

Triadic mental quotient and lifestyles in university students during pandemic-induced confinement

Edgar Eloy Carpio-Vargas¹, Fred Torres-Cruz^{1*}, Elsa Gabriela Maquera Bernedo², Frida Judith Málaga Yanqui², Haydee Celia Pineda Chaiña², William Harold Mamani Zapana², Fredy Heric Villasante-Saravia¹

¹Academic Department of Statistics and Computer Engineering, Universidad Nacional del Altiplano de Puno, Puno-Peru. ²Academic Department of Nursing, Universidad Nacional del Altiplano de Puno, Puno-Peru.

Correspondence: Fred Torres-Cruz, Academic Department of Statistics and Computer Engineering, Universidad Nacional del Altiplano de Puno, Puno-Perú. ftorres@unap.edu.pe

ABSTRACT

This research seeks to elucidate the correlation between triadic cognitive quotient and patterns of lifestyle among university learners at the National University of Altiplano-Puno-Peru during the COVID-19 pandemic. We applied a non-experimental quantitative methodology, encompassing descriptive, correlational, and multivariate statistical tools. The study sample was composed of 399 students from diverse professional faculties. The FANTASTICO healthy lifestyle instruments and the Tri-cerebral Quotient Revealer were utilized for data collection. It was determined that 87.3% of the students displayed excellent or good lifestyle habits, stemming from reduced alcohol, drug, and tobacco use during the confinement phase. In terms of triadic cerebral application, a predominance of right and central-left cerebral application was observed. Excellent lifestyle habits were found to correspond with right-brain dominance, while good lifestyle habits were associated with central and left-brain dominance. There was no considerable variation between students originating from Quechua and Aymara areas regarding the mother tongue and cerebral application. The conclusions indicate that university learners tend to manifest more emotional and operational tendencies, with reduced logicity, and that their behavior and lifestyle habits have significantly shifted due to the impacts of the pandemic.

Keywords: Lifestyle, Brain lateralization, Sleep, Stress

Introduction

The health of university students has not aroused real interest until recently; however, a good university performance depends a lot on the lifestyle, diet, and physical and mental health of the students; In Peru, 19.6% of men and 17.3% of women are between 10 and 19 years old [1], as of 2016 only 35.8% had higher education, of them the 21.5% with university education

and 14.3% non-university [2], with students from urban areas presenting a better educational level [3]. The university as a space in which knowledge is generated, trains professionals and future decision-makers who will influence family groups and others to which they belong through their opinions and values [4], playing a leading role in society, which implies not only participating in the processes of science, culture and art, but also promoting healthy lifestyles [5]; For this reason, university students require from the first years of study, a process of self-knowledge, individual and collective awareness that allows them to assume healthy lifestyles with responsibility and commitment; Although health care habits are acquired from childhood and are structured with some regularity in adolescence, it is in the stage of youth where it crystallizes [6] and once acquired and assumed, it is complex to modify them [7].

Today's university students are very diverse socially and culturally, connected and lonely, more immature, dependent,

Access this article online

Website: www.japer.in

E-ISSN: 2249-3379

How to cite this article: Carpio-Vargas EE, Torres-Cruz F, Bernedo EGM, Yanqui FJM, Chaiña HCP, Zapana WHM, et al. Triadic mental quotient and lifestyles in university students during pandemic-induced confinement. *J Adv Pharm Educ Res.* 2023;13(3):88-95. <https://doi.org/10.51847/bDdfcMvcJ1>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

and with a great capacity to obtain information because they are digital natives [8]; Due to the health crisis with restrictions and social isolation due to the COVID-19 pandemic, they have experienced nostalgia for the face-to-face teaching model, specifically due to the lack of coexistence with their classmates and teachers, which has generated alterations in mental health [9], modification of the traditional lifestyles of the population, anxiety or stress from staying at home, decreased physical activity and less motivation to eat a healthy diet [10], therefore it is important to highlight that verbal and visual communication allows for reciprocal interactions and encourages early regulation of emotions, as well as social and cognitive development [11]. Studies referring to lifestyles in university students from Colombia, Spain, and Peru, in the years 2014, 2011, and 2010 respectively, found that these were healthy in just over half of the population, predominantly females; However, the results of research in Colombia, Mexico, Spain and Peru (Lima and Puno) as of 2017, show that lifestyles are not healthy, increasing over the years, mainly in careers in the sciences of life. Health [12, 13]. On the other hand, the concern and effort of the university regarding curricula and educational programs are aimed at developing the potential of which the brain of adolescents and young people is capable [14]; knowledge of the brain and its functions progresses slowly in anatomical and neurophysiological aspects and much more slowly in aspects of educability and its use. Therefore, it is necessary to know the mental processes of university students and the approach of the brain as a system. Investigating brain predominance and its relationship with healthy lifestyles will allow us to better understand how people learn to develop their full potential; Although there is no certainty of the actual brain functioning, a functional neuroimaging study demonstrated a significant negative association between measures of emotional intelligence and effective connectivity [15]. Likewise, there is the model of the triune brain by Paul MacLean (1970), based on the theory of evolution in the Darwinian style, where three brains overlap each other. The first, the most primitive - reptilian (instinctive, physical), which includes the cerebellum, brain stem, and reticular system; then the emotional brain (the limbic system) developed: which includes the amygdala, the hippocampus, the thalamus, the hypothalamus, among other components, this brain allows the formation of groups (establishment of links), and helps to work and mediate what happens in the external environment with what happens inside the organism (allows socialization). These two "brains" form an instinctive emotional system and help ensure survival. The third, the logical-rational brain (the executive brain, the neocortex) developed on this emotional brain, which allows thinking, reasoning, deciding, controlling impulses, strategies and tactics, language, and motivation.

