Revista de Ciencias Médicas de Pinar del Río

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

REVIEW ARTICLE

Effect of study techniques on the reduction of Burnout Syndrome: a literature review

Efecto de las técnicas de estudio en la reducción del Síndrome de Burnout: una revisión bibliográfica

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Received: December 22, 2024
Accepted: December 24, 2024
Published: December 27, 2024

Citar como: Espinoza-Calle JI, Suaste-Pazmiño DI, Yabor-Labrada MC, García-García PP. Efecto de las técnicas de estudio en la reducción del Síndrome de Burnout: una revisión bibliográfica. Rev Ciencias Médicas [Internet]. 2024 [citado: fecha de acceso]; 28(S2): e6607. Disponible en: http://revcmpinar.sld.cu/index.php/publicaciones/article/view/6607

ABSTRACT

Introduction: burnout Syndrome is the result of inadequate stress management, which affects both physically and mentally college students.
Objective: the purpose of this study is to analyze study techniques for the Reduction of Burnout Syndrome in College Students.
Methods: bibliographic review, with a longitudinal trend design, since different study techniques were analyzed, focusing on their usefulness for university students. In addition, it is explanatory since it seeks to answer how the use of study techniques reduces Burnout Syndrome.
Results: they analyzed 17 articles regarding the effect of study techniques in reducing Burnout Syndrome, considering techniques such as: Underlining, rereading, study techniques of stacking and mixing, summarization, conceptual map, note-taking and outline method. However, it was verified that the application of active study techniques: Grouping, study questions, mind map, spaced study technique, active recovery, spaced repetition and Fynemann technique, are very effective in reducing Burnout Syndrome governed by the 85% rule. Discussion: Active learning techniques have a negative correlation with Burnout Syndrome, which improves the resilience of university students, so they should be implemented in the current learning system.
Conclusions: active learning techniques counteract Burnout Syndrome better than passive learning techniques.

Keywords: Burnout, Psychological; Problem-Based Learng.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

RESUMEN

Introducción: el Síndrome de Burnout es el resultado del manejo inadecuado del estrés, que afecta tanto física como mentalmente a los estudiantes universitarios.
Objetivo: el propósito de este estudio es analizar las técnicas de estudio para la Reducción del Síndrome de Burnout en Estudiantes Universitarios.
Métodos: revisión bibliográfica, con un diseño longitudinal de tendencia, ya que se analizaron diferentes técnicas de estudio, enfocadas en su utilidad para estudiantes universitarios. Además, es explicativo ya que se busca responder como el uso de las técnicas de estudio reduce el Síndrome de Burnout.
Resultados: se analizaron 17 artículos respecto al efecto de las técnicas de estudio en la reducción del Síndrome de Burnout, considerando técnicas como: Subrayado, releer, técnicas de estudio de amontonamiento y mezcla, elaboración de resúmenes, mapa conceptual, toma de notas y método de esquema. No obstante, se verificó que la aplicación de técnicas de estudio activo: Agrupar, preguntas de estudio, mapa mental, técnica de estudio espaciado, recuperación activa, repetición espaciada y técnica de Fynemann, son muy efectivas en la reducción del Síndrome de Burnout rigiéndose bajo la regla del 85 %.
Discusión: las técnicas de aprendizaje activo tienen una correlación negativa con el Síndrome de Burnout, lo que mejora la resiliencia del estudiante universitario, por lo que deberían ser implementadas en el sistema actual de aprendizaje.
Conclusiones: las técnicas de aprendizaje activo contrarrestan mejor al Síndrome de Burnout que las técnicas de aprendizaje pasivo.

Palabras clave: Síndrome de Burnout; Aprendizaje Activo.

INTRODUCTION

Burnout Syndrome (BS) is characterized by both mental and physical exhaustion, resulting from inadequate stress management, which can negatively impact professional effectiveness and the management of feelings.[1]

Troy A.,[2] conducted a study in Ecuador withuniversity students from the Faculties of Medicine, Psychology, Nursing, Nutrition and Physical Therapy, which showed that: "the overall prevalence of SB was 93,11 %, with the Faculty of Medicine being the most affected with 95,92 %" And despite the high levels of this syndrome, no solutions were offered for it.

