIDADE DE VIDA RELACIONADA À SAÚDE EM ESTUDANTES DE TÉCNICA DE ENFERMAGEM

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ABSTRACT

Objective: To analyze the quality of life related to health and its associated factors in technical nursing students of a non-university higher education institution in the Autonomous City of Buenos Aires, Argentina. **Methods:** Descriptive, cross-sectional, and quantitative study. The sample consisted of 204 technical nursing students, selected by non-probabilistic sampling, who responded to the SF-36 instrument during the first quarter of 2023. **Results:** Respondents had a mean age of 29.87 years (SD: 8.41) and were predominantly female (78.92%), single (79.41%), without children (59.31%), in the second year of the career (43.14%), and working the morning shift (40.69%). Regarding self-care, a low prevalence of smoking (18.14%) and a high prevalence of sedentary lifestyle (67.16%) were found. Most of the students had medical examinations twice a year (58.33%) and had annual blood tests performed (57.35%). When analyzing the dimensions that make up health-related quality of life, it was found that physical function obtained the best evaluation, with a mean of 89.95 (SD: 13.45), while vitality received the lowest evaluation with a mean of 49.12 (SD: 17.24). **Conclusions:** Except for vitality, all dimensions received a positive evaluation. Gender (male), year

of the career (third), shift (evening), Body Mass Index (normal), and self-care activities were positively associated with quality of life.

Keywords: Health-Related Quality of Life; Nursing Students; Student Health.

RESUMEN

Objetivo: Analizar la calidad de vida relacionada con la salud y sus factores asociados en los estudiantes de la carrera de Tecnicatura en enfermería de una institución de educación superior no universitaria de la Ciudad Autónoma de Buenos Aires, Argentina. **Metodología:** Estudio descriptivo, transversal y cuantitativo. La muestra estuvo constituida por 204 estudiantes de Tecnicatura en enfermería elegidos mediante muestreo no probabilístico quienes respondieron al instrumento SF-36 durante el primer cuatrimestre del 2023. **Resultados:** Los encuestados tuvieron una media de edad de 29,87 años (DE: 8,41) y fueron mayormente mujeres (78,92%), solteras (79,41%), sin hijos (59,31%), de segundo año del plan de estudios de la carrera (43,14%) y del turno mañana (40,69%). Relativo al autocuidado, se halló una baja prevalencia de tabaquismo (18,14%) y alta de sedentarismo (67,16%), la mayoría concurren a consulta médica 2 veces al año (58,33%) y se realizan exámenes de sangre anuales (57,35%). Al analizar las dimensiones que componen la calidad de vida relacionada con la salud, se encontró que la Función Física fue la mejor puntuada con una media de 89,95 (DE: 13,45), mientras, Vitalidad obtuvo la valoración más baja con una media de 49,12 (DE: 17,24). **Conclusiones**: Con excepción de la Vitalidad, todas las dimensiones evaluadas presentaban una valoración positiva. El sexo (hombre), el año del plan de estudios (tercero), el turno (vespertino), el índice de masa corporal (normal) y la implementación de actividades de autocuidado se relacionaron positivamente con la calidad de vida.

Palabras claves: Calidad de Vida Relacionada con la Salud; Estudiantes de Enfermería; Salud del Estudiante.

RESUMO

Objetivo: Analisar a qualidade de vida relacionada com a saúde e seus fatores associados em estudantes de técnica de enfermagem de uma instituição de ensino superior não universitária da Cidade Autónoma de Buenos Aires, Argentina. **Metodologia:** Estudo descritivo, transversal e quantitativo. A amostra foi composta por 204 estudantes de técnica de enfermagem escolhidos por amostragem não probabilística que responderam ao instrumento SF-36 durante o primeiro quadrimestre de 2023. **Resultados**: Os entrevistados tinham idade média de 29,87 anos (DP: 8,41) e eram em sua maioria do sexo feminino (78,92%), solteiros (79,41%), sem filhos (59,31%), no segundo ano do curso de enfermagem (43,14%) e no turno da manhã (40,69%). Relativamente ao autocuidado, verificou-se uma baixa prevalência de tabagismo (18,14%) e uma alta prevalência de sedentarismo (67,16%), a maioria foi ao médico duas vezes por ano (58,33%) e fez análises sanguíneas anuais (57,35%). Ao analisar as dimensões que compõem a qualidade de vida relacionada com a saúde, verificou-se que a Função Física foi a mais bem classificada com uma média de 89,95 (DP: 13,45), enquanto a Vitalidade obteve a classificação mais baixa com uma média de 49,12 (DP: 17,24). **Conclusões:** Com exceção da Vitalidade, todas as dimensões avaliadas foram avaliadas positivamente. O sexo (masculino), o ano curricular (terceiro ano), o turno (noturno), o índice de massa corporal (normal) e a realização de atividades de autocuidado estavam positivamente relacionados com a qualidade de vida.