Based on this theory, Waldemar de Gregori proposed the approach of the brain as a system, which is evolutionary and systemic but is also triadic, considering everything in sets of 3 elements or factors [16], in permanent adaptation [17], this being the essential element of all learning. Previous studies have shown that the cerebral hemispheres have differentiated structures and

functions: the right visual and synthetic, the left analytical, and with good calculation capacity [18]. Additionally, the left hemisphere deals with logical, abstract, and linear thinking and the right hemisphere focuses on intuition, imagination, and the visual, the specialization of one of these hemispheres is called cerebral dominance [19].

Despite this knowledge, scientific work prioritizes the left hemisphere, unaware that we are integral beings: creative, effective, and instinctive, qualities of the triune brain, within the perspective of tri-cerebral evolution [20]. To quantitatively identify the intellectual, emotional, and pragmatic quotient (left, right, and central brain) there is the Tricerebral Quotient Revealer, which designates as the dominant brain, the one with the highest score; the one that follows it in score is called subdominant; and to the third in score, support brain. When you have the dominant central brain you are practical, organized, and successful both at work and in business. If the dominant is the right brain, the person is affective, sensitive, creative, and dreamy. When the left brain dominates, one is a thinker or intellectual [17].

Tricerebral quotient in university students, in Spain it is considered that emotional regulation can facilitate an adequate quality of life-related to health; it means that the predominance of the right or emotional brain would allow the development of better lifestyles [21]; It is also known that central and left brain dominance is higher in systems engineering university students in Colombia [22]; and the dominant brain in Nicaraguan Psychology students was the left - rational, followed by the right [14]. In Peru there are few investigations carried out on university students and their brain dominance, no research associates this variable with lifestyles, which are currently responsible for the incidence of chronic degenerative diseases and the prevalence of infectious diseases.

The National University of the Altiplano houses students from the 13 provinces of the region and other neighboring regions such as Arequipa, Cusco, Moquegua, and Tacna. The purpose of the university is to become a true trainer, not only of the academic professional area but also of a holistic quality coupled with the training of professional citizens with high critical thinking focused on solving unconventional problems with creative and innovative acuity and with a frank ability to relate to others and him in a humane and committed way [14].

The objective has been to determine the association between lifestyles and tri-cerebral dominance, based on the hypothesis that there is an association between both variables. Based on the results, the nursing professional will be able to promote healthy lifestyles and comprehensive development, also based on the Comprehensive Health Care Model for Life Course, in force in the country [23]. Every educator must know how the brain works to promote a balance between its different brain structures and its educational development since it is certain that the brain processes information that reaches the senses and based on it, ethical and professional social conduct is established. or academic [24].

Materials and Methods

The study has been carried out under the postulates of quantitative methodology. It is a non-experimental design of a cross-sectional descriptive-correlational nature. The research was carried out on 399 university students of both sexes and from 4 professional areas: biomedical (96), social (176), engineering (87), and economic and business sciences (40) whose ages ranged from 17 to 23 years.

Instrument

Tricerebral Quotient Revealing Test (FANTASTICO) for adolescents is a one-dimensional instrument with a Cronbach's alpha above 0.81 [25], designed by Waldemar de Gregori [17, 26]; which evaluates the brain predominance of students and is made up of 27 items; each with a score between 1 and 5 (Likert-type scale). The procedure consists of adding the results corresponding to each figure; The one with the highest score will be the dominant, the one immediately below will be the subdominant and the third will be the support. It includes the law of proportionality, which means that the sides with less than two points of difference or tie are cancelled; while those with a difference greater than seven points, the highest dominates the lowest (Appendix 1). To measure lifestyles, the FANTASTICO questionnaire validated by Betancurth, Vélez and Jurado in 2015 was used, who concluded that it has optimal levels of content validity and reliability, with a Cronbach's alpha > 0.80 [27].

