

Perceptions of Health and Well-Being Among University Students With Different Cardiovascular Health Indices

Percepciones de salud y bienestar entre estudiantes universitarios con diferentes índices de salud cardiovascular

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Summary

Objective: analyze the differences in the perception of health and well-being between university students with high and low Cardiovascular Health Index (CHI) to identify those modulators that determine their adherence to healthy habits. **Methods:** We conducted a qualitative study with twenty-four students at the Medical School of the Faculty of Medicine of the UNAM, selected through purposive sampling and using the in-depth interview technique as a methodological tool. We structured the information in such a way as to facilitate addressing the differences in the perception of health and well-being based on the CHI to generate a model that would allow visualization of the interdependence between modulators of adherence to healthy behaviors. **Results:** We determined differential patterns in the perception of well-being and health between both groups, identifying the dimensions that influence the cardiovascular health status of the participants, with family support being the principal modulator of cardiovascular health in the analyzed sample. **Conclusion:** The analysis of narratives on the perception of health and well-being among students with high and low CHI revealed that individual habits influenced by family, emotional, and academic modulators determined cardiovascular health.

Keywords: Cardiovascular Risk Factors; Healthy Lifestyle; Qualitative Research; Interviews; Family Support.

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Resumen

Objetivo: analizar las diferencias en la percepción de salud y bienestar entre estudiantes universitarios con índice de salud cardiovascular (ISC) alto y bajo, e identificar moduladores que determinan su adherencia a hábitos saludables.

Métodos: estudio cualitativo realizado a 24 estudiantes de la carrera de Médico Cirujano de la Facultad de Medicina de la Universidad Nacional Autónoma de México, seleccionados mediante un muestreo intencional y utilizando la técnica de entrevistas a profundidad como herramienta metodológica. La información fue estructurada de tal manera que facilitara el abordaje de las diferencias en la percepción de salud y bienestar en función del ISC para generar un modelo que permitiera visualizar la interdependencia entre moduladores de la adherencia a comportamientos saludables. **Resultados:** se identificaron patrones diferenciales en la percepción del bienestar y la salud entre ambos grupos, así como las dimensiones que inciden en el estado de salud cardiovascular de los participantes, siendo el apoyo familiar el principal modulador de este estado en la muestra analizada.

Conclusión: el análisis de las narrativas en la percepción de salud y bienestar entre estudiantes con ISC alto y bajo reveló que la salud cardiovascular se encuentra determinada por hábitos individuales influenciados por moduladores familiares, emocionales y académicos.

Palabras clave: factores de riesgo cardiovascular, estilo de vida saludable, investigación cualitativa, entrevistas a profundidad, apoyo familiar.

Introduction

Cardiovascular health in young adults is an area of interest due to its influence

on the prediction of chronic diseases throughout life.¹ In this sense, the epidemiology of cardiovascular diseases (CVDs), closely related to the loss of cardiovascular health, indicates a global public health problem. It has been estimated that in the Americas, CVDs caused the deaths of 2 million people during 2021, second only to COVID-19. In 2021, the prevalence of CVD in Latin America and the Caribbean was 7.0%, while new cases increased from 2 million in 1990 to 4.1 million, and the total number of prevalent CVD cases rose from 20 million to 47 million during that period. Regarding mortality rates and the annual number of deaths from CVD, these are now higher in Latin America and the Caribbean compared to North America, ranging from 100 to 200 deaths per 100,000 people. About risk factors, most are related to cardiometabolic factors (high blood pressure, cholesterol, diabetes, obesity) and tobacco use.²