Palavras-chave: Qualidade de Vida Relacionada à Saúde; Estudantes de Enfermagem; Saúde do Estudante.

INTRODUCTION

The training process in health sciences programs demands a considerable investment of time to meet academic requirements. This, coupled with professional, social, and family obligations,[1] as well as lifestyle changes,[2-4] can compromise the well-being of students, negatively impacting their health.[5]

The individual's perception of their own health, both physically and mentally, is referred to in the literature as Health-Related Quality of Life (HRQOL). This term is subjective, broad, and multidimensional, and aims to comprehensively integrate the evolving definitions of health and quality of life over time, alluding to the influence of health on an individual's perception of well-being.[7]

The World Health Organization[8] defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Meanwhile, Quality of Life is defined in terms of “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.” The latter term involves the subjective assessment of physical, psychological, social, and environmental aspects, personal beliefs, and degree of independence.[9]

The measurement of Health-Related Quality of Life (HRQOL) emerges as a valuable tool for identifying factors that jeopardize the health and overall well-being of individuals. This makes it possible to design and implement strategies aimed at intervening, eliminating, or minimizing risk factors.[10]

In the case of prospective nursing students, the assessment of HRQOL is equivalent to measuring "health" and seeks to describe health in terms of functionality and well-being. This is particularly relevant given the numerous challenges faced by students,[1-4] which makes it necessary to analyze physical and mental health in the context of a comprehensive assessment.

Several research efforts have been conducted to understand the HRQOL of higher education students and the factors affecting it. Overall, findings suggest that these students exhibit poorer HRQOL, especially in terms of mental health; this is primarily associated with health conditions and educational variables.[11-13] Consequently, interventions such as mental health education, psychological counseling, social support, and the promotion of healthy lifestyles have been recognized as valid approaches to maintaining and enhancing HRQOL.[14]

The available literature on Health-Related Quality of Life (HRQOL) in nursing students is limited, with studies predominantly conducted within university populations. A study conducted in Brazil with a sample of 256 nursing students found a correlation between a deterioration in HRQOL and the presence of depressive symptoms.[11] In contrast, another study carried out in Saudi Arabia, involving 283 advanced nursing students, established a link between HRQOL and academic success.[12] On the other hand, a study conducted in nine countries (Chile, Egypt, Greece, Hong Kong, India, Kenya, Oman, Saudi Arabia, and the United States) found that nursing students reported positive evaluations of their physical function, while the social domain received negative ratings. Factors such as age, country of residence, and family income were shown to influence quality of life.[13]

Given the above, this study aims to analyze the Health-Related Quality of Life and its associated factors among students pursuing a technical Nursing degree in a non-university higher education institution in the Autonomous City of Buenos Aires, Argentina.

METHODOLOGY

This is a descriptive study with analytical, quantitative, and cross-sectional components. The population consisted of 431 students enrolled in the technical Nursing program at a non-university

higher education institution in the Autonomous City of Buenos Aires, Argentina, during the first semester of 2023. The sample included 204 students, providing a confidence level of 95%, a margin of error of 5%, and a power greater than 80%. The sampling method was non-probabilistic, aiming to include the largest possible population, with the participation of the aforementioned sample.

Inclusion criteria encompassed students from the technical Nursing program of any gender, enrolled in all three shifts (morning, afternoon, and evening), who voluntarily agreed to participate. Exclusion criteria comprised pregnant students and those who did not attend on the data collection day, the latter because an individual informed consent process was required.

