Salud, Ciencia y Tecnología. 2025; 5:1623
doi: 10.56294/saludcyt20251623

ORIGINAL

Relationship Between Selective Attention and Study Habits in High School Students at José Ignacio Ordoñez Educational Unit

Relación entre la Atención Selectiva y Los Hábitos de Estudio en los Estudiantes de Bachillerato de La Unidad Educativa José Ignacio Ordoñez

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Cite as: Gordón P, Chango J, Marcillo J. Relationship Between Selective Attention and Study Habits in High School Students at José Ignacio Ordoñez Educational Unit. Salud, Ciencia y Tecnología. 2025; 5:1623. https://doi.org/10.56294/saludcyt20251623

Submitted: 21-09-2024 **Revised:** 05-12-2024 **Accepted:** 12-04-2025 **Published:** 13-04-2025

Editor: Prof. Dr. William Castillo-González

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ABSTRACT

Introduction: selective attention is a fundamental cognitive process that enables individuals to filter and prioritize relevant information while avoiding distractions. Its role in education is crucial, as it influences concentration and academic performance. Similarly, study habits are systematic strategies that optimize learning. However, gaps remain in the literature regarding the relationship between selective attention and the development of study habits in high school students.
Method: a quantitative, cross-sectional, and correlational study was conducted with a sample of 142 high school students from the José Ignacio Ordoñez Educational Unit in San Pedro de Pelileo, Ecuador. Two instruments were applied: the D2 Attention Test, to measure attentional efficiency and concentration, and the Gilbert Wrenn Study Habits Inventory, to assess learning strategies. Data were statistically analyzed using SPSS, applying Pearson's correlation.
Results: the findings indicated that students with higher attentional capacity demonstrated better study habits, including more efficient time management and greater concentration. However, the correlation between selective attention and study habits was significant but of low magnitude (r=0,204, p=0,015), suggesting that while a relationship exists, its impact on academic performance is not decisive.
Conclusions: selective attention was found to influence the development of study habits, but other factors, such as self-regulation and the socio-educational context, may play a more significant role. It is recommended that future longitudinal and neuropsychological studies explore the relationship between attention, cognitive load, and neural plasticity to better understand the mechanisms that optimize learning in high school students.

Keywords: Selective Attention; Study Habits; Academic Performance; Concentration.

RESUMEN

Introducción: la atención selectiva es un proceso cognitivo fundamental que permite a los individuos filtrar y priorizar información relevante, evitando distracciones. Su papel en el ámbito educativo es crucial, ya que influye en la concentración y en el rendimiento académico. De manera paralela, los hábitos de estudio constituyen estrategias sistemáticas que optimizan el aprendizaje. Sin embargo, aún persisten brechas en la literatura sobre la relación entre la atención selectiva y la formación de hábitos de estudio en estudiantes de bachillerato.
Método: se realizó un estudio cuantitativo, transversal y correlacional con una muestra de 142 estudiantes de bachillerato de la Unidad Educativa José Ignacio Ordoñez, en el cantón San Pedro de Pelileo, Ecuador. Se aplicaron dos instrumentos: el Test de Atención D2, para medir la eficacia atencional y la concentración, y el

Inventario de Hábitos de Estudio de Gilbert Wrenn, para evaluar estrategias de aprendizaje. Los datos fueron analizados estadísticamente con SPSS, utilizando la correlación de Pearson.
Resultados: los resultados mostraron que los estudiantes con mayor capacidad atencional presentaron mejores hábitos de estudio, reflejados en una organización más eficiente del tiempo y una mayor concentración. Sin embargo, la correlación entre la atención selectiva y los hábitos de estudio fue significativa, pero de baja magnitud (r=0,204, p=0,015), sugiriendo que, aunque existe una relación, su impacto no es determinante en el rendimiento académico.
Conclusiones: se evidenció que la atención selectiva influye en la consolidación de hábitos de estudio, pero otros factores, como la autorregulación y el contexto socioeducativo, podrían intervenir en mayor medida. Se recomienda realizar estudios longitudinales y neuropsicológicos que exploren la relación entre la atención, la carga cognitiva y la plasticidad neuronal para comprender mejor los mecanismos que optimizan el aprendizaje en estudiantes de bachillerato.

Palabras clave: Atención Selectiva; Hábitos de Estudio; Rendimiento Académico; Concentración.

INTRODUCTION

In a world characterized by the presence of multiple distracting stimuli, the ability of people to maintain attention on relevant elements allows optimizing information processing and decision making. Thus, Introzzi et al.[1] and Hobbiss et al.[2] state that selective attention refers to the cognitive action of human beings that allows them to differentiate between objects and stimuli, in order to avoid possible distractions; that is, to focus the attentional resources of information to inhibit irrelevant stimuli that interfere with the execution of an activity.

Selective attention is characterized as a mental function in charge of information processing and is important in the educational context because most students are distracted and lose concentration, causing difficulties related to the assimilation of knowledge and poor academic performance.[3] Demonstrating that selective attention is a mental ability that helps people to maintain focus on a particular element by suppressing everything that is cognitively irrelevant, i.e., ignoring distractions as part of adaptive behavior.[4]

On the other hand, study habits are patterns made up of behaviors, methods and automatic strategies that a person performs when in situations of learning or assimilation of knowledge, which do not incur the need to constantly reflect on how to proceed.[5] These habits are necessary for academic efficiency and performance, improving concentration, optimizing time and facilitating the acquisition of knowledge.[6] They are structured in four main aspects: method, organization, time and procrastination.

To address the way in which attention processes are shaped, certain cognitive models developed to explain the mechanisms that allow human beings to process, select and prioritize sensory information are described.[7] In 1958 Broadbent formulated the early selection model which defines that selective attention is a product of short-term memory where information processing will be executed as long as the physical characteristics of the stimuli have been previously analyzed, otherwise, those that are irrelevant are discarded or attenuated to avoid cognitive overload.[8]

On the other hand, the supervised attentional control model proposed in 1986 by Norman and Shallice is related to selective attention since it describes how actions are regulated and prioritized according to the environment, i.e., a response is generated according to specific input stimuli.[9] In order to differentiate between relevant stimuli called "objects" from irrelevant "distractors", the subject must have focused attention. One of the psychological tools designed by Brickenkamp to evaluate selective attention and the level of concentration in a limited time is called the d2 attention test.[10,11]

Approaching study habits from a theoretical perspective, Sweller's cognitive load theory states that not managing information correctly can result in an overload of working memory, thus limiting the ability to retain and understand content.[12] On the other hand, Zimmerman's self-regulated learning theory emphasizes that planning, monitoring and self-regulation of key processes are key to academic success.[13] Both theories are interrelated by demonstrating that, without a good organization of cognitive resources, selective attention is weakened, thus emphasizing that study habits work as a link between this theory.[14,15] An individual with well-structured habits can better manage the cognitive load, improve his attention and strengthen his capacity for self-regulation.

