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Attention Span Across Academic Years in Dental Studies, A Cross-Sectional Study Among Local Population

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Abstract

Objectives: To determine the association between attention span and year of study of dental students. To identify the factors affecting the attention span.

Methods: A cross-sectional study at CMH Lahore Medical College & IOD from Oct to Dec 2024, involved 155 students from 1st to 4th year BDS, using a Stratified Random Sampling technique. The study used demographic data and an online Attention Control Scale (ACS) questionnaire, excluding students with low attendance or attention deficit hyperactivity disorder ADHD, and IBM SPSS 26 used for descriptive and inferential statistics.

Results: The mean age of respondents were 155(21.1+_1.68), and 63.2% of them were female. The men's average score was (50.31±6.37), while women's average was (45.12±7.12). Second-year students scored the lowest (58±7.02) and fourth-year students earned the highest (75.4 ±6.67) on the "Attention Control Scale (ATS)". Significantly influenced internal factors are emotions about 52.25%, while nearby noises (79.35%) and classroom environment (74.83%) were additional external variables. 73.54% of students struggled listening to a one-hour class, while 80.64% preferred PBL and small group discussions as teaching methods.

Conclusion: Students' attention span is affected by both internal and external factors, including emotions and learner type, as well as by traditional lectures and long-duration lectures. External effects include the length of the course and noise in the surroundings.

Keywords: internal and external influences, attention span. Dental students, Attention Control Scale (ACS)

Introduction:

The length of time a student can concentrate on a task without becoming distracted or in other words, Attention Span is the duration of time for which one can concentrate on a task without distraction.[1] It is a cognitive metric referring to sustained focus on learning materials such as lectures, readings, or clinical tasks. Digital devices pose substantial threats to the human ability to focus and hold attention. [2,3] Attention span is the period during which cognitive engagement with a stimulus or task is sustained and is vital in learning, productivity, and cognitive functioning overall. People are worrying about attention span like never before, and a great deal of research is emerging about the attention span including the nature, causes, and effects of this cognitive possibility. Attention span is an important concept to understand, as it has far-reaching implications, from education to workplace productivity to mental health.[4]

The attention process consists of a number of sub-components. [5] In our study, we focus primarily on sustained attention and focused attention. An instance of sustained attention is selectively concentrating on a discrete aspect of information while neglecting other perceptible information, whereas focused attention involves maintaining cognitive activity over a prolonged period of time.

It takes sustained attention for information to be encoded into memory efficiently, a cognitive process that is essential for long-term knowledge consolidation and retrieval. Memory and attention are interconnected and work together. [6] In the field of medicine, attention is essential for professional development. This study aims to determine the active attention span in individuals in their early twenties, as there is a lack of literature on this age group.

Grasping the intricacies of attention span is essential for enhancing educational results. Several key factors come into play, including the length of lectures, the quality of sleep an individual receives, levels of stress, dietary habits, overall health, ambient noise, and personal challenges. Each of these elements can significantly impact cognitive performance, resulting in lapses in focus and slower reaction times, ultimately hindering the learning process. Understanding how these variables intersect can lead to more effective strategies for fostering better attention and engagement in educational settings.[7] Research indicates that young learners typically exhibit a shorter attention span, averaging around 5 to 7 minutes, in contrast to adult learners, who can focus for a more extended period, generally between 10 to 15 minutes.[4] This difference highlights the need for tailored instructional strategies that can engage younger audiences effectively within their limited span of concentration. [8] To foster student engagement and

enhance attention spans in educational settings, it's important to consider the optimal length of lectures and incorporate active learning strategies. These approaches can create a more dynamic and interactive learning environment that benefits students. [9]

This study seeks to investigate the differences in attention span among Dental students, with a particular emphasis on how factors like age and gender may influence these variations. By examining the students' attentional capabilities throughout their Dental training, the research will delve into specific facets of attention, including sustained attention (the ability to maintain focus on a task over an extended period), focused attention (the capacity to concentrate on a particular stimulus amid distractions), and attention shifting (the skill of changing focus from one task or stimulus to another). Through this comprehensive analysis, the study aims to deepen our understanding of how attention spans evolve during Dental education and how they may vary among diverse groups of students. This research endeavor focuses on exploring variations in attention span patterns across different genders, providing insight into how these patterns may differ and evolve. Additionally, it examines the trajectory of students' attention spans as they advance through their educational journeys, highlighting the changes that occur at various stages of learning. The study seeks to uncover both internal factors, such as cognitive processes and personal motivation, as well as external factors, including classroom environment and teaching methods, that may influence attention span. Through this comprehensive analysis, the research aims to paint a clearer picture of the dynamics surrounding attention span in academic settings.