The questionnaire enjoys the assumption of parsimony, characterized by being brief and simple, represented by letters, whose domains are: F = Family and friends; A = Physical activity; N = Nutrition; T = Tobacco and toxic substances; A = Alcohol and other drugs; S = Sleep / Stress; T = Work/Personality type; I = Introspection; C = Health and sexual behaviors; O = Other Behaviors. The questionnaire has 30 items, with three response options that have a numerical value of 0, 1, or 2; the sum of the values of each domain is multiplied by two; the sum of all the resulting scores makes it possible to obtain the global score that classifies the lifestyle of the subjects into five levels: danger if you obtain 39 points or less; bad if you get between 40 to 59 points; regular from 60 to 69 points; good from 70 to 84 points; and excellent from 85 to 120.

Procedure

The instruments were designed using digital channels like Google Forms format due to the confinement due to the pandemic and were administered to the sample following the following procedure: they coordinated with the directors and teachers of the different selected professional schools, who through social networks they shared the link to the google forms, which included the informed consent, the data collection was carried out in the second semester of 2021 from October to December. The study was approved by the Institutional Research Ethics Committee of the Universidad Nacional del Altiplano; in this

sense, it met the ethical criteria for research with human beings. Subsequently, a database was built for the processing described below.

Analysis of data

First, data cleaning was performed to detect possible missing data and outliers; later the data was encrypted and stored in a database with restricted access. Subsequently, the data was passed to a Psychometric evaluation using the JAMOVI software, which reports the following results:

	Mean	SD	Cronbach's α	McDonald's ω
Scale	3.75	0.554	0.911	0.916

Likewise, the data were subjected to descriptive and graphic analysis. **Table 1** shows the reliability statistics. To identify the difference between the observed and expected values, the chi-square test of agreement was used; To establish the relationship between lifestyles and brain predominance, the technique of simple correspondence analysis was used, focusing on the figure of the symmetrical distribution; To determine the relationship of responses to the dimensions of lifestyles, the statistical technique of cluster analysis was used to group the variables.

Results and Discussion

The results of the statistical analyses carried out based on the proposed objectives in this paper are shown below.

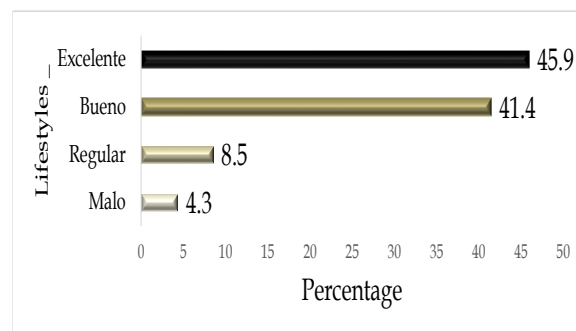


Figure 1. Lifestyles of university students in times of confinement due to the pandemic.

Figure 1 delineates the lifestyle categorization of university students during the pandemic period, characterized as 'excellent' (45.9%), and 'good' (41.4%), collectively accounting for 87.3% of the total. Moreover, the mean lifestyle score was quantified as 83.6 on a scale of 120, accompanied by a standard deviation of 13.4. The spectrum of lifestyle scores spanned between the minimum (44) and maximum (120), in accordance with the guidelines established by the utilized instrument. The categories of 'bad' and 'regular' lifestyles constituted a significantly smaller proportion when compared to the 'good' and 'excellent' categories.

Table 2. Lifestyles of university students in times of confinement due to the pandemic, by areas of study

Study Area	Lifestyles								Total	
	Excellent		Well		Regular		Bad			
	f	%	f	%	f	%	f	%	f	%
Biomedical	39	40.6	44	45.8	11	11.5	2	2.1	96	100
Social	84	47.7	75	42.6	10	5.7	7	4.0	176	100
Engineering	42	48.3	32	36.8	8	9.2	5	5.7	87	100
Economics and Business sciences	18	45.0	14	35.0	5	12.5	3	7.5	40	100

Table 2 shows the lifestyles according to the proposed areas of study, it can be seen that, in the students of the areas of engineering, social sciences and economic and business sciences, the excellent lifestyle predominates with 48.3 %; 47.7% and 45.0% respectively; while in the biomedical area the good lifestyle reaches a higher percentage with 45.8%.