The SF-36 instrument, developed during the Medical Outcomes Study (MOS) and consisting of 36 items, was used to assess the mental and physical health status of the participants. The psychometric properties of the instrument have been evaluated in various studies and are validated for the Argentine population.[10,15,16] The SF-36 has a Cronbach's alpha of 0.93, indicating high consistency in measuring Health-Related Quality of Life (HRQOL).[17]

The SF-36 is a self-administered instrument, requiring approximately 20 minutes for its completion. Respondents answer items using a Likert scale with two to six alternatives, corresponding to eight multi-item scales or dimensions (Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health), along with a single-item question unrelated to any specific dimension, referred to as the Health Transition dimension. The 36 items are grouped into eleven questions that correspond to the dimensions as follows:[10,17]

- Physical Functioning: This dimension includes items 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h, 3i, and 3j. It assesses the extent to which health limits physical activities such as self-care, walking, and lifting, as well as moderate and vigorous efforts.
- Role-Physical: Encompassing items 4a, 4b, 4c, and 4d, this dimension estimates the extent to which health interferes with work and other daily activities.
- Bodily Pain: Comprising items 7 and 8, this dimension evaluates the intensity of pain and how it affects work, social activities, and household tasks.
- General Health: Including items 1, 11a, 11b, 11c, and 11d, this dimension analyzes the individual's personal assessment of current health, prospects, and resistance to illness.
- Vitality: Encompassing items 9a, 9e, 9g, and 9i, this dimension assesses the perception of energy and vitality compared to feelings of fatigue or exhaustion.
- Social Functioning: Comprising items 6 and 10, this dimension assesses the extent to which health problems affect social life.
- Role-Emotional: Including items 5a, 5b, and 5c, this dimension measures the extent to which emotional problems interfere with work or other daily activities, reducing the time allocated to them.
- Mental Health: Encompassing items 9b, 9c, 9d, 9f, and 9h, this dimension assesses overall mental health, including feelings of depression and anxiety, as well as behavioral and emotional control.
- Health Transition: This dimension includes item 2 and assesses the current health status compared to the previous year.

The data collection was supplemented with 14 questions aimed at characterizing the sample demographically, educationally, and occupationally. Additionally, an assessment of self-care

activities was conducted, including regular physical activity, smoking habits, regular medical consultations, annual blood tests, and Body Mass Index (BMI). Weight and height were measured on the day of data collection using appropriate and calibrated instruments, and BMI was calculated by dividing the weight in kilograms by height in meters squared (kg/m^2). Students were classified into six BMI categories: underweight (<18.5 kg/m^2), normal weight (18.5 – 24.9 kg/m^2), overweight (25.0 – 29.9 kg/m^2), obesity class I (30 − 34.9 kg/m^2), class II (35 - 39.9 kg/m^2), and class III (≥ 40 kg/m^2).[18]

For data collection, participants were required to provide informed consent after receiving the necessary information to decide on their participation. Those who agreed to complete the informed consent form received it via email or through an institutional platform (Google Classroom), using Google Forms for data collection.

The responses to items were standardized in the instrument analysis, raw scores were calculated for each scale, and the required summation and linear transformation were performed according to the SF-36 manual. The final scores for the scales range from 0 to 100, where a higher score indicates a better health status, with the cutoff point between better and worse health being a score of 50.[17]

The data were analyzed using the free version of the statistical analysis software Infostat. Means and standard deviations were calculated for the quantitative variables, while for the categorical variables, absolute frequencies (n) and relative frequencies (%) were calculated. Due to the behavior of the variables, observed through the modified Shapiro-Wilk normality test, parametric tests were chosen. Student's t-tests, ANOVA, and Pearson's correlation test were implemented, with a significance level set at $p < 0.05$.

As for the ethical considerations, the study was approved by the Research Department under resolution 05 of 2023. Written informed consent was implemented, and no personal or identifying data such as names, surnames, document numbers, or any other information that could link the respondent to the completed instrument were collected, ensuring anonymity. National and international laws regarding research ethics and the protection of research subjects were respected. This study is considered "low risk" as it is an observational study, and no personal identification data were collected.[19]

RESULTS

The sample consisted of 204 students from the Technical Nursing program with an average age of 29.87 years (SD: 8.41), ranging from a minimum of 17 to a maximum of 55 years. The respondents were predominantly female (78.92%), single (79.41%), without children (59.31%), second-year students (43.14%), attending morning classes (40.69%), living with their nuclear family - parents and siblings (40.20%), and actively employed (81.37%) (Table 1).