According to Wühr et al.[16] the d2 test consists of 14 rows and 57 stimuli represented by a combination of the letters "d" and "p" accompanied by one to four dashes whose positions tend to vary either above or below the letters. The usability of this test is related to the ability of the participants to visually analyze, scan and select those letters "d" and "p" with two hyphens to obtain a total result of 20 stimuli per row, which are analyzed through the processed items (TR), hits (TA), omissions (O) and commissions or errors (C).[17,18]

In the study by Bernal-Vega et al.[19] whose objective was to analyze the relationship between selective attention and academic performance of students in subjects such as Mathematics, Physics and Chemistry through the application of the D2 Attentional Test in terms of attention effectiveness (AT) and concentration level (CON), the following results were obtained: The average score was 166,6 TA and CO, the correlation values for Mathematics were rs=0,863, Physics with a value of rs=0,819 and Chemistry with rs=0,850 demonstrating that there is a strong positive relationship between the effectiveness of attention and performance, that is, the greater the capacity to identify relevant stimuli, the lesser the influence of distractors and the greater the academic performance.

In this same sense, Resett[20] carried out an investigation with the purpose of determining the relationship between attention and grades in children in 4th and 5th grades with average ages of 9 and 10 years and adolescents in 3rd and 4th grades with average ages of 14 and 15 years. To achieve this objective, the D2 attention test was used as a function of the value of the total number of correct answers (TA) and total number of responses (TR). The children obtained an average TR and TA of 274,34 and 101,11 respectively; on the other hand, the adolescents obtained values of 347,70 and 158,12. Regarding the prediction of the children's grades in Mathematics, values of TR (ß=0,118, p=0,020) and TA (ß=0,211, p=0,001) were obtained; in the same way, the adolescents obtained values of TR (ß=0,233, p=0,001) and TA (ß=0,119, p=0,004).

In contrast, the instrument used to evaluate learning strategies and techniques is Gilbert Wrenn's study habits inventory, whose purpose is to measure four key aspects: reading and note-taking, concentration, time management and attitudes towards study. Participants must respond to its 28 items according to the frequency with which they apply each of the habits, identifying strengths and weaknesses in learning to optimize academic performance and improve study organization.[21]

An example of this is the study by Ordoñez et al.[22], where the study habits inventory of Gilbert Wrenn was used with the aim of analysing the relationship between study habits and academic performance of students at the Pontificia Universidad Católica del Ecuador, Where the instrument was applied to a total of 108 students of the career of business administration, by means of stratified random sampling, contrasting the results that indicated that a total of 48 % of the students approved with minimum qualifications identifying deficiencies in the study habits whose statistical analysis with the correlation of Pearson yielded a value of 0,229 indicating a weak positive relationship, thus proving that academic performance is influenced by study habits

Likewise, Magulod[23] analyzed the relationship of study skills, learning styles and academic performance of 75 applied science students at Cagayan State University, using Gilbert Wrenn's study habits inventory. Indicating that the students preferred a group visual and kinesthetic learning style, on the other hand, their study habits were classified as moderate and with a special emphasis on time management and preparation for exams. Having an academic performance of 85,55 points finally showing a positive relationship between study habits and academic performance.

The José Ignacio Ordoñez Educational Unit is facing a problem related to the low academic performance of its students, showing difficulties in achieving the expected standards in different subjects, this situation denotes factors that are affecting the learning process, among which stand out the lack of attention and the absence of good study strategies. The lack of concentration does not allow students to retain adequate information, while the lack of adequate habits limits the ability to manage time and efficiently address academic tasks. Given this problem, it is necessary to evaluate the attentional levels and study habits of students through methods supported by research in education and psychology.

In relation to previous research that has demonstrated the effectiveness of psychological tools, such as Rolf Brickenkamp's d2 Test and Gilbert Wrenn's Study Habits Inventory, the main objective of the present study was to determine the relationship between selective attention and study habits in high school students of the José Ignacio Ordoñez Educational Unit, located in the San Pedro de Pelileo canton, province of Tungurahua.

METHOD

Research Approach

In order to carry out the study, it was decided to maintain a quantitative research approach, which, according to Sánchez-Flores[24], is an approach through which phenomena whose characteristics are measurable and quantifiable can be analyzed. That is, through the use of statistical and mathematical tools, data can be collected, processed and analyzed with the purpose of explaining their occurrence. Through the use of the D2 test of selective attention and the study habits test, the level of concentration and attentional efficiency, as well as learning patterns of the participants were analyzed. The data obtained from the application of the questionnaires were statistically processed in order to identify the correlation between selective attention and study habits of the analyzed sample.

Type of Research

The study is a cross-sectional, field and correlational study. Cross-sectional research refers to the collection of data and information from the participants at a given time, that is, there was no manipulation of variables

over time, which allowed us to obtain a general view of the problem. Likewise, the research was field research, since the questionnaires were applied directly to the students of diversified secondary education within the facilities of the José Ignacio Ordoñez Educational Unit, which allowed the collection of data in an environment under real conditions.

Finally, a correlational research was considered by verifying the hypotheses that arose in terms of the independent variable (selective attention) and the dependent variable (study habits). In this way, it was possible to infer whether the students' ability to concentrate and focus during the development of a task at a given time influenced the way in which they developed or built their study habits.

Population and sample

The population to be analyzed in the research consisted of students attending high school at the José Ignacio Ordoñez Educational Unit, an institution located in the central zone of Ecuador, in the province of Tungurahua, specifically in the Pelileo canton. The sample universe consisted of 223 students belonging to different levels of diversified secondary education with average ages between 14 and 17 years old. The study population was chosen because it prefigures the most important segment in the educational field, especially because of its age group, since in these age ranges it is essential to adopt appropriate learning and concentration strategies that can influence their academic development.

Sample size calculation

In order to determine the number of students that would be part of the study sample, the formula for the calculation of samples in finite populations specified below in equation 1 was used, which allowed selecting the appropriate number of participants from the total population, thus ensuring representative and accurate results without the need to apply the instruments to all students.

$$n = \frac{NZ^2p(1-p)}{E^2(N-1)+Z^2p(1-p)} \qquad (1)$$

Where:
n= Sample size
N= 223 (Population size)
Z= 1,96 (Value of the standard normal distribution for a 95 % confidence level)
p= 0,5 (Expected proportion of the population with the characteristic of interest)
E=0,05 (Allowable margin of error 5 %)

$$n = \frac{223 \times (1{,}96)^2 \times 0{,}5 \times (1-0{,}5)}{(0{,}05)^2 \times (223-1) + (1{,}96)^2 \times 0{,}5 \times (1-0{,}5)} \approx 141{,}7 \approx 142\ students$$

Sample distribution

The sample consisted of 142 students, with the following distribution classified according to age and gender.