To address a research gap in this important Dental area, this study at CMH Lahore Medical College & IODinvestigates the attention span of Pakistani Dental students.

Methodology:

A cross-sectional study was conducted at CMH Lahore Medical College & IOD from Oct 2024 to Dec 2024 to investigate attention control among dental students by using a Stratified Random Sampling technique. A sample size of 155 was determined utilizing Rao Soft software, with a specified margin of error of 5% and a confidence level of 95%. The study employed probability proportional to size (PPS) sampling to guarantee equal representation from each academic year for each year equal representation. The data collection process utilized a pre-tested and validated instrument, referred to as the "Attention Control Scale," (ACS) and its reliability 0.61. [10]

Approval from the Institutional Review Board (IRB) for Biomedical Research at CMH Lahore Medical College & IOD, Lahore (Letter No. 684/ERB/CMH/LMC)

Attention Control Scale (ACS):

The Attention Control Scale (ACS) is a self-report scale developed to measure the two key factors of attention (attention focusing and attention shifting). This scale is also known as ATTC. The ACS/ATTC comprises 20 items, rated on a four-point Likert scale (1-4 from almost never to always). The reliability of this scale was 0.74-0.93 and internal consistency was 0.93.[11]

SCALES

The ACS/ATTC generates a single total scale and two subscales (attention shifting and attention focusing). Below are described the scales and item loadings. Scale scores are derived from the sum of the respective items.

SCALE NAME	DESCRIPTION	ITEM LOADINGS
ATTC-TOT	**Total**	**1-20**
ATTC-FOC	**Attention Focusing**	**1,2,3,4,5,6,7,8,12**
ATTC-SHIF	**Attention Shifting**	**9,10,11,13,14,15,16,17,18,19,20**

Table 1: ATTC scale

The questionnaire effectively captured demographic variables, alongside key internal and external factors that significantly influence attention span. An informed consent was obtained before participants completed the questionnaire, ensuring the confidentiality of their responses. Students with an attendance rate of less than 75% and those diagnosed with attention deficit hyperactivity disorder (ADHD) were excluded from the study to ensure a comparably homogeneous population. Data was analyzed by using SPSS version 26. The mean score of attention control was calculated, and descriptive statistics were employed to analyze demographic variables. Additionally, statistical tests including independent t-tests, one-way ANOVA, and chi-square tests were performed to investigate significant relationships among the variables.

Results

A study of 155 dental students found in table 2, the average attention span was (53.31±6.37) for males and (45.12±7.12) for females when Independent T-test was applied. No significant difference p=0.321 was there.

Group	Sample Size (n)	Mean Attention Span (minutes)	Standard Deviation (SD)
Male	**57**	**53.31**	**±6.37**
Female	**98**	**45.12**	**±7.12**

Table 2: students attention span

The age ranged from 17 to 25 years, with a mean of 22.12±1.587. The student population varies across academic years, with the first year having the highest student representation at 70%, followed by the second year at 58%, the third year at 75.5%, the fourth year/ final year with 74.5%.

		n	%
Perceived Factors Affecting Span n=155	**External Factors**		
	• **Nearby Noice**	**123**	**79.35**
	• **Classroom Environment**	**116**	**74.83**
	• **Long duration of Class**	**114**	**73.54**
	• **Repetition of Lecture**	**95**	**61.29**
	Internal Factors		
	• **Less/No interest in the subject**	**78**	**50.32**
	• **Emotions**	**81**	**52.25**
	• **Physical health**	**64**	**41.29**
	• **Mindset**	**53**	**34.19**

Table 3: students' attention spans can be influenced by internal and external factors

When ANOVA was conducted it was found that attention span varied across different academic years but had insignificant association between mean of attention focusing and different years p=0.172, attention shifting and advancing years p=0.143, as well as the mean of total attention and the means of different year groups p=0.106. table 3 discusses different factors that distracted students during lectures included internal factors like emotions, health, mindset, and personal interests, with 78 (50.3%) experiencing emotional distractions. External factors like course length and nearby noises were also noted, with 123 (79.3%) finding longer courses hindering their attention.