According to figures provided by the National Institute of Statistics and Geography (INEGI, Spanish acronym) from January to June 2024, 417,408 deaths were recorded in Mexico, with heart disease being the leading cause of death with 100,710 cases.³ On the other hand, in compliance with a summary of the Global Burden of Disease 2021, several states in the north of the country, as well as the state of Yucatán, reported higher mortality from CVD, with ischemic heart disease as the leading cause of death.⁴ Poor nutrition was also sometimes reported.⁵ In Mexico, a study conducted at the University of Sonora aimed to determine the level of physical activity and the perceived health status of its student population, revealing obesity and overweight con-

ditions, as well as low levels of physical activity.⁶ Other studies conducted at different universities in the country that sought to identify the prevalence of cardiovascular risk factors in their populations reported a high percentage of university students with overweight, obesity, and high blood pressure, in addition to altered lipid profiles, alcoholism, and smoking. Poor nutrition was also sometimes reported.⁷⁻¹⁰

The American Heart Association (AHA) developed the Life's Essential 8 as a framework for assessing cardiovascular health status based on behavioral and biological parameters, thus allowing the classification of individuals according to their cardiovascular health index (CHI).¹¹ However, beyond physiological factors, the subjective perception of health and well-being could modulate adherence to healthy behaviors and determine the risk of developing metabolic and cardiovascular diseases in the future,¹² so CHI levels are linked to psychological and social variables.^{13,14} In this regard, evidence suggests that young people with strong support networks and adequate coping strategies show greater adherence to healthy practices. In contrast, those with fewer support networks tend to experience a progressive deterioration in their physical and emotional well-being.¹⁵ However, the way in which university students conceptualize their health and the factors that contribute to their perception of well-being remains an underexplored area.¹⁶

This study aimed to analyze differences in health and well-being perceptions among university students with high or low CHI, to identify the modulators that determine their adherence to healthy habits and construct a

model that integrates the core dimensions of cardiovascular health in this population.

It is expected that the findings of this research will provide elements for the development of strategies that encourage healthy behaviors, taking into account social and emotional factors affecting student well-being, to guide programs focused on preventing cardiovascular deterioration from an early age.

Methods

The cardiovascular health profile was determined using the CHI. The methodology for calculating the cardiovascular health score according to the Life's Essential 8 (LE8) model, developed by the AHA, is based on the evaluation of eight metrics: diet, physical activity, nicotine exposure, sleep, body mass index (BMI), blood lipids, blood glucose, and blood pressure. Each metric is scored on a continuous scale of 0 to 100 points, with 100 representing optimal health. The overall cardiovascular health score is obtained by calculating the unweighted average of the individual scores for these eight metrics, resulting in a total score ranging from 0 to 100 points.

An initial population of 158 students from the Medical School of the National Autonomous University of Mexico (UNAM), previously assessed to calculate their CHI, were invited by email to participate in this qualitative study. A sample of 24 students was intentionally selected according to their cardiovascular profile: 12 with a high CHI (80 or more component points) and 12 with a low CHI (60 points or less). The sample consisted of 14 women and 10 men, with a mean age of 21 years, enrolled in the first and second years of the bachelor's degree.

The in-depth interview technique was used as a methodological tool, guided by a semi-structured protocol that allowed for a detailed exploration of the subjective dimensions of health and well-being. The instrument design was based on predefined theoretical categories, structured according to the Cisterna-Cabrera proposal,¹⁸ and complemented by the identification of emerging categories obtained during the analysis. Each interview lasted approximately 90 minutes and was conducted in a neutral environment to promote participant comfort and minimize bias in the interaction. All sessions were audio-recorded with high-fidelity equipment, ensuring accuracy in transcription and subsequent analysis. Participation in the study required the signing of an informed consent form by the students, in accordance with current ethical standards. The research protocol was approved by the Research and Ethics Committees of the UNAM School of Medicine under registration number FM/DI/022/2021.

The recordings were transcribed verbatim and analyzed using systematic text condensation, following Malterud's methodology.¹⁹ Open and axial coding was used to identify semantic patterns in the discourses, allowing for the categorization of core elements in the subjective construction of health and well-being. Atlas.ti software was used to organize the data and structure the relationships between emerging categories.