Table 1 . Distribution of the student sample according to age and gender

Age (years)	Female	Male	Total
14	11	8	19
15	24	34	58
16	22	16	38
17	15	12	27
Total	72	70	142

As shown in table 1, the mean age of the students was 15 years, and a higher representation of the female gender was observed. This was a balanced sample, facilitating a more precise analysis of the relationship between selective attention and study habits.

Instrument

The "D2 Attention Test" is an instrument composed of a self-correcting sheet with 14 lines of 47 characters each, where the stimuli are marked with the letters d or p, accompanied by small lines at the top or bottom. The task of the evaluated student consists of marking only the letters d with two dashes, avoiding the irrelevant

letters p and d with one or no dashes. Each line has a maximum time of 20 seconds to be completed, the evaluation of the instrument includes indicators such as TR (total responses), TA (total hits), O (Omissions), C (Commissions or errors) as well as TOT (total effectiveness, calculated as TR - [O + C]), CON (concentration index, calculated as TA - C) and VAR (variation index, obtained from the difference between the line with the highest and the lowest number of items attempted). The interpretation of these results is performed using normative scales or percentiles, which allow classifying the performance of the evaluated person as high, normal or low, depending on the age group and characteristics of the evaluated population.

The second instrument used is the "Gilbert Wrenn Study Habits Inventory" which is composed of 28 items with three response options: rarely or never, sometimes and often or always, the students under study should mark only one response per item, since selecting more than one invalidates the result. This instrument covers four sections: reading and note-taking habits, concentration habits, time distribution and relationships during study, and general habits and attitudes. These sections are oriented to reflect the habitual behaviors of the students, qualifying them by means of keys that assign scores to each answer where columns one and three evaluate habits (stable behaviors) and column 2 attitudes (unstable behaviors), where a positive score represents adequate behaviors and inadequate negative ones. The diagnosis can be quantitative using algebraic sums and considering a table of scores, where the values can vary between a range of +10 and -13 in the first column, between +5 and -10 in the second column, and finally +8 and -11 in the third column, having as main consideration that a score of 25 is considered normal, higher scores indicate that it is above normal and lower scores are subnormal.

Hypothesis

Alternate hypothesis (H_1): selective attention has an impact on the study habits of high school students of the José Ignacio Ordoñez Educational Unit (Unidad Educativa José Ignacio Ordoñez).

Null hypothesis (H_0): selective attention does not affect the study habits of high school students of the José Ignacio Ordoñez Educational Unit.

Analysis of Data Obtained

For the development of the present study, permission was requested from the educational institution for the application of the D2 Test and Gilbert Wrenn's Study Habits Inventory instruments to its students between 14 and 17 years of age. The first test administered to the participants was Test D2, in which they had to identify and underline the letters "d" containing two lines, either both above, both below or one above and one below the letter from a total of 14 rows with an estimated response time of 20 s for each. After completing the first instrument, statistical analysis was performed using SPSS and Microsoft Excel software, which allowed us to obtain descriptive results for the variables Effectiveness (TOT) and Concentration Level (CON).

After the application of the "Gilbert Wrenn Study Habits Inventory" instrument, the data of the 142 participants were processed in Microsoft Excel software, assigning the corresponding scores of the instrument and classifying them in three possible categories: inadequate habits, inadequate attitudes and adequate habits. For the respective analysis we worked only with the total amount of inadequate habits denoted with the variable (TOTAL_HAB) in the SPSS software, establishing a scale of affectation in five levels, from a score of 1 "Significantly impairs academic performance in a very high way" to 5 "Does not affect academic performance", said data were transferred to SPSS to determine the relationship between inadequate habits and the variables, effectiveness (TOT) and level of concentration (CON) of the D2 test through a bivariate Pearson correlation.

Pearson's correlation coefficient (r) was analyzed according to the significance value (p), considering that if $p < 0,05$ the statistical relationship is significant, allowing the hypothesis to be accepted, otherwise if $p>0,05$ the hypothesis is refuted or discarded. The (r) value is also taken into account to determine the magnitude and direction of the correlation, establishing whether the relationship between both variables (TOTAL_HAB) and (TOT, CON) is strong, moderate or weak.

RESULTS

For the development of this research we worked with a total of 142 students divided between males and females whose ages range from 14 to 17 years old. The d2 attention test was the instrument applied to the participants in order to understand their level of attention in relation to the variables TOT (total effectiveness of the test), that is, it reflects the speed of processing and the level of cognitive activity of the students in the development of the instrument, and the variable CON (concentration index) related to the number of correct answers once the omission errors had been eliminated.

Through these indicators it was possible to measure the students' ability to concentrate and their level of cognitive performance in the development of activities or tasks that required their sustained and selective attention. The descriptive statistical results presented in table 2 show the mean and standard deviation values of the TOT and CON variables.

Table 2 . Descriptive values of effectiveness and concentration of the D2 test

Descriptive Statistics					
Variables	**N°**	**Minimum**	**Maximum**	**Media**	**Standard Deviation**
TOT	142	19	579	372,75	119,66
CON	142	15	286	135,06	45,30

Table 2 shows the mean and standard deviation values of the variables TOT (effectiveness) and CON (level of concentration). Initially, it is evident that the total mean of the 142 participants is 372,75, which value corresponds to a 40th percentile due to the fact that on average most of the students evaluated are 15 years old, which is why the percentile table was used based on the scale for the range of 15 to 16 years old. When interpreting this variable, it can be mentioned that the participants have processed a smaller amount of stimuli in reference to the average value of the scale for this age group, i.e., the students tend to develop their tasks at a slower pace due to attentional difficulties.

The data described in table 2 shows that the mean concentration level of students was 135,06, which is lower than the reference scale mean of 150,12 for participants aged 15 to 16 years, with a difference of approximately 15 points. This result indicates a lower concentration level in the sample compared to the reference values.

Through the results obtained in table 3, it was possible to examine the behavior of the age group made up of 14-year-old students. For the frequency analysis of the responses to test D2, the corresponding scale for males and females between 13 and 14 years of age was considered; however, the sample corresponds only to 14-year-old students.

Table 3. Effectiveness data and concentration level in 14-year-old students

Range	**Frequency TOT**	**Percentage TOT**	**Frequency CO**	**Percentage CON**
P81-P99	13	68,4	8	42,11
P61-P80	1	5,3	0	0,00
P41-P60	3	15,8	4	21,05
P21-P40	2	10,5	2	10,53
P1-P20	0	0,0	5	26,32

As shown in table 3, of a total of 19 participants aged 14 years, 68,4 % are located between the 81st to 99th percentile, which reflects a higher performance according to the total amount of correctly processed stimuli, that is, their value is above the normative average of the reference scale of 341,25 corresponding to the 50th percentile. Likewise, 15,8 % (3 students) are located within the range of the 41st to 60th percentiles, showing that their performance for the development of the test reflected an average performance. Based on these data, it can be stated that most students were able to analyze stimuli in a concentrated manner in a given time while maintaining their selective attention and information processing.