Liu Zand col.,[3] In their cross-sectional study of 22.983 students from 13 universities in China, the following risk factors were assessed: gender, monthly living expenses, smoking, study and life pressures, parents' educational level, and current level of interest in professional knowledge, resulting in more than 50 % presenting SB; study and life pressures being the main risk factor, since students' enthusiasm when starting their university life diminishes with the passage of time, they become disappointed with their university, are dissatisfied with their studies, lose interest in their career and begin to adopt destructive behaviors such as skipping classes or not turning in assignments.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

Given the concern about SB, Zhang XJand col.,[4] In its systematic review, it determined the main interventions to reduce this syndrome, such as; "workshops to develop self-regulation skills, training programs in stress management and improvements in the learning health system" interventions that are included within the study techniques, turning them into a tool to improve the resilience of those who apply them, and into a bridge that separates SB from personal well-being.

Therefore, high levels of SB and their consequences make it possible to ask the following question.In university students, can burnout syndrome be reduced by applying active learning techniques compared to passive learning techniques?

METHODS

This study is a bibliographic review, with a longitudinal trend design, since different study techniques were analyzed, focusing on their usefulness for university students. In addition, it is explanatory since it seeks to answer how the use of study techniques reduces Burnout Syndrome.

Search Strategy

Scientific articles, books and websites from 1973-2024 were examined, with the main databases being: PubMed, Springer, Elsevier and NIH.

Inclusion and exclusion criteria

Articles in both English and Spanish, focused on university students, related to study techniques and Burnout Syndrome, were included. Articles with conflicts of interest, sponsored articles, or articles with biased results were excluded.

Data Extraction

Following the initial search, a total of 150 potentially relevant articles were collected, of which 17 were included in the review. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were used in the search and screening processes (Figure 1).

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

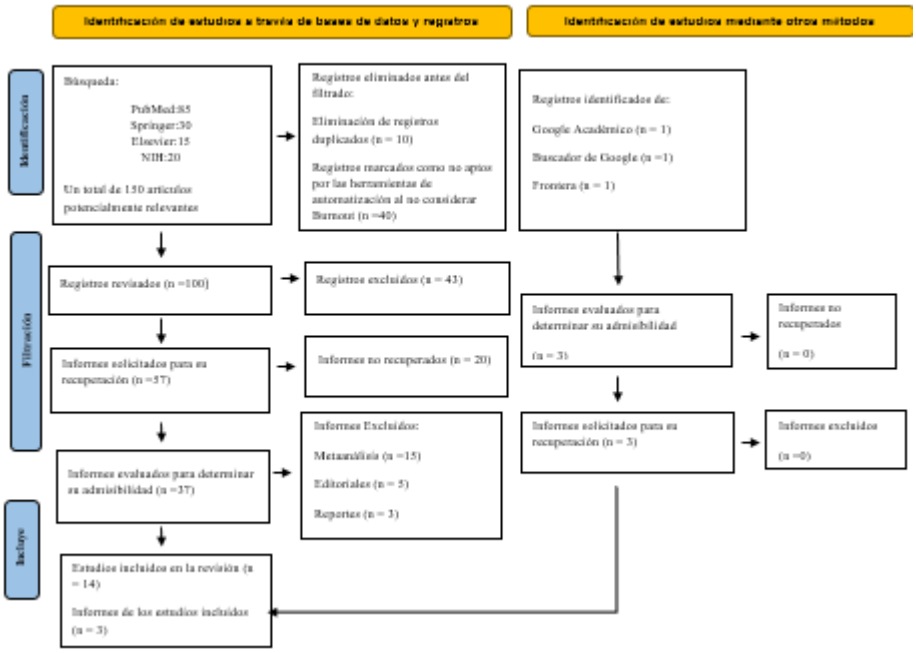

Fig. 1 Systematic Review and Meta-Analysis (PRISMA)

RESULTS

Burnout Syndrome

Burnout Syndrome (BS) is defined from a psychological point of view as the "syndrome that causes damage at a cognitive, emotional and attitudinal level, which translates into negative behaviors towards work, colleagues, users and the professional role itself".[6] Likewise, the symptoms of SB according to the International Journal of Environmental Research and Public Health (IJERPH) are:

Emotional exhaustion, as the constant feeling of tiredness, fatigue or weakness, experienced by a person when their emotional energy is so low that it is not enough to complete their work tasks. Depersonalization or cynicism, which translates as the set of negative behaviors and attitudes towards other people, patients or clients; which is always accompanied by irritability and indifference towards work. And the reduction of personal achievements, consequence of a decrease in productivity, distrust in one's own abilities and a lack of coping with work problems.[6]

Therefore, SB does not start by affecting academic performance, this is a consequence of damage to the emotional intelligence (EI) of the university student. The relationship between EI and SB is inversely proportional, being a determining factor for academic performance.[7]

It is worth noting that the university student is affected, from an intrapersonal point of view through emotional exhaustion and low efficacy, and from an interpersonal point of view, with the dimension of cynicism.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

Study Techniques

The most comprehensive concept of study techniques (ST) is given by Bifrost University, explaining that "they are a set of skills that enhance the student's ability to study, retain and remember information." and that can be learned and applied in different fields of study.[8]

The different TEs are defined below (Table 1), prior to their comparative analysis.

Table 1. Concept of the different study techniques,

Author	Study technique	Definition
Nights and Fires[9]	Underlining	It consists of reading the text to be learned while underlining what is considered important.
Suppawittaya and Yasri[10]	Chunking (Grouping)	Information that is familiar or of which there is prior knowledge is grouped, but it is also grouped according to its characteristics.
Tofade[11]	Study Questions	It consists of creating questions, whether they are convergent (closed, which encourage a more focused and precise response) or divergent (open, which allow for a variety of responses).
Tavares[12]	Mind Map (Mind Map)	The main ideas of a text are visualized and connected as a network.
Hartwig and Malain[13]	Spacing Study Technique (Spaced study technique)	It consists of the study divided into multiple sessions, and in each one the characteristics of the information are differentiated.
Dunlosky[14]	Active Recall	It is based on recovering information from memory, so that when remembering the brain works actively.
Wollstein and Jabbour[15]	Spaced Repetition	It consists of reviewing previously studied content, in multiple time intervals, carefully selected and specific to reinforce learning, which allows retaining information for long periods of time.
Kings[16]	Fyneman Technique	More complex topics should be explained using simple ideas and terminology.
Weinstein[17]	Rereading (Releer)	Reread the paragraphs over and over again.
Luo[18]	Cramming & Massing Study Technique (Stacking & Mixing Study Technique)	Cramming: Cramming is the process of studying relentlessly before exams. In fact, studying begins shortly before the exam season. Massing: It consists of studying blocks of information.
Turky[19]	Symmary Elaboration	It is based on summarizing a text in an extractive way (taking textual sentences from the document, ordering them and adding your own annotations) or in an abstract way (new sentences are generated based on the document).
Guelton[20]	Concept Map (Conceptual Map)	After a preliminary study, "pre-existing" elements are selected to be further explored.
Kiewra[21]	Note-Taking (Note Taking)	It consists of taking notes to later review them.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

Oklahoma State University[22]	Outline Method (Outline Method)	The information is organized hierarchically by using dashes or bullets.

Effectiveness of different study techniques

Active Learning Techniques

Active learning techniques (ALT) are based on the "active collection, processing and application of information", Unlike passive learning techniques (TAP) that only allow passive assimilation of knowledge. [23]

McCarthy J and Anderson L.,[24] in their study at the University of Georgia conclude that TAA: role-play and collaborative exercises, are more effective, against traditional teaching styles such as: rereading the readings (rereading) while the teacher explains the same content. To this end, a Political Science class was analyzed with 16 students in the experimental group and 14 in the control group. The experimental group carried out the active learning activity entitled "The Trouble with Opinion Polls: A Political Science Activity" while the classes of the students in the control group consisted of rereading and listening to the teacher.

Now, after 2 weeks, all students took a test that consisted of completing an essay answering a stipulated question on the topic that had been discussed in class on the day the experiment was conducted and, through a regression analysis of the results, it was determined that those who applied Active Learning Techniques increased an average of 0.93 points in their exam, unlike the control group, which increased an average of 0.84 points.[24]

Chunking (Grouping)

The student analyzes the information in order to create groups with similar characteristics, in order to achieve an organized and simple learning. Chase W and Simon H.,[25] in their experiment entitled "Perception in Chess" suggested that the most experienced players could encode the information of each position of the chess pieces in fragments. Then, three players were studied and recorded: a master (M), a class A player (A) and a beginner (B).