Regarding the implementation of self-care activities, it was found that 18.14% of the respondents smoke regularly, with an average of 5 cigarettes per day. Additionally, 67.16% are sedentary, 58.33% regularly attend medical consultations (2 times a year or more), and 57.35% undergo annual blood tests (Table 2). The mean Body Mass Index (BMI) was 27.91 kg/m2 (SD: 5.47), and 69.61% are classified as overweight or obese (Graph 1). Furthermore, 7.84% have been diagnosed with a chronic illness.

Table 1: Sample characterization (sociodemographic, educational, and work variables), 2023. (n = 204)

Variable	Category	n	%
Sex	Man	42	20.59
	Woman	161	78.92
	Other	1	0.49
Marital Status	Single	162	79.41
	Civil Partnership or Married	33	16.18
	Divorced or widowed	9	4.41
Children	Yes	83	40.69
	No	121	59.31
Number of Children	None	121	59.31
	One	34	16.67
	Two	37	18.14
	Three of more	12	5.88
Academic Year	First	56	27.45
	Second	88	43.14
	Third	60	29.41
Shift	Morning	83	40.69
	Afternoon	36	17.65
	Evening	85	41.67
Who do they live with	Alone	29	14.22
	Partner	45	22.06
	Partner and children	9	4.41
	Children	21	10.29
	Parents and/or siblings	82	40.20
	Grandparents and/or aunts/uncles	5	2.45
	Other Family	6	2.94
	Friends	7	3.43
Job Status	Yes	166	81.37
	No	38	18.63
	Total	204	100.00

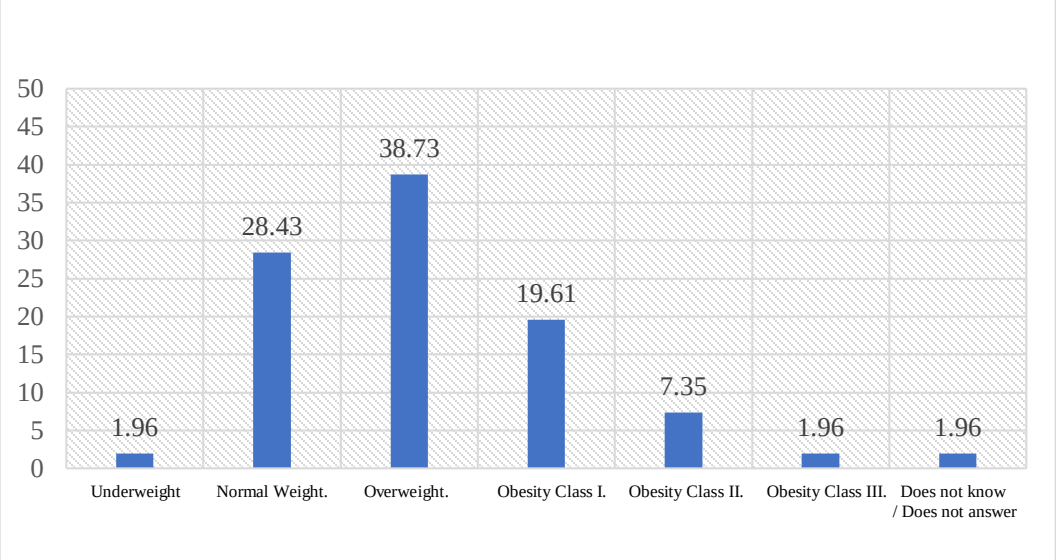
Source: Own elaboration.

Table 2: Self-Care Activities, 2023. (n = 204)

Variable	Category	n	%
Smoking Habit	Yes	37	18.14
	No	167	81.86
Physical Activity	Not Regularly	137	67.16
	Yes, 1-3 times/week	52	25.49
	Yes, 4-7 times/week	15	7.35
Regular Medical Appointments	Yes	119	58.33
	No	85	41.67
Annual Blood Tests/Controls	Yes	117	57.35
	No	87	42.65
	Total	204	100.00

Source: Own elaboration.

Graphic 1: Distribution of the Body Mass Index categories of the students, 2023. (n = 204)



Source: Own elaboration.