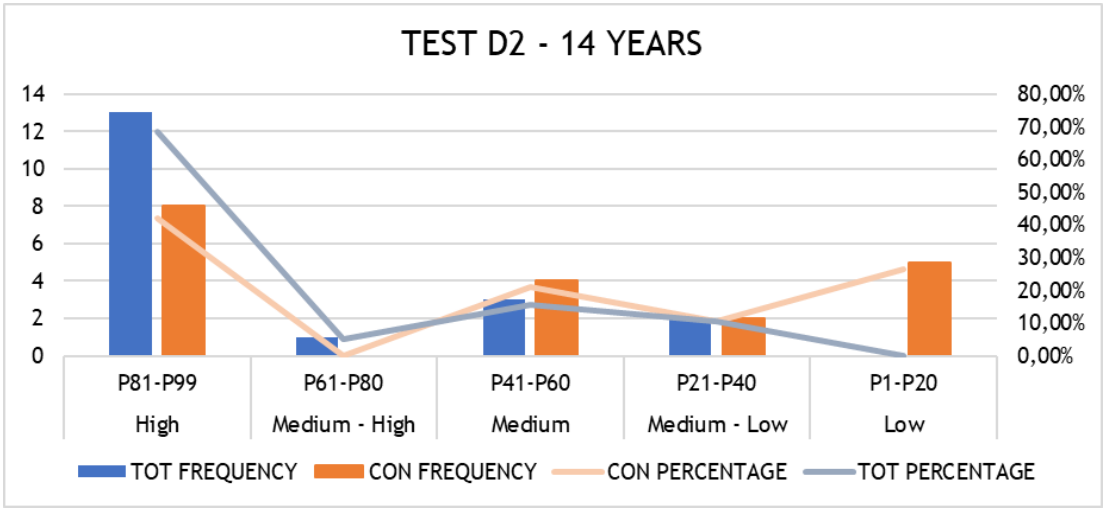

Figure 1. Distribution (TOT) and (CON) in 14-year-old students

When analyzing the results of the variable CON, which was calculated as a function of the number of correct answers minus the number of errors, 42,11 % showed greater concentration and thanks to this they were able to reduce the number of errors when correctly locating the stimuli. On the other hand, in figure 1, it can be observed that 26,32 % of the students are within the range of percentile 1 to 20, being alarming data since it denotes the deficit of concentration that leads to suppressing the correct stimuli by those incorrect ones.

Table 4. Effectiveness data and concentration level in 15-year-old students

Range	Frequency TOT	Percentage TOT	Frequency CON	Percentage CON
P81-P99	18	31,0	9	15,52
P61-P80	12	20,7	9	15,52
P41-P60	3	5,2	7	12,07
P21-P40	8	13,8	13	22,41
P1-P20	17	29,3	20	34,48

Table 4 shows that 31 % of the 15-year-old students are located in the 81st to 99th percentile, demonstrating that their selective attention is higher than the average of the scale for males and females between 15 and 16 years of age, whose value ranges between 388,4. On the other hand, 29,3 % (17 students) out of a total of 58 belong to the 1 to 20 percentile range, showing their inability to identify relevant stimuli due to their slow processing or lack of sustained attention, which affects their ability to generate responses to pressure situations.

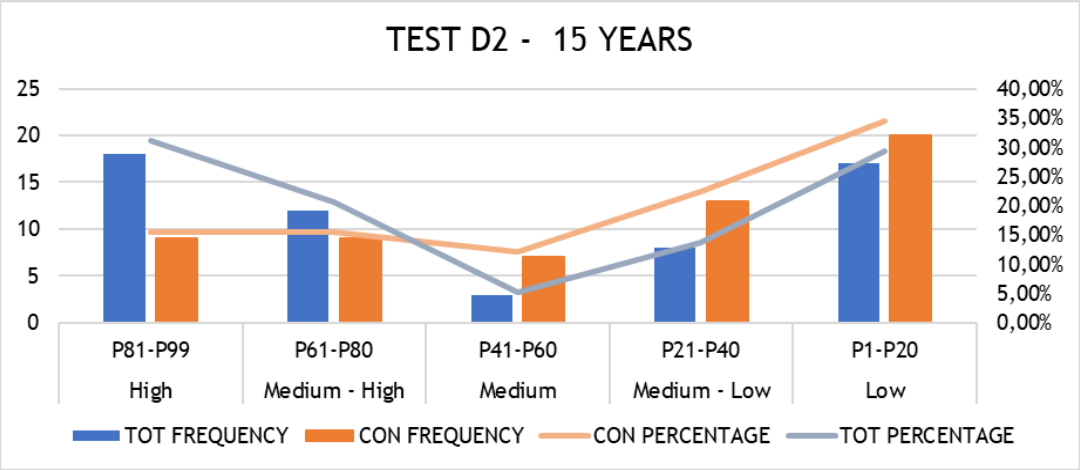

Figure 2. Distribution (TOT) and (CON) in 15-year-old students

On the other hand, when evaluating the percentage of students with greater representativeness and concentration level (CO), it is evident in figure 2 that only 15,52 % are between the percentile ranges 81 to 99, while 34,48 % of the students presented a deficit in their concentration level and attentional control capacity during the development of the test, resulting in erroneous answers due to lack of precision and the presence of difficulties in the execution of tasks or activities that require the participants to maintain a prolonged focus, whether for problem solving or information analysis.

Table 5. Effectiveness data and concentration level in 16-year-old students

Range	Frequency TOT	Percentage TOT	Frequency CON	Percentage CON
P81-P99	5	13,2	3	7,89
P61-P80	3	7,9	3	7,89
P41-P60	4	10,5	3	7,89
P21-P40	4	10,5	11	28,95
P1-P20	22	57,9	18	47,37

https://doi.org/10.56294/saludcyt20251623

Similar to the analysis performed for the 15-year-old age group, in the case of 16-year-old students, the scale corresponding to males and females aged 15 to 16 was used. The results are shown in table 5, where only 13,2 % of the students were able to maintain a high effectiveness in the development of the test accurately and efficiently pointing out the correct stimuli within a wide group of options. With reference to the mean value of the scale, only 10,5 % remained within the range of the 41st to 60th percentiles, i.e., their performance was moderate and they made occasional errors. And 57,9 % had a low score, suggesting a deficiency in the processing of stimuli and a greater tendency to make errors due to a low selection speed.