We based the sample selection on Malterud's theory of information power, which posits that the adequacy of the sample size depends on the quantity and depth of information provided by each participant in relation to the study's objectives.²⁰ In this model, a small sample is adequate when the data obtained

present sufficient information richness to answer the research questions and generate robust interpretations. To assess this adequacy, the theory establishes five dimensions: 1. delimitation of the object of study, 2. specificity of the sample, 3. theoretical anchoring, 4. quality of the dialogue, and 5. analysis strategy.

This study met these criteria, ensuring the relevance of the methodological design. We explained each criterion applied in this work below.

The research objective was clearly defined, allowing for focused data collection aimed at identifying differential patterns.

Sample specificity was ensured through stratified purposive sampling, selecting participants based on their CHI. We established two groups: one with high values and one with low values, ensuring sufficient variability within each category. In turn, we implemented random selection within each stratum to minimize selection bias and allow the inclusion of heterogeneous perspectives, enriching the qualitative analysis.

The study was based on the theoretical framework provided by AHA's Life's Essential 8, which allows for data interpretation within a validated model of cardiovascular health. This theoretical framework facilitated a structured comparison of participants' accounts and contextualized their perceptions in relation to behavioral and physiological factors previously established in the literature.

The quality of the dialogue was carefully maintained to ensure that the interviews fostered a detailed and thoughtful expression of individual experiences. Accordingly, we designed a semi-structured interview protocol incorporating open-ended questions

and comprehensive inquiry strategies to effectively capture nuanced discourse and enhance the depth of information gathered. Attention was paid to the relationship between interviewer and interviewee, creating an environment that fostered openness and trust to obtain detailed and truthful testimonies.

Data analysis was structured in sequential stages, incorporating preliminary reviews after the first round of interviews. This strategy enabled real-time assessment of information saturation, identifying whether the data obtained was sufficient to answer the research question. The systematic text condensation technique outlined by Malterud was applied,¹⁹ incorporating open and axial coding that facilitated the identification of emerging patterns.

For data interpretation, we adopted a methodological strategy based on modified grounded theory, following the methodological guidelines proposed by Charmaz.²¹ This strategy facilitated the analytical co-construction of emerging

categories through dialogue between researchers and participants, enabling the generation of an interpretive framework that reflected the differences in perception of health and well-being between groups with high and low CHI. The flexibility of this methodological strategy facilitated the integration of predefined categories and the incorporation of new emerging dimensions, thus enriching the understanding of the study phenomenon.

We developed the analytical process in three sequential levels. At the first level, an open and axial coding scheme was applied, through which the data were fragmented, compared, and reorganized into meaningful units. This level allowed for the identification of recurring discursive patterns and the construction of a preliminary categorical structure, in which individual experiences were grouped based on their semantic similarities and differences. The initial methodological structure included predefined categories. However, the analysis iden-

tified additional dimensions, resulting in the redefinition and expansion of the original categories.

At the second level of analysis, we organized the narratives into five main subcategories (Table 1). These subcategories emerged from the interrelationship between the empirical data and the theoretical framework of the AHA's Life's Essential 8,¹¹ allowing a more comprehensive analysis of differences in health and well-being perceptions as related to CHI. The structuring of these subcategories facilitated the identification of elements that influenced self-perception of cardiovascular health, demonstrating the interaction between individual and collective variables in the construction of subjective well-being.