When comparing the expected and achieved scores in the different dimensions of the lifestyle questionnaire, considering that if the value achieved is closer to the expected, one is healthier or vice versa. The dimensions with the least healthy scores are: control of health/sexual behavior (2.5/6); introspection (3.7/6), work/personality type (3.6/6), presence of sleep/stress (3.8/6), physical activity (3.6/6) and nutrition (4, 0/6); On the contrary, the alcohol and other drugs dimension reaches healthy scores (11.5/12).

Analysis of the dimensions of lifestyles

To describe the dimensions of lifestyles, the multivariate technique of cluster analysis has been used, showing the results utilizing a dendrogram Figure 2 of homogeneous groups in their responses.

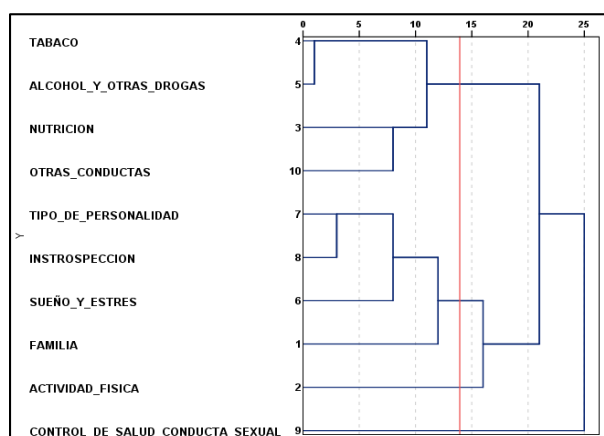


Figure 2. Dendrogram for homogeneous groups of the dimensions of lifestyles in university students, in times of confinement due to the pandemic.

To establish the similarities of behavior against the dimensions, the Ward grouping method has been used with a chi-square association measure, cutting at 14. The results show that the dimensions of Tobacco, Alcohol and other drugs, nutrition, and other behaviors had similar responses by university students, that is, the behavior in these dimensions is similar, being able to classify them as dimensions towards the tendency of some vice.

Another group of similar responses is made up of personality type, introspection, sleep and stress, and family dimensions, which can be classified as dimensions referring to personality formation and stress problems.

The variables physical activity and control of health and sexual behavior behave independently in terms of the similarity of responses with the other variables, that is, there is no dependency between physical activity and sexual behavior and health of adolescents, as well as with the other dimensions of the variable.

Brain dominance

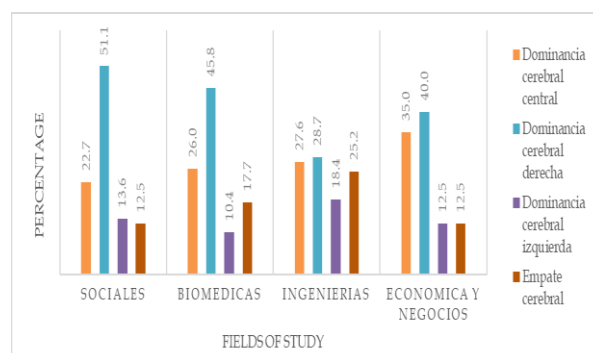


Figure 3. Cerebral dominance in university students, by area of study.

Figure 3 shows brain dominance by study area. We can see that the use of the right brain predominates in the Social Sciences (51.1%) and Biomedical (45.8%) areas; In the area of engineering, the use of the central brain (27.6%), right brain (28.7%) and a significant percentage of brain tie (25.2%) predominate. The percentages are very similar with a lower percentage of students presenting left brain dominance (18.4%); in the area of economics and business, the use of the right (40%) and central (35%) brain predominates.

Figure 4 shows brain dominance by area of origin that would be closely linked to speaking the mother tongue. The analysis can be started by indicating that there are no similar studies on brain dominance in mother-speaking students, this being a first observation on this variable. In students who come from Quechua areas (46.5%), Aymara (47%) and those from the city (42.3%), the use of the right brain predominates widely, followed by the use of the central brain with significant percentages.

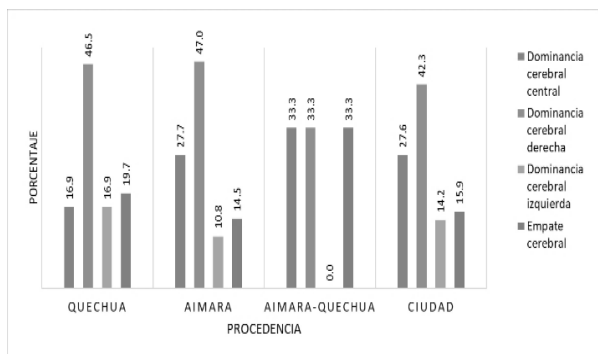


Figure 4. Cerebral dominance in university students, by area of origin.