In addition, they selected 20 moves, the first 10 of which were middlegame positions, when there were 24-26 pieces left on the board, while the remaining 10 were endgame positions, when there were 12-15 pieces left. It should be noted that 4 middlegame positions and 4 endgame positions were created randomly, taking into account the pieces on the board.[25]Each player then sat in front of 2 boards, to their left was a board with the pieces already placed in 1 of the 28 moves, while the second board was placed in front of the player completely empty with the chess pieces to their right. The order was simple, they had 5 seconds to observe the board with the move and then they had to replicate it on the empty board. [25]

As a result, when the move to be replicated was an existing one (documented in the chess book used in the experiment), in his first attempt player M got 16 pieces right, A 8 and B only 4. On the other hand, when replicating a random move, created by the researchers, after the first attempt players M, A and B all got 3 pieces right. On the other hand, the recording of the games revealed something interesting: in player M, it was noticed that there were short and long time intervals when placing the pieces, the longest period being the beginning of each fragment or chunk of chess pieces to be placed.[25]

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

Study Questions

This TAA consists of creating original questions based on the study material. As an example, Foos P.,[26] in his article, "Student Study Techniques and the Generation Effect", carried out an experiment with 210 students from Florida, divided into 7 groups of 30 members, who received different orders: group 1 had to make outlines (outline method), group 2 asked questions without answers, group 3 generated questions with answers (Study Questions), group 4 received the ready-made outline, group 5 was given the ready-made questions, group 6 received both the questions and ready-made answers, finally group 7 was given no instructions (control group); with the objective of taking an exam in 2 days on the text entitled "The Work of Being a Bee".

Finally, it was verified by the ANOVA statistical test that the students of groups 1, 2 and 3 who made their own questions and schemes obtained better results, compared to groups 4, 5, 6 and control, as demonstrated by the result $F(1,24) = 8.94$, $p < 01$. In addition, the techniques used by group 7; 30 % consisted of taking notes in the margin of the text (note-taking) and the remaining 70 % underlined the text (underlining).[26]

Mind Map

A good mind map (MM) should link the main ideas of the text in a spider-web-like fashion, in order to see the information as a connected whole. Farrand P.,[27] conducted an experiment, in which 50 medical students from the University of London were recruited, divided into 2 groups of 25. The experimental group would be instructed in creating MMs while the control group could use their own study technique. For the experiment, each group was given the same 600-word text, from which they would take a 15-question test on the same day and after a week. [27]

As a result, the academic performance of the experimental group was superior to that of the control group both in the first assessment and in those carried out 7 days later. It should be added that those who applied their own study method were more motivated than those who had to learn and apply the Mind Map Study Technique. [27]

Finally, the study techniques most commonly used by the control group were: writing down key words, rereading or underlining key words, repetition and summary elaboration.[27]

Spacing Study Technique

Spaced study consists of analyzing an aspect of different sources of information in several study sessions in order to discern what is characteristic of each of them. An example of this TAA is the experiment by Kornell N and Bjork R.,[28] that was carried out with 120 students from the University of California, which consisted of the following; each participant in front of a computer was shown 6 paintings by 12 different artists (72 in total) for 3 seconds with the last name of the artist at the bottom.[28] The paintings of 6 artists were presented in a block (Massing = M), that is, in one session all the paintings of a single artist were presented and so on, while the paintings of the remaining 6 artists were mixed with paintings of other artists (Spacing = S), so the order of the blocks with the random artists was as follows: MSSMMSSMMSSM.

In the next evaluation phase, each participant was presented with 48 paintings (4 new paintings by 12 different artists) with the objective of selecting which artist the painting on the screen belonged to. In addition, after the test, the university students were asked the following question: ''Which do you think helped you learn more, massed or spaced?''. [28]

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

As a result, 78 % of the participants recognized more spaced paintings (S) than those presented in blocks (M) but, according to the perspective of 78 % of the students, they assured that the paintings presented in block (M) helped them to remember as much or even better than the spaced ones (S).[28]

Actice Recall (Active Recovery)

The student must express in writing or verbally everything he or she remembers from the information previously studied. In order to test this TAA, professors from the Department of Psychology at the University of Karpicke J and Blunt J.,[29] in their article, "Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping" they conducted a study involving 80 university students, divided into 2 groups of 40 people.