At the third level of analysis, we designed a conceptual framework to synthesize the main dimensions that contribute to participants' cardiovascular health. This integrative model allowed for the visualization of the interdependence among factors that modulate adherence

Table 1. Methodological Design.
The Construction of a Priori Categories Is Shown, in Sync with the Research Question

Thematic scope	Research problem	Research questions	General objectives	Classification	Subclassification
Student health and wellness	Differences in perceptions of health and well-being between students with high and low cardiovascular health scores	1. What are the concepts of health and well-being among students? 2. How does health status influence the perception of academic and emotional well-being?	1. Describe the conceptions of health and well-being among students 2. To evaluate the influence of health status on the perception of academic and emotional well-being	1. General attitude	1.1. Influence of the academic environment
				2. Beliefs about health	1.2. Importance of health in daily life
				3. Healthy factors	1.3. Personal wellness practices
				4. Emotional contrast	1.4. Emotional perceptions
				5. Attitude towards health changes	1.5. Changes in health perception over time

Table 2. Phase I: Categorization and Analysis of Testimonies

Subclassification	Description	Representative testimonials of high CHI	Representative testimonials of low CHI	Descriptive analysis	Interpretive analysis
1.1 Influence of the academic environment	Relationship between cardiovascular health and well-being in the academic field	“Mmm, well, because right now at school I feel good, right now I have no problems and at home I have the full support of my parents”	“Ah, well, at school I feel fine right now, since I don't have many problems, but at home sometimes I do feel tired because of household chores”	Students with high CHI describe a stable environment, both academically and personally. In contrast, those with low CHI report partial well-being, influenced by external factors such as household chores	Family support and the burden of external responsibilities can modulate perceptions of academic well-being. Environmental stability acts as a buffer against stress for students with high CHI, while greater external burdens interfere with their well-being for those with low CHI
1.2 Importance of health in daily life	Health assessment and its influence on academic performance	“Yes, in fact, yes, well, I feel that if I eat well, if I exercise, well that helps me to be well”	“Well, for me, health is very important in terms of my performance. If I feel good, I perform well at school”	Both groups recognize the importance of health, but high CHI students view it as a comprehensive self-care strategy, while low CHI students associate it more with their immediate academic performance	Students with high CHI engage in healthy practices preventively, while those with low CHI engage in them reactively, prioritizing immediate effects. This could influence long-term adherence to healthy habits
1.3 Personal wellness practices	Strategies and habits adopted to maintain well-being	“Well, I say that it does influence how we feel, because if we're well, we eat well, we rest well, then that's reflected”	“So, this is what helped me and what I saw was that when I ate well and rested well, I felt better”	Students with high CHI describe wellness habits as a systematic and consistent practice, while those with low CHI identify them as beneficial but do not maintain them regularly	Students with high CHI have developed structured self-care strategies that contribute to their physical and emotional stability. In contrast, those with low CHI recognize the importance of healthy habits, but their inconsistent practice suggests external barriers or planning difficulties
1.4 Emotional perceptions	Relationship between emotions and maintaining healthy habits	“... when I manage to maintain healthy habits, I feel good and happy because I see that I am doing things right”	“Ah. Ay, I don't know what I feel, it's like everything is very tired, but I must keep going”	Students with high CHI associate maintaining healthy habits with satisfaction and emotional well-being, while those with low CHI report burnout and see these practices as a burden	Students with high CHI experience positive emotional reinforcement that encourages adherence to healthy habits. In contrast, those with low CHI perceive self-care as demanding, which can affect its long-term sustainability
1.5 Changes in health perception over time	Evolution of health status and its impact on well-being	“Well, I feel like I've improved compared to last year, because I've been exercising more and taking more care of what I eat”	“I think my physical health isn't very good right now. I feel like not exercising has affected me a lot”	Students with high CHI perceive a progressive improvement in their health due to the implementation of healthy habits. In contrast, those with low CHI report a deterioration in their physical fitness due to a decrease in physical activity	Students with high CHI reinforce their habits as they experience improvements in their health, creating a positive feedback loop. Those with low CHI perceive a decline, which can make it complicated to adopt positive changes

to healthy behaviors. The structure of the framework was based on the interaction of these elements within a dynamic continuum, which configures participants' cardiovascular well-being.