Cerebral dominance and lifestyles

To establish relationships between the different indicators of the variables cerebral dominance and quality of life, the technique of simple correspondence analysis was used, the results of which are shown below. The chi-square statistic of the contingency tables has a point value of 14.791 with 9 degrees of freedom and a probability of 0.0457, which is less than 0.05 (chosen significance level), therefore, it can be concluded that there is a direct significant statistical relationship between lifestyles and types of brain dominance.

Regarding the symmetrical relationship between the responses to the variables under study, these behave as follows:

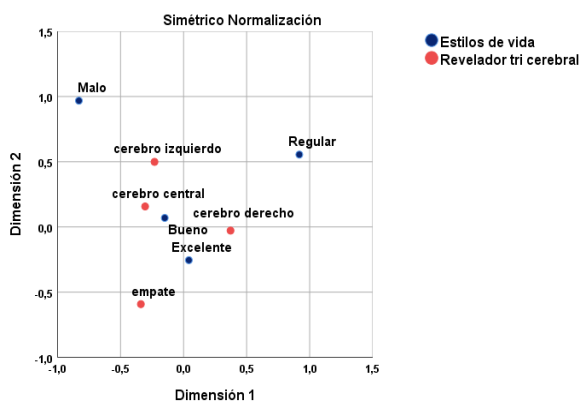


Figure 5. Symmetrical distribution of lifestyle and brain dominance in university adolescents in times of pandemic

Figure 5 shows that, in university students with excellent lifestyles, right brain dominance predominates; in students with good lifestyles, central brain dominance and left brain dominance predominate, respectively; Finally, regular and bad lifestyles are not related to any brain dominance. The tie cerebral predominance is shown to be far from the relationship with any type of cerebral dominance.

It should be noted that these results correspond to the time of confinement due to the pandemic, so university students were limited to carrying out individual or group social activities.

The university stage is an opportunity for personal development but it is also considered to be of great vulnerability and risk given the changes they face. They belong to a particular generation assuming the responsibility of developing their habits and lifestyles that will determine their quality of life. future life.

The World Health Organization defines healthy lifestyles as a "general way of life based on the interaction between living conditions in a broad sense and individual behavior patterns, determined by socio-cultural factors and personal characteristics" [28].

The styles of life in university students of Puno are good and excellent primarily; Similar results have been found at the Universidad Nacional Mayor de San Marcos in Lima, where 60% of students had a healthy lifestyle [29]; In Puno, regarding the dimensions of lifestyles, it was found that the least healthy are: health control/sexual behavior, introspection, work/personality type, presence of sleep/stress, physical activity, and nutrition; the one referring to the consumption of alcohol and other drugs is healthier, since very few adolescents consume them; this is similar to the results found in Colombia [30] where the majority of students expressed inefficient communication with parents to address sexuality issues.

Other studies in Colombia reported that students of technological careers do not perform physical or leisure activity; 88% consume fast foods, 74% skip main meals; they do not present consumption of alcohol and illegal drugs; 43% have sleep disturbances; they do not have interpersonal relationships; in the emotional dimension, 55% state that they have felt sadness, boredom, loneliness, anguish, stress or nervousness [13]; in university students of the physiotherapy, respiratory therapy and speech therapy program, it was highlighted that two dimensions evaluated obtained an unhealthy score: physical activity and leisure, and the dimension of food qualified as highly healthy [31]. In contrast, at the Universidad Nacional Mayor de San Marcos de Lima, it was found that in the dimensions of health, with responsibility (76.7%) and physical activity (82.9%) an unhealthy lifestyle predominates [29]. These results have probably been altered due to the health emergency measures established by the Peruvian government since March 2020, as a consequence of the COVID-19 pandemic.

The results obtained could indicate that the nursing professional is probably not identifying risky habits or behaviors that affect the health status of university students, nor proposing strategies that promote healthy lifestyles, in addition to the fact that students do not seek health care; Therefore, it is important to evaluate the lifestyles of university students periodically because it is in higher education where responsible attitudes towards healthy lifestyles are appropriated [32].

The results of lifestyles, according to study areas, show that the social area presents a higher percentage of students with excellent lifestyles, followed by engineering and economic and business sciences; the students of the biomedical area present a good lifestyle; These results are similar to those found at a private university in Lima in 2018, where 51% of students presented an unhealthy lifestyle and 49% healthy, but they also found that Health Sciences students predominantly have an unhealthy lifestyle [12]. It could be assumed that health science students with knowledge about aspects of the area, health promotion, and disease prevention, could take better care of their health; however, it can be affirmed that knowledge does not guarantee the practice or compliance with healthy lifestyles.