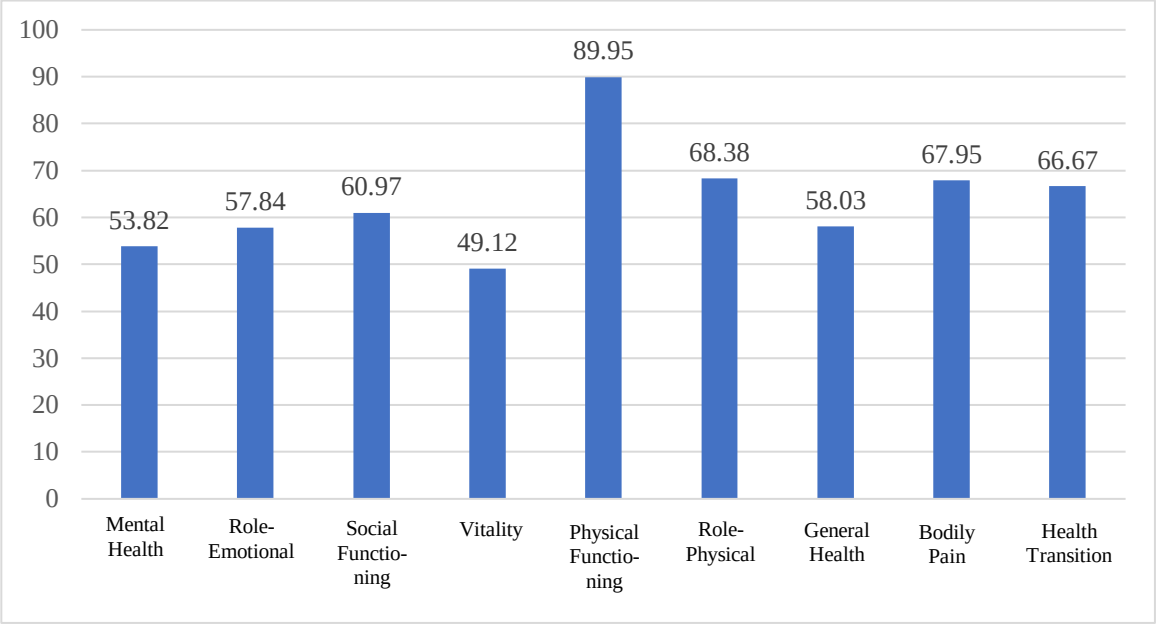
Note: Categories were assigned according to the WHO guidelines.

In the analysis of the dimensions comprising Health-Related Quality of Life (HRQOL), Physical Functioning received the highest score, with a mean of 89.95 (SD: 13.45), while Vitality obtained the lowest rating with a mean of 49.12 (SD: 17.24). Except for Vitality, all HRQOL dimensions had mean values above 50 points, indicating positive evaluations on the rating scale (Graph 2).

In the inferential analysis, it was identified that, among males, the mean values of Physical Functioning, General Health, Vitality, and Mental Health were higher. Concerning the academic year, first-year students obtained lower mean values in the dimensions Bodily Pain and Role-Emotional, while third-year students achieved higher means in Physical Functioning and General Health (Table 3).

Respondents from the evening (night) shift showed higher mean values in the Mental Health dimension, and those who reported having children obtained higher means in Role-Emotional and Health Transition. Working students achieved a higher mean in the Physical Functioning dimension and a lower mean in Bodily Pain. Those who reported having a diagnosed chronic illness had a lower mean score in the Physical Functioning dimension. Finally, marital status was not found to be related to the dimensions of HRQOL (Table 3).

Graphic 2: Mean values of the HRQOL dimensions, 2023. (n = 204)



Source: Own elaboration.

Table 3: HRQOL dimensions and sociodemographic, educational, and work variables, 2023. (n = 204)

Variable	Categories	PF	RP	BP	GH	VT	SF	RE	MH	HT
Sex	Man	**94.29***	NS	NS	**65.64***	**55.71***	NS	NS	**61.33***	NS
	Woman	88.76			56.08	47.24			51.80	
Academic Year	First	89.91	NS	**74.14***	59.71	NS	NS	**42.86***	NS	NS
	Second	87.78		63.03	57.7			65.53		
	Third	**93.17***		69.37	**61.33***			60.56		
Children	Yes	NS	NS	NS	NS	NS	NS	**66.67***	NS	**69.64***
	No							51.79		64.63
Working	Yes	**90.90***	NS	66.25	NS	NS	NS	NS	NS	NS
	No	85.79		**75.34***						
Academic Shift	Morning	NS	NS	NS	NS	NS	NS	NS	50.76	NS
	Afternoon								51.66	
	Evening								**57.74***	
Chronic Disease	Yes	87.50	NS	NS	NS	NS	NS	NS	NS	NS
	No	**90.16***								

Source: Own elaboration.