Results

We organized the findings into two levels or analytical phases. Phase I presented representative testimonies from each identified subcategory, differentiating between students with high and low CHI. Based on these testimonies, we conducted descriptive and interpretive analysis, enabling the establishment of differential patterns in the perception of well-being and cardiovascular health (Table 2).

Phase II integrated an interpretive scheme that synthesized the main dimensions influencing the cardiovascular health status of the participants, offering an overview of the coexisting factors (Figure 1).

Cardiovascular health lies at the center as the unifying axis of the three identified factors. The size of each petal represents the magnitude of its influence: family support is the largest, reflecting its determining role; emotional regulation occupies an intermediate position, indicating its function as a modulator of resilience; while the academic environment is the smallest, demonstrating its lesser direct impact, although it is relevant in shaping well-being. Created at <https://BioRender.com>.

The interpretative analysis identified three dimensions that influence participants' cardiovascular health status: self-care practices, perception of well-being, and psychosocial context. These dimensions interact in a dynamic model that influences adherence to healthy habits and subjective perception of health (Figure 1). This model summarizes the

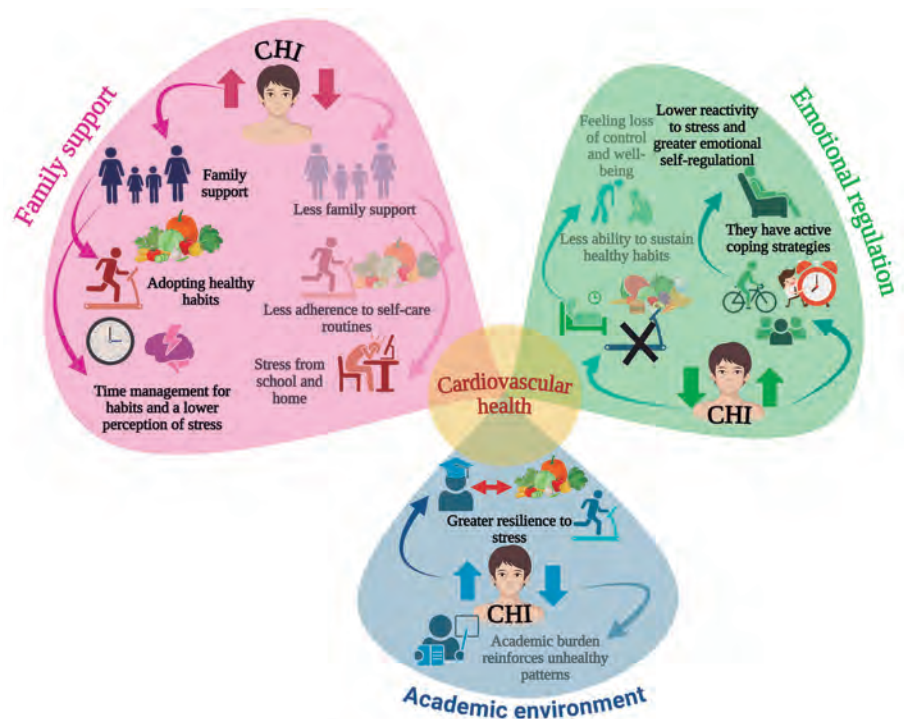
interrelationship between the environment, emotions, and individual self-care strategies shaping students' cardiovascular health.

In addition to identifying the dimensions that impact students' cardiovascular health, the analysis also revealed that family support is the principal modulator of cardiovascular health in the study population (Figure 1). Students with a high CHI reported that family support facilitated the adoption and maintenance of healthy habits like a balanced diet and regular physical activity. In this group, family functioned as a protective factor by diminishing perceived stress and supporting effective time management for the implementation of

wellness practices. In contrast, students with a low CHI reported less availability of family support, which generated additional challenges for maintaining healthy habits. Furthermore, this group presented higher levels of stress, partly attributed to the burden of responsibilities outside the academic environment, such as household tasks.