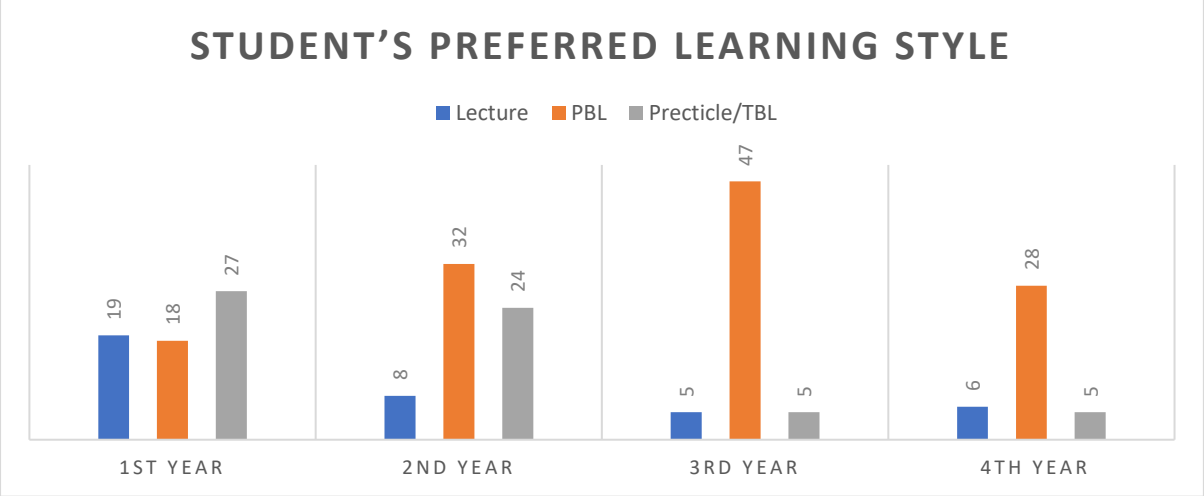

Table 4: Students' Preferred Methods for Student Learning

As Table 4 shows about 43 (27,7%) of students reported difficulty sustaining attention in one-hour lectures, while 125 (80.64%) preferred Problem-Based Learning (PBL), and 61 (39.35%) Task-Based Learning (TBL), Practical, and Small Group Discussions. Visual learners comprised 89 (58.1%), with 24 (15.5%) being kinesthetic learners. The study highlights the need for strategies to enhance attention and engagement among Dental students, such as creating a conducive learning environment, considering lecture duration, implementing interactive learning methods, and accommodating diverse learning styles.

Discussion

A strong attention span is crucial for students' academic success, as it helps them stay focused, absorb information, and engage in learning activities. [12] Attention span is positively correlated with students' ability to concentrate, comprehend complex concepts, and perform well on exams and assignments, ultimately shaping their academic achievements and future educational opportunities overall learning outcomes.[13] As they are better equipped to sustain their focus, they process information deeply, and actively contribute to classroom discussions. [14]Our study suggests that attention span may not be directly influenced by the advancing years in Dental college. It is important to consider that attention span is a complex construct influenced by various factors, and the progression of years in Dental education alone may not be sufficient to impact this aspect of cognitive functioning. According to our study, which sought to check any correlation between attention span and age or year of study of a dental college student, the p-value came out to be insignificant. However, a trend of attention span going down in the third year of dental school and rising toward the final year was found the study reveals that as students' progress through dental education, they experience attitudinal changes, such as increased cynicism and empathy towards patients, often linked to the transition from preclinical to clinical years [15], exposing students to real-world dental settings. Further research is needed to explore the intricate relationship between attention span and dental education progression, considering additional variables such as stress levels, workload, and students coping mechanisms. Several studies indicate that attention span can vary among individuals based on various factors, such as gender and age.[13,16] However, it is important to note that this study only looked at a specific population (college students).