Note: *p:<0,05. **NS:** Non-significant. **PF:** Physical Functioning, **RP:** Role-Physical, **BP:** Bodily Pain, **GH:** General Health, **VT:** Vitality, **SF:** Social Functioning, **RE:** Role-Emotional, **MH:** Mental Health, **HT:** Health Transition.

Age showed positive correlation levels ranging from very low to low with the dimensions General Health (r: 0.15, p: 0.032), Vitality (r: 0.39, p: <0.001), Social Functioning (r: 0.16, p: 0.022), Role-Emotional (r: 0.25, p: <0.001), and Mental Health (r: 0.27, p: <0.001). On the other hand, BMI exhibited a low positive correlation with the dimensions Bodily Pain (r: 0.15, p: 0.028) and Role-Emotional (r: 0.17, p: 0.018). It is noteworthy that, although the findings are statistically significant, the effect is small in terms of the correlation level between variables.

Regarding self-care habits and their relationship with the HRQOL dimensions, it was found that individuals with sedentary behaviors had lower mean values in the dimensions Bodily Pain, General Health, and Health Transition. Conversely, those who reported engaging in regular physical activity had higher means in the dimensions Mental Health, Social Functioning, and Physical Functioning (Table 4).

Smokers had lower means in all HRQOL dimensions, although these findings were not statistically significant.

Respondents who slept between 7 and 8 hours per day had a higher mean in General Health. Those who regularly attended medical check-ups (at least twice a year) had higher means in almost all dimensions, except for Physical Functioning, Role-Physical, and Social Functioning, where no statistically significant differences were identified. Respondents who reported undergoing blood tests at least once a year had higher means in General Health, Vitality, Mental Health, and Bodily Pain (Table 4).

Table 4: Self-care and HRQOL dimensions, 2023. (n = 204)

Variable	Categories	PF	RP	BP	GH	VT	SF	RE	MH	HT
Smoking Habit	Yes	NS	NS	NS	NS	NS	NS	NS	NS	NS
	No									
Physical Activity	Not Regularly	88.32	NS	**63.49***	**54.64***	NS	57.85	NS	51.36	**64.23***
	Yes, 1-3 times/week	**94.81***		75.98	64.88		66.83		**59.08***	70.77
	Yes, 4-7 times/week	88.00		80.80	65.20		**69.17***		58.13	74.67
Regular Medical Appointments	Yes	NS	NS	**71.61***	**60.65***	**52.18***	NS	**63.59***	**57.01***	**68.74***
	No			62.82	54.36	44.82		49.80	49.36	63.76
Annual Blood Tests/Controls	Yes	NS	NS	**73.38***	**61.53***	**53.76***	NS	NS	**58.05***	NS
	No			60.63	53.32	42.87			48.14	
Daily Hours of Sleep	≤6 hours	NS	NS	NS	56.34	NS	NS	NS	NS	NS
	7-8 hours				**64.31***					
	≥9 hours				47.57					

Source: Own elaboration.

Note: *p:<0,05. **NS:** Non-significant. **PF:** Physical Functioning, **RP:** Role-Physical, **BP:** Bodily Pain, **GH:** General Health, **VT:** Vitality, **SF:** Social Functioning, **RE:** Role-Emotional, **MH:** Mental Health, **HT:** Health Transition.

DISCUSSION

Prospective nursing professionals face a series of challenges during their training period that can impact their physical and mental health. These challenges include a heavy academic workload, being responsible for the health of their patients, balancing academic, family, social, and work life, high stress and emotional pressure from these activities, and changes in self-care patterns. All of these factors can negatively affect their psychological and physical health in various aspects, ultimately impacting their academic performance. Students whose quality of life deteriorates often experience difficulties in concentration, decision-making, and providing quality care to patients, which reveals the importance of conducting studies in this area.[11-13,20,21] It is noteworthy that the consulted studies were conducted in university populations, establishing this work as a precedent in the non-university population.