Emotional regulation was identified as the second most important modulator within the model (Figure 1). Students with a high CHI demonstrated more effective emotional self-regulation strategies. This group reported the implementation of active coping strategies, such as exercising, time planning, and seeking out support networks, which

Figure 1. Phase II: Visual Model of the Determining Modulators of Cardiovascular Health



favors less reactivity to stress and greater emotional stability. In contrast, students with a low CHI expressed difficulties in managing stress, which generated greater vulnerability to the negative effects of academic load and external pressures. In this group, poor emotional regulation translated into a reduced ability to maintain healthy habits, reflected in irregular eating habits, lack of physical activity, and altered sleep patterns. Likewise, these students reported an emotional state characterized by exhaustion, frustration, and a feeling of loss of control over their well-being.

On the other hand, although the academic environment had a little effect compared to the previous modulators (Figure 1), its influence on cardiovascular health was evident in both groups. Students agreed that academic load represents a significant source of stress, but the way this pressure affects health differs according to their CHI. Students with a high BSI demonstrated more structured time management strategies and an attitude focused on preventing physical and mental exhaustion. Their ability to balance academic demands with healthy habits indicated greater resilience to stress, which mitigates its effect on cardiovascular health. In contrast, students with a low BSI experienced difficulties structuring their time, which affected their diet, physical activity level, and sleep quality. The absence of effective coping strategies resulted in a cumulative effect, in which the academic load became a factor reinforcing unhealthy behavior patterns.

Discussion

The findings of this study reflected the interrelationship between psychosocial and behavioral factors in university

students' self-perception of health and well-being. The distinction between high and low CHI groups suggested that adherence to healthy habits and perceptions of well-being depend on the interaction between social support, emotional regulation, and coping strategies in the face of academic stress.

Family support was the principal modulator of well-being in university students. Those with high CHI frequently mentioned that the presence of a support network facilitated the implementation and sustainability of healthy habits, consistent with previous studies that have highlighted the influence of family dynamics on the adoption of health-protective behaviors.¹ In this group, the emotional and material support from the family environment served as a buffer against stressors. It helped maintain a better balance between academic demands and self-care. These results align with a previous study that examined the relationship between family functionality and risk behaviors in health science students, finding a correlation: a functional family is linked to better university adjustment, healthier eating habits, and improved academic performance. Unlike our study, the earlier work did not focus on cardiovascular health, and its approach was quantitative, using two questionnaires as instruments.²² Alternatively, students with low CHI reported less availability of support, which led to difficulties in consistently maintaining healthy habits. The absence of a solid support structure was associated with greater vulnerability to stress and greater difficulty prioritizing personal well-being. This finding is related to previous research showing the relationship between lack of social support and lower adherence to healthy practices, as

well as its influence on cardiovascular health. It noted the authors conducted this research in a non-university adult population and that the study type was quantitative, including various instruments to measure the proposed variables, including questionnaires, surveys, and both somatometric and biochemical measurements.¹⁵ This finding is also connected to another quantitative study, in which components of the lifestyles of university students and their relationship with socio-environmental factors, such as family, were explored, finding an association between family dysfunction, suicidal risks, and eating disorders.²³

Emotional regulation capacity represented a primary modulator of the difference between the two CHI groups. Students with high CHI reported the use of active coping strategies that facilitated maintaining a balance between their well-being and academic demands. The literature suggests that effective emotional regulation improves the perception of well-being and is also associated with a lower incidence of cardiovascular disease in the long term.²⁴ In contrast, students with low CHI described difficulties in stress management, affecting their ability to maintain healthy habits. The perception of burnout and lack of control over well-being were constant in this group and reinforced the hypothesis that emotional instability increases susceptibility to unhealthy lifestyles and their adverse physiological effects.¹³ In this regard, a 2020 study aimed to examine the relationship between academic stress, body composition, and emotional regulation in female university students using a descriptive-correlational approach. The study employed four measurement tools, primarily questionnaires, to assess the variables under analysis. The analysis

of the results of this study reinforces what was obtained in our work, since it was shown that higher academic stress scores, higher BMI and body fat percentage scores, as well as lower emotional regulation scores and vice versa, that is, there is a relationship between emotional regulation, academic stress, and health in a population of university students.²⁵