The control group was asked to study a text and then make a concept map. The experimental group was asked to write down all the information they remembered on a separate sheet of paper (active recall). It should be noted that both groups studied the same amount of information and in the same amount of time.[29]

As a result, there was no difference in averages when tested on the same day, but after a week the experimental group managed to remember 50 % more than the control group, their long-term memory had improved.[29]

Space Repetition (Spaced Repetition)

This TE consists of reviewing information over different periods of time in order to remember it in the long term. For example, in 2019, Routledge magazine published a study involving 62 students from the University of the Arts, United States, enrolled in the Spanish II Course.[30]

This experiment consisted of three phases. First, students were instructed in the use of mobile assisted spaced-repetition (ANKI), then they were given an ANKI-Deck with flashcards covering both grammar and vocabulary from the source text, and finally they were tested twice; the first time in the third week of the semester and the second time in the last week (week 15). It should be noted that the students' ANKI accounts were monitored by the researchers since the instruction was to review the ANKI-Deck for at least 5 minutes per day, 5 times per week. [30]

Hence, when comparing the tests from the third week with those from week 15, it was shown that the student who used ANKI the most (80 days) went from having 77% in the first test to 95 % in the second, unlike the course average, which was 67,8 % in the first test and 77,4 % in the second, with an improvement noted despite the fact that they only reviewed for 63 days.[30]

Feynman Technique

Like the physicist Feynman, the student must explain in a simple way everything he knows about a topic. To illustrate this TAA, Xiaofei W et al.,[31] recruited 45 students from Xuzhou Medical University, China, and divided them into 3 groups (A, B, and C) of 15 members each. Group A received a class with tutors specialized in Stomatology, so that they could later apply the Feynman Technique when teaching what they had learned, but this time to the students in groups B and C.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

After class, the students in group A studied the class again and were classified as group A+. The groups were then evaluated and compared using the Least Significant Difference (LSD) method, which resulted in the students in group A+ obtaining a grade of 84,4 %, compared to group B with 73,7 % and group C with 74,1 %, thus demonstrating the effectiveness of Feynman's technique.[31]

Relationship between Study Techniques and Burnout Syndrome

TEs are definitely important to reduce SB, as demonstrated by research from the Department of Psychology, carried out at the University of Eastern Finland, where a survey of 515 university students found that 45 % of students had high levels of Study-Related Burnout (SRB), due to dissatisfaction with the teaching and learning environment (TLE) of the university, which severely affected personal motivation (PM), as a consequence, a demotivated student does not study, stress increases and academic performance decreases;For this reason, researchers emphasize the responsibility that both teachers and students have. [32]

On the one hand, teachers must create teaching-learning methods to avoid both dissatisfaction and burnout among their students and on the other hand, it is also the responsibility of students to improve what the study mentions as "study skills" so that they can react actively to stressful situations, with TE being the best option to fulfill this task.[32]

The above is not an isolated issue, as evidenced by doctors Dunn L et al,[33] made a publication in the Academy of Psychiatry of the United States, suggesting the term "Coping Reverse", the concept is simple: If we have in mind a drinking party, which can have a Negative Input represented by stress, internal conflict and demand for time and energy, as well as a Positive Input that includes psychosocial support, healthy activities and intellectual stimulation. Students may have two destinies: If the Negative Inputs prevail the result is SB, but if the Positive Inputs predominate, the result is Resilience.

Of all the positive inputs, the one related to TE is called Intellectual Stimulation. If the student begins to have academic difficulties, which generates anxiety and other symptoms of Burnout, their resilience must be reinforced by developing a study strategy, either through study groups or tutoring that helps them improve their studies, which again is synonymous with using TE, but focused on the organization and effective management of time.[33]

It should be noted that in recent years, Rational Emotive Behavior Therapy (REBT) has become popular, postulated by Dr. Albert Ellis, a psychologist. It was applied to a group of 18 university students of History in Nigeria, managing to reduce SB by 10 % compared to the control group, made up of 17 students.[34] REBT is based on the ABC model, A for the triggering events, B for the irrational and rational processing of information and C for the consequences. It should be noted that the ABC model is closed, a cycle, where the Consequences (C) can be the starting point as Triggering events (A).[35]

So, through REBT, we start by solving emotional problems and then practical problems. When applied to SB, the scheme would be as follows: A) stress, anger, insecurity, classic SB emotions act as initiating events. B) An irrational idea is to blame the amount of information received at university or that the base text used is too complex to study. All these thoughts must be transformed into rational ideas such as: It would be better to focus on improving my study techniques and C) Reduction in the levels of academic burnout.[35]

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

The Sweet Spot

Wilson RC.,[36]In his article, "The Eighty Five Percent Rule for optimal learning," he publishes the 85 % rule or "sweet spot," the exact point where the level of difficulty is not so exaggerated that it makes the student discouraged, but not so easy that it makes him bored; it is the perfect point of balance.