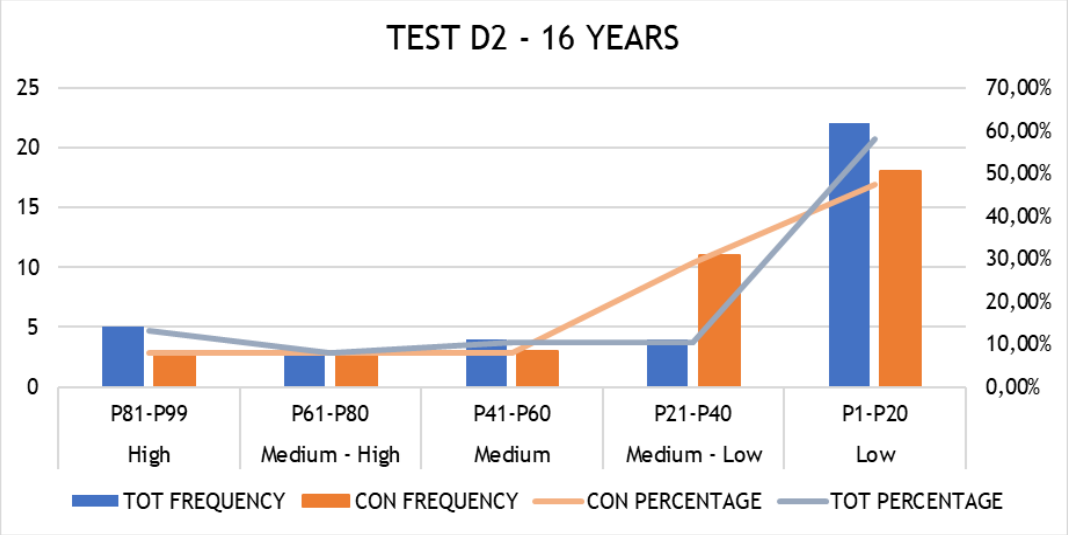

Figure 3. Distribution (TOT) and (CON) in 16-year-old students

As shown in figure 3, there is a significant percentage of students with a low level of concentration, located in the percentile range from 1 to 20. Particularly, 47,37 % of the group, almost half of the students tended to be more easily distracted, preventing them from focusing on the development of the D2 test, which caused them to make a greater number of errors and thus develop a lower ability to filter relevant stimuli. In addition, due to the number of items, participants tended to experience cognitive fatigue and this was evidenced in the progressive performance of the instrument, where the greater the progress, the greater the number of incorrect answers.

Table 6. Effectiveness data and concentration level in 17-year-old students

Range	Frequency TOT	Percentage TOT	Frequency CO	Percentage CON
P81-P99	6	22,2	2	7,41
P61-P80	4	14,8	5	18,52
P41-P60	3	11,1	5	18,52
P21-P40	8	29,6	3	11,11
P1-P20	6	22,2	12	44,44

To summarize, to analyze the data obtained once the D2 test was applied, the scale for males and females aged 17 to 18 years was used, with special attention to the last age group of the study corresponding to 17 year olds. When evaluating the effectiveness of the test, it became evident that 22,2 % of the participants generated accurate responses in the search for stimuli thanks to their agile processing capacity and greater attentional endurance. On the other hand, 29,6 % of the students' responses were classified in a percentile range of 21 to 40, which values are below the average scale of 407,93. This situation underscores that while a few participants maintained focus on the test objective within the established time frame, most of them became unfocused and decreased their performance.

Figure 4 shows that there is a greater number of students whose level of concentration is minimal; 44,44 % of the participants gave answers that show difficulties in maintaining attention and focus. This age group showed greater impulsivity in the development of the instrument, generating hurried and mostly wrong answers compared to 7,41 % who indicated a high level of concentration.

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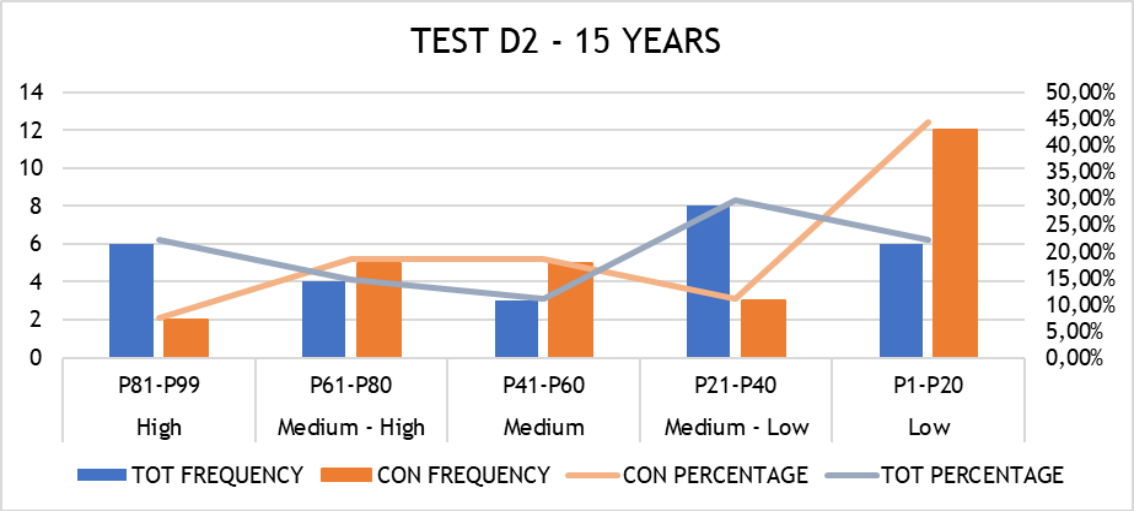

Figure 4. Distribution (TOT) and (CON) in 17-year-old students

The Gilbert Wrenn Study Habits Inventory was administered to 142 students to assess their habits in four key areas: reading and note-taking habits, which analyzes how often they read and take notes; concentration habits, which measures their ability to stay focused during study; time allocation during study, which assesses how they organize their time between study and other activities; and general work habits and attitudes, which examines their attitude and commitment to academic work.