Although the academic environment was the least influential modulator compared to family support and emotional regulation, its effect on adherence to healthy habits was evident. Students with high CHI showed greater organization and proactivity in time management, which allowed them to mitigate the impact of academic stress on their health. This finding is consistent with research that has documented the importance of time management skills in promoting student well-being,¹⁴ including the inverse relationship between academic stress and time management, as determined by a quantitative study conducted with university students using two standardized questionnaires.²⁶ In contrast, students with low CHI reported difficulties in managing their time, which led to irregular eating habits and reduced physical activity. This situation has been observed in other research, where poor time management is associated with low physical activity,²⁷ while individuals with good time management tend to maintain healthier eating habits in both quality and quantity.²⁸ In this regard, a qualitative study conducted with adolescents (13-14 years) analyzed the motivations and perceived barriers to healthy eating and physical activity through focus groups. Its results indicated that one of the main barriers to performing both activities was a lack of time, demonstrating that these behaviors arise at an early age.²⁹

One limitation of this study is its single-center design, specifically at the Faculty of Medicine of the UNAM. It is necessary to explore other faculties and university centers, whether private or rural, to enhance the model and broaden the applicability of the results. Considering the use of additional research methodologies, such as mixed methods, might be beneficial as they enable the triangulation of qualitative and quantitative data, thereby enhancing the credibility of the findings.

For future studies, it would be pertinent to evaluate the role of the principal modulator of well-being identified in this research—family support—in the context of cardiovascular health. Among Health Science students, this is relevant given that their lifestyles are risk factors for the development of cardiovascular disease.³⁰ Whereas in first-year residents, cardiovascular disease progression is associated with a poor support network and functionality.³¹ An intervention designed around this modulator will allow us to determine the impact on the health and well-being of this population.

Based on the findings, it is recommended to implement intervention strategies that consider the three identified modulators by promoting healthy habits, strengthening support networks, and developing emotional regulation in university students, following the example of programs that have demonstrated positive effects on youth cardiovascular health.³²

The framework of modulators identified in this study provides an integrative perspective for designing university policies focused on improving student well-being. Initiatives that incorporate strategies to promote social support, emotional regulation training,

and academic management optimization could prevent a decrease in cardiovascular health in this population.

Conclusion

The analysis of students' narratives revealed that cardiovascular health is determined by individual habits, which are affected by familial, emotional, and academic factors. Family support is identified as the most relevant factor in adherence to healthy behaviors, followed by emotional regulation, which modulates the ability to cope with stress. Academic load, although significant, appears to have an effect conditioned by the presence or absence of the first two factors.

These results suggest that university health intervention strategies should be re-evaluated, with an emphasis on adopting a multidimensional approach that considers the interactions between these determinants. Future studies could delve deeper into the specific dynamics of social support and its interaction with cardiovascular health in student populations, integrating mixed methodologies that allow for a better understanding of these processes.

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Authors' contribution

R S-C; JA C-M; L L-C; CA C-C; L G-V: conceptualization, development and writing of the manuscript; R S-C; JA C-M; L L-C; CA C-C; L G-V: data collection and analysis, manuscript writing; R S-C; JA C-M; L L-C; CA C-C; L G-V: data analysis and interpretation, discussion of results; R S-C; JA C-M; L L-C; CA C-C; L G-V: critical review and editing of the manuscript; R S-C: supervision, conceptualization and final review of the manuscript. All authors approve the publication of this paper.

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Conflicts of interest

The authors declare that they have no conflicts of interest that could influence the interpretation or presentation of the results.

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