So, researchers from the Department of Psychology at different universities in the United States, using the Gaussian Noise as a basis, created a mathematical formula, the result of which was the following: The optimal error rate is 15 % while the optimal accuracy rate is 85 %, hence the name: The eighty-five percent rule.

In other words, the learning rate is maximized when the level of difficulty of the training allows for an accuracy of 85 %, for example: If a student, after applying different study techniques, decides to test himself by means of a self-assessment of the studied content, he must be able to answer 85 % of the assessment correctly, allowing him to fail 15 %. Only in this way can he be sure that he has found his sweet spot to maximize his learning.[36]

DISCUSSION

Burnout Syndrome is a reality. According to the Medscape Report on Burnout and Depression in Physicians 2024, it is reported in the section dedicated to Burnout that "49% of doctors have SB, and of that percentage, 56% are women."[37]

The results determined that the main risk factor for developing SB is the pressure of studying and that one way to counteract it is by improving the learning health system (application of TAA), from the point of view of Dr. Dunn, L (2008) it would be part of a Positive Input.[33] Likewise, Salgado S and Au-Yong M.[38] They conducted a study in Portugal with university students and determined that there is a "moderate and statistically significant negative correlation (rsp = −0,267; p < 0,001) between burnout and academic performance". In other words, if academic performance increases, burnout levels are reduced, thus improving resilience, which acts as a protective factor against SB.

They also highlight the importance of resilience, since a resilient student is protected against the negative emotions produced by study obstacles, which allows him to reduce the effects of SB while improving his quality of life.[39] However, both authors assume that the university student has resilience.

Now, Asikainen H et al.,[40] in their cross-sectional study carried out with 399 first-year university students, compared different learning profiles with Burnout levels, taking as reference the grade point average (GPA) and the dimensions of SB, being the "students who apply deep learning processes those who present less emotional exhaustion and greater productivity". In line with what was mentioned about the TE, since they are skills that enhance the student's ability to study, retain and remember information, taking the student to a deeper level of knowledge.

Similarly, in the search to reduce burnout levels, Marôco J et al.,[41] after applying the Coping Orientation to Problems Experienced (COPE) questionnaire to 4,061 university students from the United States, Brazil, Finland, among others, determined the following coping strategies against SB: active coping, positive reframing, planning, and instrumental support.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2024; 28(S2): e6607

On the other hand, Rizk A et al.,[42] talk about the academic challenges faced by medical students and the different study techniques they use. However, they go one step further, since they confront the current evaluation methods in medical schools and propose using ANKI as an active learning method during the semester, since if the student completes his daily flashcards he will be rewarded with 0,5-10 % extra points to his final grade for the semester (or as agreed by the professor).

Finally, Xiaofei W et al.,[31] with his experiment on teaching groups, managed to materialize the concept given by Reyes EP et al.,[16] on the Feynman Technique.

CONCLUSIONS

There are multiple ETs that can be applied by university students, the difference between them lies in their ability to promote passive or active learning. In other words, the so-called TAAs have been scientifically proven to be better at processing, storing and retrieving information. Therefore, when university students apply TAAs, the results are reflected in better academic performance while reducing levels of Burnout in all its dimensions. It should be added that there are good proposals to implement TAAs in the current education system, the only thing that is required is to maintain good levels of resilience on the part of university students and commitment from their teachers.

Conflicts of interest
The authors declare that there are no conflicts of interest.

Authored Contribution
JIEC, DISP, MCYL: Conceptualization, Formal analysis, Research, Project management, Resources, Supervision, Validation, Visualization, Writing - review and editing**.**
PPGG: Data Curation, Methodology Data Curation, Methodology, Software, Writing - original draft.

Financing
The authors did not receive funding for this research.

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