While this study shows a positive evaluation of the HRQOL dimensions, the Vitality dimension scored below the cutoff value, indicating low quality of life on this scale. This finding disagrees with several studies, such as that of Fuentes-Heredia & Pastor-Ramírez,[20] who found a medium level of vitality in a sample of 356 nursing students in Peru. It has been described that factors such as academic and clinical burden, stress, and lifestyle changes are related to a decline in vitality in this population.[21] Some studies[22-24] have linked obesity and overweight to a perception of low vitality, making it a relevant area for further exploration in future research.

Regarding self-care activities, it is important to highlight the low prevalence of smoking (18.14%), which is comparable to findings in similar studies.[25] A literature review conducted in 2018 reports that smoking is a habit found in 1.2% to 51.3% of the surveyed students in health careers.[25]

On the other hand, the prevalence of people who are overweight, which is possibly linked to the high rate of physical inactivity, is a concerning factor that requires intervention.[25,26] Various studies have mentioned that the reduction of leisure time, exhaustion due to inadequate sleep patterns, and the overload of academic activities typical of university life are associated with sedentary behaviors and quality of life deterioration.[4,25,27] A study conducted in Argentina[2] with nursing students found that only 24.14% of the respondents received an adequate score regarding their level of physical activity, similar to the results of this study. Furthermore, a positive relationship was found between regular physical activity and positive evaluations in the HRQOL dimensions. This finding is supported by a meta-analysis that included 30 studies and 19,731 students, which found a relationship between quality of life domains (Physical Functioning, Social Functioning, Mental Health, and Vitality) and physical activity.[28]

The number of hours dedicated to sleep and rest was found to be linked to the general health assessment of the students. Regarding this, a study conducted in northeastern China found that adequate rest and good sleep hygiene were related to a better assessment of quality of life in a sample of 926 undergraduate students.[29] These findings are widely supported by the literature.[14,30]

In a study conducted in Colombia, 29.1% of the nursing students reported undergoing regular health check-ups.[4] It was found that more than half of the respondents regularly attended medical consultations and annual blood tests or check-ups. While a higher commitment to this behavior was observed, it is essential to highlight that self-care is generally inadequately implemented.

It is necessary to consider the quality of life of students when planning the curriculum, including aspects that may negatively affect it.[31] Additionally, promoting self-care in educational spaces is crucial so that future professionals not only are able to promote the health of their patients, their families, and the community, but also implement these activities in their daily lives.[25]

One limitation of this study is that it was conducted in a single non-university private institution located in a capital city in Argentina. Additionally, the high number of students in this research who study and work, which is common in Argentina due to the country's socio-economic reality, may not be found in other educational levels or locations.

CONCLUSIONS

The HRQOL of nursing students received a positive evaluation in several dimensions, except for the Vitality dimension. Physical Functioning was the best-assessed dimension, while Vitality was perceived as the least favorable.

Factors associated with lower HRQOL mean values in nursing students included age (being older), gender (woman), attending the morning shift, having a chronic disease, not having children, not working, being sedentary, having an inadequate sleep pattern, not regularly attending medical consultations, not undergoing annual blood tests, and having a high Body Mass Index.

In conclusion, promoting a healthy lifestyle (adequate sleep duration, regular physical activity, not smoking, reducing alcohol consumption, improving eating habits, regular medical check-ups, and annual blood tests) is a key strategy to maintaining and improving HRQOL in higher education students, given its impact on preserving health.

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CBJC: Conception and formal data analysis, collection/obtaining of results, research, methodology, and resources, manuscript writing, critical review of the manuscript, validation, and approval of its version.
JAA: Conception, research, methodology and resources, manuscript writing, critical review of the manuscript, validation, and approval of its version.
ECA: Conception, research, methodology and resources, manuscript writing, critical review of the manuscript, validation, and approval of its version.
MAM: Conception, research, methodology and resources, manuscript writing, critical review of the manuscript, validation, and approval of its version.
DNG: Conception and formal data analysis, results collection/obtaining, research, methodology and resources, manuscript writing, critical review of the manuscript, validation, and approval of its version.

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