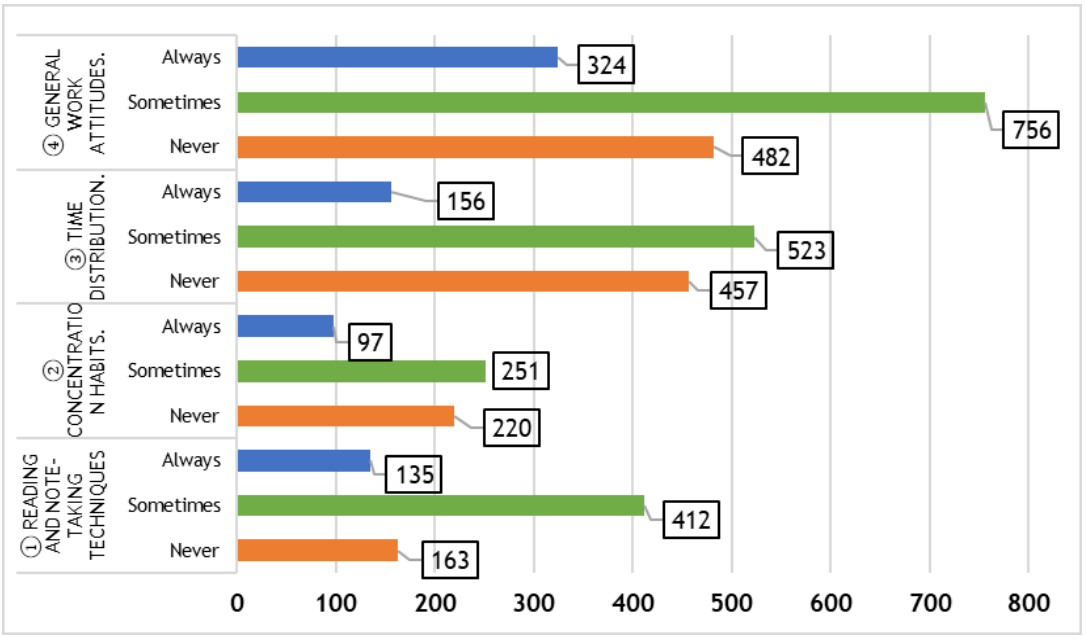

Figure 5. Frequency of study habits according to the Gilbert Wrenn Inventory

The results of the Gilbert Wrenn Study Habits Inventory show that students have key areas that require improvement. In the "Reading Habits and note-taking" section, 58 % of students indicated that they "sometimes" perform these activities, and 23 % said they "never" perform them, suggesting the need to establish a more consistent routine. In "Concentration Habits," 44 % indicated that they "sometimes" concentrate, and 39 % mentioned that they "never" concentrate well, highlighting a generalized difficulty in maintaining attention. Only 17 % showed consistent concentration, underscoring the importance of improving sustained attention.

Regarding "Time distribution during study", 40 % of the students indicated that they "never" organize their time adequately, and 46 % do so "sometimes", reflecting a lack of time management skills. Only 14 % managed to maintain an adequate time distribution. Finally, in "General work habits and attitudes", 31 % of the students said they "never" have adequate work habits, while 48 % have them "sometimes". Only 21 % showed a consistently positive attitude, indicating the need to foster greater discipline and academic commitment.

After obtaining the responses from each of the respondents, we proceeded to exchange the scores for those established in the Gilbert Wrenn Study Habits Inventory. The following descriptive statistics were obtained for each of the sections evaluated:

Table 7. Descriptive statistics of the Gilbert Wrenn Study Habits Inventory score by category

	Reading and note-taking techniques	Concentration habits	Time Distribution	General work attitudes
Media	-1,70	1,39	3,28	-0,53
Standard error	1,18	1,01	1,90	1,53
Median	-2,00	2,00	5,00	-1,00
Fashion	-11,00	17,00	10,00	-2,00
Standard deviation	14,01	11,99	22,62	18,25
Sample variance	196,26	143,77	511,55	333,05
Kurtosis	-0,05	-1,11	-0,84	0,33
Asymmetry coefficient	0,53	0,11	-0,02	-0,24
Range	65,00	42,00	94,00	101,00
Minimum	-30,00	-19,00	-42,00	-59,00
Maximum	35,00	23,00	52,00	42,00
Sum	-241,00	198,00	466,00	-75,00
Account	142,00	142,00	142,00	142,00

The results of the Gilbert Wrenn Study Habits Inventory show great variability among students. In Reading and Note-Taking Skills, the mean of -1,70 indicates that, on average, students have difficulty in this area. The standard deviation of 14,01 and the range of 65 reflect the wide dispersion in responses. In Concentration Habits, the mean was 1,39, suggesting that, in general, students manage to concentrate somewhat well, although the standard deviation of 11,99 shows differences among students. The range of 42 also reflects variability in concentration levels.

Regarding Time Distribution during study, the mean of 3,28 indicates that some students manage their time adequately, but the standard deviation of 22,68 shows that there is a lot of dispersion. The range of 94 reinforces the idea that there are students with good time distribution and others with difficulties. Finally, in General Work Attitudes, the mean of -0,53 reflects a moderate attitude and the standard deviation of 18,25 indicates high variability in commitment and attitudes toward academic work. The range of 101 shows large differences in students' attitudes toward their studies. In summary, these results show high variability, suggesting that intervention is needed in several aspects to improve consistency and effectiveness in study habits.

Table 8. Descriptive statistics of the total score on the Gilbert Wrenn Study Habits Inventory

Study Habits Inventory Total Score	
Media	2,45
Standard error	3,98
Median	3
Fashion	-25
Standard deviation	47,47
Sample variance	2254,02
Kurtosis	-0,77
Asymmetry coefficient	0,112
Range	188
Minimum	-90
Maximum	98

The results of the Hilbert Wrenn Study Habits Inventory show great variability among students. The mean of 2,45 is below the score considered normal of 25, indicating that many students have subnormal habits, although this does not necessarily affect their academic performance. According to the established criteria, those with scores above 25 are above average, while those with lower scores have less effective habits.

The standard deviation of 47,48 and the range of 188 show a large dispersion, suggesting that some students have good habits, but others have much lower scores. The minimum of -90 and maximum of 98 highlight the extreme differences. The median of 3 indicates that most students are below the ideal level of 25, highlighting

the need to improve their habits. Overall, while some students have good habits, there is a large disparity that needs to be addressed.

Continuing with the scoring, the negative scores at the extremes are assigned to inadequate habits, while the negative scores in the center correspond to inadequate attitudes. Positive scores are assigned to adequate habits. After assigning the scores, a count is made of the responses in each category (adequate habits, inadequate habits, and inadequate attitudes), which makes it possible to evaluate the prevalence of each type of habit and attitude in the student. This count helps determine whether habits and attitudes affect academic performance and guides the interventions needed to improve student performance.