The study found no significant difference in attention span between male and female participants based on the Attention Span Test.[1] It is important to note that while the mean scores show a slight disparity, the lack of statistical significance implies that any observed difference could be due to random variation or other factors unrelated to gender. Girls tend to

have longer attention spans [6] because they are stronger in the verbal-emotive area, whereas boys are more inclined towards kinesthetic and visual-spatial activities. There is no strong evidence suggesting a gender effect.[7] Research suggests that males have greater vigilance.[17] Another study significant gender differences in sustained attention and relate it with sociocultural factors of gender inequality. However, even in that study they admit that wherever there is minimal disparity this gender factor became insignificant. [13]

Our study focuses on the best learning methods for students in Dental colleges, with Problem-Based Learning (PBL), Task-Based Learning (TBL) being the most effective and engaging education methods.[18] It allows students to actively participate in their learning, develop essential skills for the future, and retain knowledge in the long term.[19] This concurs with our findings too. Traditional learning is the least preferred teaching method, as it has been around for 600 years without significant changes. [20] Also in this type of learning students are passive learners. They cannot communicate directly with the teacher and have no conditions for self-study and decisions.[21] That's why students prefer an active mode of methods which can help them in active learning.

Dental college students exhibit a preference for multimodal learning approaches. When evaluating unimodal methods, visual learning was the most cited method (38.59%) and kinesthetic learning was the least favored (10.52%). Students from first to final year also tend to prefer visual learning. Based on research, the predominant learning style identified in Dental colleges is kinesthetic (22,23). Kinesthetic learning involves whole-body movement, strengthening relationships, enhancing students' capacity to derive meaning, and fostering rigor. [17]

The Attention span is crucial for students' academic achievements and long-term success. A high level of attention span indicates high academic achievements. [1] It found that 73.54% of students struggle to maintain their attention span in a 1-hour lecture, which should not exceed 15 minutes[4]. But keeping in mind the burden of Dental studies this is not applicable.

To improve attention span, incorporating humor, physical and brainstorming activities, and visual aids can promote retention and optimize classroom environments.[10]

Students' learning processes are influenced by various external and internal factors, which are similar to our study including noise, side conversations, and passing individuals. Higher noise levels can disrupt learning and make it difficult for students to understand instructions, potentially resulting in errors.[22]

The physical atmosphere of the classroom, including seating arrangements, can also influence focus.[23] For instance, sitting next to friends may lead to off-topic conversations and loss of

concentration. The classroom management strategies also affect attentiveness. Emotions also influence attention[24], particularly in the Dental field where job opportunities are limited Physical health is another crucial factor affecting academic performance, with poor health increasing the likelihood of academic difficulties.[10] Distractions and poor attention span may hinder students from fully engaging in hands-on clinical experiences, which are essential for developing practical skills. Addressing attention barriers is vital for optimizing learning experiences and maximizing educational outcomes.[22]

To optimize learning, students should be trained to avoid distractions, and manage internal and external factors such as maintaining good sleep, and mental and physical health. Faculty should hold motivating workshops, establish engaging materials and activities, foster a positive environment, and promote active participation, especially at the high school level so that the factors affecting attention span are not carried forward when students reach the undergraduate level.[25]

The finding of this study could be made more generalized and applicable to educational culture in Pakistan by extending the study to public dental colleges with diverse educational backgrounds. This research can also be done in non-dental students for educational modifications hence increasing the attention span of students.

Conclusion

About 75% of students expressed an inability to listen to a one-hour lecture. Most students were visual learners. PBL (problem-based learning), Task-Based learning (TBL), and small-group discussions that promote active participation are typically preferred by students. Various perceived internal and external elements, including emotions, the classroom atmosphere, and surrounding noises can influence the student's attention spans.

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Authors Contribution

Conceptualization: SS, SI

Methodology: SA, MA

Formal analysis: SA, HS

Writing review and editing: MA, SI

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