Regarding the brain predominance variable, it was found that university adolescents in the areas of economics and business, biomedical, and social sciences have right brain dominance, and in engineering, left brain dominance reaches the highest percentage compared to the other areas; Regarding the disproportion due to a tie or brain conflict, this occurs in all areas, being greater in engineering. A study in particular on university students from the Faculty of Education of Puno-Peru shows a similar behavior, where there is a predominance of the right (52%) followed by central (35%) and left (13%) [24]; another study in tenth-grade students of an educational institution in Pereira - Colombia, obtained right dominance (53.8%), followed by central (30.8%) and finally left with (15.4%) [33]. Probably people develop skills and abilities related to doing and being that prepare them for work since high school and are linked to the right and central brain respectively. The human brain has three mental processes (Logical, Creative, and Operative), three ways of looking at reality, three ways of learning, three ways of feeling, and three ways of doing things; the predominance is called proportional and favors the assimilation of the three types of knowledge if there are no other obstacles. University students with a predominance of the left brain have a predilection for careers in philosophy, mathematics and engineering; those with the central brain due to health and education careers and the predominance of the right brain, due to careers in letters, law and the arts [17].

On the other hand, students from the systems engineering program in Colombia showed harmony between the three types of brain, with a greater central predominance (leaders), followed by left (logicians) and finally right (design) [22]. Probably due to the activities of the program itself, it allows the prevailing development to differ from one country to another.

Likewise, in workers from 2 Colombian cities, those who develop strategic vision level activities were analyzed, of which 45% had a predominance of central brain, 30% left, and 25% right; while in those who are dedicated to missionary strategic level activities, 45.8% have a central predominance, 29.2% left and 25% right [34]. Probably the differences found are since these workers have been holding a position, under job stressors, the experience gained and lessons learned also count; The human being has links between all the areas of his brain and they perform a reciprocal feeding between them to conceive and react to different daily life situations [35]. In our study, we found a predominance of the right brain in social and biomedical areas and a central brain predominance in the engineering area with lower percentages of left brain predominance.

Other studies in Colombia show that 15.4% of tenth-grade students [33] and 49% of students in the first cycle of Administration and Public Accounting at the University of Manizales present a brain conflict due to a tie [36]. This occurs when a person has a major change in their life (passage from school to university, grief, vocational guidance, etc.) [17]. It is noted that the student who has the same results in two or three of their brains, when subjected to a stressful situation, is blocked, therefore, decision-making is negatively affected [36]. In our study, a few cases of brain tie were presented.

The left brain is called logical, scientific, and rational; the intuitive, emotional, mystical, futurologist right brain; and the motor, operational central brain, manager of economic production [17]. The results do not strictly coincide with the theory of the triadic mental quotient, probably because the teaching-learning styles favor the development of a certain brain, leaving aside the one that needs to be developed for a better function in the chosen career.

Finally, by establishing the relationship between variables, it was found that students with excellent lifestyles have right brain dominance; those with good lifestyles are related to central brain dominance, and those with fair and bad lifestyles are not related to any brain dominance. In this regard, people with right brain dominance have a better perception of themselves and their body, respect for maternal values, sensitivity and relationships, and better self-esteem [34]; these characteristics lead to a better lifestyle, while predominantly left-brained people tend to memorize and philosophy, waiting for real verification of what is explained, those with the central brain are concerned with making more money and having fame, which perhaps does not help in personal care.

Given these results, it is important to highlight the role of the nursing professional in their work to promote healthy lifestyles in this stage of life, recognizing that human beings have three mental processes, considering the university student as a purposeful being in their activities, unique and comprehensive. It is of the utmost importance that universities carry out their diagnosis regularly, in such a way that it guides the implementation of strategies to improve lifestyles and strengthen the self-care of the students themselves, and in their communities and families: Likewise, the strategies of teaching-learning should be reviewed, to strengthen brain dominances related to each student's career without losing sight of their individuality.

Conclusion

The Tricerebral coefficient has been applied to observe the cerebral predominance of university students, as well as the FANTASTICO questionnaire to measure lifestyles in times of pandemic and establish the relationship between both variables. The predominant brain in university students is the right brain, followed by the central and left brain, having emotional and operational university adolescents. College students with excellent lifestyles have high percentages of right brain dominance, those with good lifestyles are related to central brain dominance, and those with fair and bad lifestyles are not related to any brain dominance. On the other hand, the students show excellent and good lifestyles, highlighting the low consumption of alcohol and drugs in times of pandemic. On the other hand, regarding the predominance according to mother tongue in students who come from Quechua areas (46.5%), Aymara (47%) and those from the city (42.3%), the use of the right brain predominates widely, followed by the use of the central brain with important percentages.

Acknowledgments: We would like to express our heartfelt gratitude to all the individuals who contributed to this project. Their dedication, expertise, and support were instrumental in its successful completion.