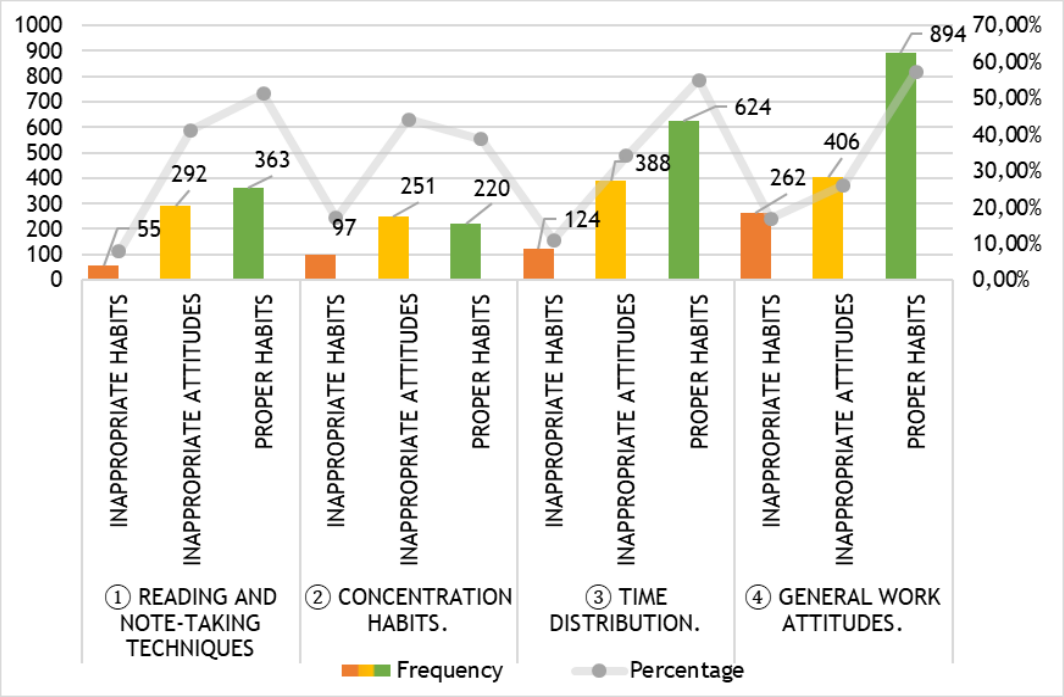

Figure 6. Frequency and percentage of adequate and inadequate habits in the Study Habits Inventory

Figure 6 shows the results of the 3976 responses obtained from the 142 students, distributed in three categories: adequate habits, inadequate attitudes and inadequate habits, from the 28 items of the inventory. In the section of Techniques for reading and note-taking, most students (363) have adequate habits, while only 55 present inadequate habits, suggesting that, in general, students have good habits for reading and note-taking, although some still present difficulties. In Concentration Habits, adequate habits (292) outnumber inadequate habits (251), indicating that, although many students manage to concentrate well, there is a significant proportion facing difficulties in maintaining attention. Regarding Time Distribution during the study, 388 responses were classified as adequate habits, while 124 were inadequate habits, reflecting that many students manage their time effectively, but some need improvement in this area.

Regarding General Work Attitudes, the majority of students (894) show adequate habits, but 406 responses were classified as inadequate attitudes, suggesting that, although the majority have a positive attitude towards their academic work, there is a relevant percentage with attitudes that could affect their performance. In summary, although the majority of students present adequate habits in key areas, there are areas such as concentration, time distribution and general work attitudes that require attention to improve overall academic performance.

Table 9. Classification of the impact of inadequate habits on academic performance

Number of inadequate habits	Impact on academic performance
0	They do not affect academic performance.
1-2	It is possible or could affect academic performance.
3-4	They significantly impair academic performance.
5-9	They significantly impair academic performance.
10 or more	They significantly impair academic performance to a very high degree.

https://doi.org/10.56294/saludcyt20251623

To interpret the impact of inadequate habits on the academic performance of each student, the table of inadequate habits is used, which classifies the results according to the number of inadequate habits recorded.

Below is the graph illustrating the distribution of inadequate habits among students, with frequency and percentage values, which allows visualizing the potential impact on their academic performance.

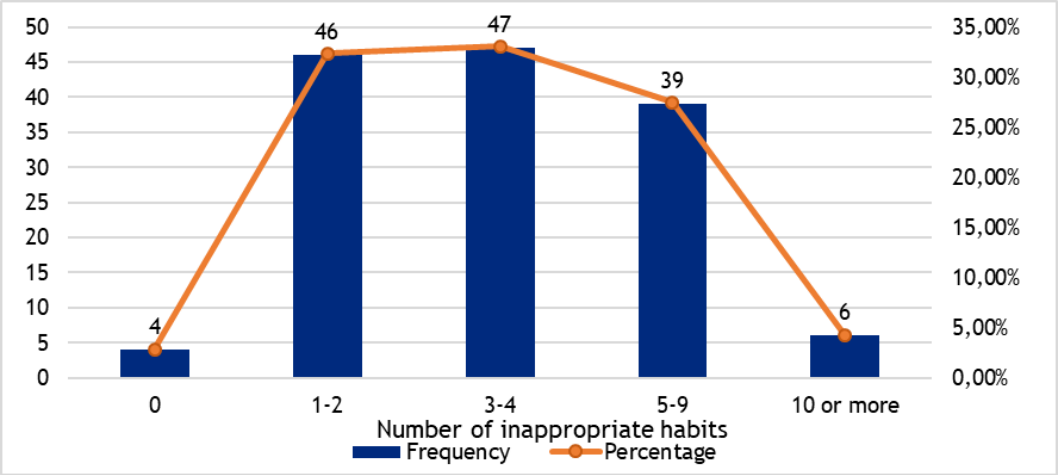

Figure 7. Total distribution of inappropriate habits in students

The results show that 2,82 % of the students (4 in total) have no inadequate habits, which does not affect their academic performance. 32,39 % (46 students) have between 1 and 2 inadequate habits, which could affect their performance. A 33,10 % (47 students) have between 3 and 4 inadequate habits, which significantly impairs their academic performance. A 27,46 % (39 students) have between 5 and 9 inadequate habits, which highly affects their performance, and 4,23 % (6 students) have 10 or more inadequate habits, which very negatively impacts their performance. In general, a considerable part of the students present inadequate habits that affect their academic performance, so interventions are required to improve these habits.

Table 10. Correlation between inappropriate habits and selective attention (Test d2)

		TOT	CON
Total_Hab	Pearson correlation	0,204*	0,143
	Sig. (bilateral)	0,015	0,091

Note: TOT: Effectiveness, CON: Concentration Level, TOTAL_HAB: total of inappropriate habits

The results obtained through Pearson's correlation suggest that there is a significant relationship between the selective attention metric, Total correct answers (TOT) of the d2 test and the result of the inadequate habits count of the Gilbert Wrenn study habits inventory (r=0,204, p=0,015). Considering that the p-value is less than the significant level that is p=0,015 < 0,05 the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, which indicates that selective attention influences the study habits of individuals, in spite of this the magnitude of the correlation is low, indicating that although there is a relationship its impact is not strong. In contrast, the correlation with the concentration index metric (CON) and study habits is not statistically significant as we have as a result (r=0,143, p=0,091). Since the p-value is greater than the 0,05 significance level, it is considered that there is no evidence to reject the null hypothesis (H_0) in this specific dimension of the d2 test.

DISCUSSION

Through the development of the research, it became evident that selective attention in students influences their study habits, since it is a cognitive capacity in charge of processing, filtering and retaining the most relevant information, ensuring a higher level of concentration in the execution of academic tasks, facilitating the organization of learning and reducing the interference of distracting elements, resulting in better academic performance. On the contrary, those students whose attentional capacities are limited are exposed to situations of disorganization, less retention of information and knowledge, and a decrease in the quality of their studies.

By virtue of this, Pawlowskin[25] in his study analyzes the influence of the variables TR and CON through the application of the D2 Test to a group of students between 18 and 39 years of age. The results show that the older the age of the participants, the lower their processing capacity due to changes in their level of cognition,

since the level of CON concentration of students aged 18 to 24 was 186,25 and from 25 to 35 years old was 178,13. This research supports the values obtained in the present study, where students aged 14 were the age group with the highest level of concentration with values higher than the 81st to 99th percentiles. Similarly, Monzón et al.[26] in their research applied to 762 workers reflects that young participants aged 18 to 39 years reached higher values than the age group 40 to 59 years with a mean difference of 24,67 and a p=0,00.

On the other hand, Caamaño-Navarrete et al.[27] affirm that selective attention is one of the primary elements that helps to understand the learning processes, since a good ability to concentrate is related to the level of attention. Thus, the research showed that 14-year-old students, as opposed to the 15 to 18-year-old age groups, have higher values in the TOT effectiveness variable and CON concentration level, since during the development of the instrument they proved to be able to work in an agile and precise manner to distinguish between different stimuli. On the contrary, in the study by Cevallos et al.[28] after applying the questionnaire to subjects from 18 to 59 years of age, a mean of 74,82 was evidenced in populations older than 45 years of age, this contradicts the positions of previous research and affirms that this change is due to the fact that attention and concentration are able to improve with the experience and cognitive maturity of the subjects.

In the study by Fernández-Menor[29] through the implementation of the D2 selective attention test and the immersion of technological resources and software, the improvement in the concentration habits of ADHD students with low performance problems is analyzed. The results reflect significant advances before and after applying the test with a score of 80 and 99 respectively, suggesting that the intervention of ICTs improves the level of concentration. According to the present study, 44 % of the 142 students affirmed that sometimes they remain concentrated during their study or educational sessions; therefore, the analysis of Fernández-Menor[29] would serve as a guideline for future interventions thanks to the help of technological tools that allow students to stimulate their cognitive functions in an interactive and adaptive way.

The results of Gilbert Wrenn's study habits inventory indicate deficiencies in areas such as note-taking, concentration and organization of study time. Thirty-nine percent of the students report difficulties in concentrating and 40 % do not organize their study time, which evidences the need to improve their study strategies, comparing it with the studies of Cuizon et al.[30] and Ordiz et al.[31], who also used the same instrument revealed very similar findings. Cuizon et al. identified that Filipino college students showed preference for tactile and group learning styles, but presented inadequate habits, with 54 % not planning their time and 42 % reporting low concentration. In contrast, Ordiz found that habits do not guarantee an improvement in problem-solving efficiency, employing multiple regression analysis, it was found that students with analytical-logical skills performed better than those who relied more on their study habits.

From a different point of view, studies such as Tus et al.[32] and Capuno et al.[33]use different methodologies that support the relationship of study habits and attitudes with performance, as the study of Tus et al. used the Study Habits Inventory of Palsane and Sharma, confirming that although the students possessed habits to an intermediate degree, it did not show a significant correlation with academic performance, with values of r=0,18 and p>0,05. On the contrary, the study by Capuno et al.[33] used a Likert scale-based technique using Charles-Ogan and Alamina's Students Study Assessment Scale (SSHAS) instrument, whose findings showed a significant correlation between study habits and academic performance in mathematics with values of r=0,227 and p=0,002, suggesting that students with better habits would normally receive better grades. The findings of the studies reviewed confirm that study habits influence academic performance.

When the alternative hypothesis of the research between selective attention and study habits was accepted (r=0,204, p=0,015), the paper by Torres-Acuña et al.[34] was considered, in which it was demonstrated from the application of the D2 test and the Progressive Linguistic Complexity Reading Comprehension Test. The results obtained after applying the instruments to 69 students between 11 and 12 showed a general correlation (rs=0,36 and p<0,05), with variations in the subtests evaluated: VI-A-1 categorization of elements with values of (rs=0,27 and p>0,05), VI-A-2 cause and effect relationships (rs=0,31 and p>0,05) and VI-A-3 critical reading level with values of (rs=0,25 and p<0,05). Thus, categorizing the elements allows the hierarchization of concepts and facilitates the identification of main ideas, cause and effect relationships allow the logical interpretation of the text and the understanding of the connection between events, and the critical reading level is referred to as the students' ability to analyze the meaning of a text.

According to Gilbert Wrenn's Study Habits Inventory, time distribution and social interactions during study, together with general patterns and attitudes, affect selective attention. The research by Pawlowski et al.[35], using the d2 Test, found a relevant correlation between selective attention and school performance (r=0,356, p<0,01), as well as with reading frequency (r=0,279, p<0,05). To study study practices and time distribution, they used a study habits questionnaire based on the structure of the Wrenn Inventory. This revealed that a more efficient organization of time and regulation of social distractions encourage a continuous focus on academic activities. Additionally, a positive link was evidenced between students' age and their attention (r=0,301, p<0,05), suggesting that cognitive advancement and maturity also influence the ability to concentrate.

Likewise, the study by Vendramini et al.[36] carried out on a set of 51 children aged 6 to 8 years, used the CARAS-R Test to assess selective attention and the Evaluation Test of Cognitive Abilities for Interpersonal

Problem Solving (EVHACOSPI) to measure the ability to resolve conflicts, where a mean in selective attention performance (M=4,94, SD=1,14) and a non-relevant correlation (p>0,05) with interpersonal problem solving were perceived. In the aspect of general work habits and attitudes, 67 % of the children opted for appropriate solutions to solve problems, while 59 % did not adequately recognize conflicts. This indicates that less selective attention could be linked to problems in work organization and in the regulation of interpersonal relationships. This indicates that children with greater selective attention could manage their time better and cope more successfully with interpersonal situations within the school environment.

These findings corroborate that selective attention is fundamental for regulating study patterns, facilitating better time organization, managing distractions and improving the learning process. The ability to focus on relevant information simplifies task organization and interaction management during research, preventing cognitive burnout.

CONCLUSIONS

The study confirms that selective attention plays a role in the development of study habits, but it is not the sole determining factor. While students with higher attentional capacity tend to exhibit better organization and concentration strategies, other elements such as self-regulation, cognitive flexibility, and the socio-educational environment have a significant influence on the formation and effectiveness of these habits.

It is evident that attentional capacity evolves with age, impacting the ability to process information efficiently, retain knowledge, and sustain focus. As students progress through their academic journey, study habits often become less structured and effective, which can negatively affect their performance, time management, and capacity for sustained concentration. This suggests that attention alone is insufficient for maintaining strong study habits and that broader cognitive and behavioral strategies are necessary to optimize learning outcomes.

Given the complexity of these interactions, further longitudinal and neuropsychological studies are recommended to explore the connections between selective attention, working memory, cognitive load, and emotional regulation. Understanding these relationships could provide valuable insights into how attentional processes support academic success. Additionally, incorporating neuroeducation and metacognition approaches in educational programs could help students develop more adaptive learning strategies, fostering.

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FINANCING

The authors did not receive funding for the development of the present research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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