Conflict of interest: None

Financial support: This research was made possible through financial support from Universidad Nacional del Altiplano de Puno. Their investment in our project has been invaluable in advancing our understanding and contributing to the field.

Ethics statement: The research undertaken in this study, received full approval from the appropriate institutional review committees. Before the commencement of any study-related procedures, written informed consent was obtained from all participating students.

References

- National institute of statistics and informatics. Peru Demographic and family health survey ENDES 2020. In INEI. 2021. Retrieved from: https://proyectos.inei.gob.pe/endes/2020/INFORME_PRINCIPAL_2020/INFORME_PRINCIPAL_ENDES_2020.pdf
- National Institute of Statistics and Informatics. Press release No 215-22 September 2017. 2017. Retrieved from: <https://www.inei.gob.pe/prensa/noticias/36-de-jovenes-de-15-a-29-anos-de-edad-cuentan-con-educacion-superior>
- INEI. National Population and Housing Census 2017. In Economic Censuses. 2018. Retrieved from: <http://censo2017.inei.gob.pe/resultados-definitivos-de-los-censos-nacionales-2017/>
- MINSA. Technical document: Technical guidelines to promote healthy universities. 36. 2015. Retrieved from: <http://bvs.minsa.gob.pe/local/MINSA/3396.pdf>
- Olivero Pacheco N, Benites Vega JC, García Casique A, Bello Vidal C. Lifestyles in students of a public university. Villarreal Chair. 2016;1(2):227-32. doi:10.24039/cv20164163
- Arrivillaga M, Slazar IC, Correa D. Beliefs about health and its relationship with risk or protection practices in young university students. Colomb Méd. 2003;34(4):186-95. Retrieved from: <https://www.redalyc.org/articulo.oa?id=28334403>
- Pastor Y, Balaguer I, García-Merita M. The relationship between self-concept and a healthy lifestyle in adolescence: An exploratory model. Psicothema. 2006;18(1):18-24. Retrieved from: <https://www.psycothema.com/pdf/3170.pdf>
- Rodríguez Espinar S. Today's university students: A multilevel vision. RED. Univ Teach Mag. 2015;13(2):91. Retrieved from: <https://www.researchgate.net/publication/282505870>
- Vilela Alemán P, Sánchez Claderón JE, Chau C. Challenges of higher education in Peru during the COVID-19 pandemic. Desde el Sur. 2021;13(2):e0016. doi:10.21142/des-1302-2021-0016
- Loor CL, Per GM, Martillo JL, Alarc RA. Food practices and lifestyle in the population of Guayaquil during the Covid-19 pandemic. Clin Nutr Hosp Diet. 2021;41(3):70-8. doi:10.12873/413poveda
- Macari S, Milgramm A, Reed J, Shic F, Powell KK, Macris D, et al. Context-specific dyadic attention vulnerabilities during the first year in infants later developing autism spectrum disorder. J Am Acad Child Adolesc Psychiatry. 2021;60(1):166-75. doi:10.1016/j.jaac.2019.12.012
- Uriarte Y, Vargas A. Lifestyles of health sciences students at Norbert Wiener University. Norbert Wiener University. Thesis, 74. 2018. Retrieved from: <http://repositorio.uwiener.edu.pe/bitstream/handle/123456789/2390/TITULO-URIARTE-VARGAS.pdf?sequence=1>
- Zambrano Bermeo RN, Rivera Romero V. Lifestyles of students of technological careers in the health area. Venezuela Arch J Pharmacol Ther. 2020;39(4):291-5. doi:10.5281/zenodo.4092457
- Mendieta Alonso MR, Briones Mendieta CA. Cerebral dominance and university education. Humanism Soc Change Mag. 2017;10:102-13. doi:10.5377/hcs.v0i10.8250
- Bajaj S, Killgore WD. Association between emotional intelligence and effective brain connectome: A large-scale spectral DCM study. NeuroImage. 2021;229:117750. doi:10.1016/j.neuroimage.2021.117750
- Gregori W. In search of a new noology. Pedagog Stud.1999:371-87.
- Gregori W. Neuroeducation for success (National University of the Altiplano, Ed.). 2019. Retrieved from: <https://isbn.cloud/9786124295744/neuroeducacion-para-el-exito/>
- Jaime AC. The predominance of the cerebral hemispheres in medical residents. 1999;10(1).
- Millán AB, Millán ZL, Carvajal AB, Morales MD, Fuster BM, Días ED. Cerebral dominance and associated factors in fourth year dentistry students. MediSur. 2018;16(4):514-21.
- Pérez-Carrero C, Rodríguez-Moreno SM, Sánchez-Mayorga LD. The triadic brain and its relationship with curiosity, teamwork and the explanation of phenomena for the development of a scientific attitude. Traces Faces. 2015;17(31):99-110. doi:10.16925/ra.v17i31.1106
- Estrada Guillen M, Monferrer Tirado D, Moliner Tena MA. Relationship between learning styles according to the whole brain model and emotional intelligence. Jaume Univ. 2017:1471-82. Retrieved from: https://idus.us.es/bitstream/handle/11441/78134/Relacion_entre_los_estilos_de_aprendizaje_segun_el_modelo_de_cerebro_total.pdf?sequence=1

22. Bayona Ibañez E, Bayona Moreno AN, Cardenas Trillos JJ. Study of triadic thinking in systems engineering. *Colombia Mag Adv Technol.* 2018;1. doi:10.24054/16927257.v31.n31.2018.2763
23. MINSA. Technical document: Comprehensive health care model for the life course, for the person, family and community (MCI). Ministerial Resolution-030-2020-MINSA §. 2020.
24. Sánchez Rossel MC, Gómez-Arteta II, Bonifaz Valdez B. Cerebral predominance and academic performance in students of the faculty of education of the national university of the Altiplano (UNA)-Puno. *Comuniación: J Res Commun Dev.* 2020;11(2):97-106. doi:10.33595/2226-1478.11.2.432
25. Quintero R, Arias A. Relationship between triadic brain proportionality and student academic performance. 2013.
26. Arapa P. Revealing test of the tricerebral quotient. 2020. Retrieved from: <https://estadisticando.blogspot.com/2020/06/test-revelador-del-cociente-tricerebral.html>.
27. Betancurth Loaiza DP, Vélez Álvarez C, Jurado Vargas L. Content validation and adaptation of the Fantastico questionnaire by Delphi technique. *Uninorte Health.* 2015;31(2):214-27. Retrieved from: <http://www.scielo.org.co/pdf/sun/v31n2/v31n2a03.pdf>
28. Cerón Souza C. University and health. In *UMH Sapiens Scientific Disclosure.* 2015 (Vol. 2015). Retrieved from: <https://umhsapiens.com/universidad-y-salud/>
29. Ponte Apcho MV. Estilo de vida de los estudiantes de enfermería, según año de estudio de la Universidad Nacional Mayor de San Marcos 2010. 2010. Retrieved from: http://cybertesis.unmsm.edu.pe/bitstream/cybertesis/1307/1/ponte_am.pdf
30. Guerrero de Caballero H, Contreras Orozco A. Lifestyles and sociodemographic characteristics of adolescents. *Sci Care Mag.* 2020;17(1):85-98. doi:10.22463/17949831.1630
31. Zambrano Bermeo R, Rivera Romero V, Rincón Villegas F, López Flórez Y. College student lifestyles. *Soc Sci J.* 2021;27(4):468-76. Retrieved from: <https://dialnet.unirioja.es/servlet/articulo?codigo=8145534>
32. Alonso Gatell A, Martínez Moreno AR, Banda Muñoz F. Contribution of healthy lifestyles to the integral formation of the university student. *Didas Mag Cuba.* 2019;10(2):79-88. Retrieved from: <https://isidore.science/document/10670/1.7vwz35>
33. García Cardona J. Relationship between academic performance and learning difficulties derived from brain structure and function in 10th grade students of the IE Alfonso Jaramillo Gutiérrez in the city of Pereira, Colombia. *Natl Open Distance Univ - UNAD;* 2020;53. Retrieved from: <https://1library.co/document/y9g6lmjq-relacion-desempeno-dificultades-aprendizaje-funcionamiento-estudiantes-jaramillo-gutierrez.html>
34. González Ruiz GE, Peralta González OJ, Serrano Castro H, Peralta González G. Predominance of the "triadic brain" according to levels of strategic performance of a group of Colombian workers. *Cuban J Nurs.* 2018;34(2):298-308. Retrieved from: <http://www.revenfermeria.sld.cu/index.php/enf/article/view/1511>
35. Velasquez Burgos BM, Remolina de Cleves N, Calle MG. Determination of the profile of cerebral dominance or ways of thinking of the first semester students of the bacteriology and clinical laboratory program of the Colegio Mayor de Cundinamarca University. *Nova.* 2008;6:101-2012. Retrieved from: <https://scholar.archive.org/work/tkhtudxpwbdkvaflehb3s2fba>
36. Arias A, Quintero E, Sandoval J. Relationship between triadic cerebral proportionality and student academic performance. *Univ Manizales - CINDE.* 2013. Retrieved from: <http://bibliotecadigital.iue.edu.co/jspui/handle/20.500.12717/1690>