IAP Journal of Medical Education and Research
Volume 3, Issue 1 - 2026, Pg. No. 15-19
Peer Reviewed & Open Access Journal

Research Article

The Early Bird Catches the Rank: A Study of Chronotype, Learning Styles, and Performance in Medical Entrance Exams

Noorin Bhimani[1], Momi Baruah[2]

[1,2]Professor, Additional, Department of Physiology, Lokmanya Tilak Municipal Medical College, Sion, Mumbai, India

I N F O

Corresponding Author:
Noorin Bhimani, Department of Physiology, Lokmanya Tilak Municipal Medical College, Sion, Mumbai, India
E-mail Id:
drnoorin@gmail.com
Orcid Id:
https://orcid.org/0000-0003-1773-7239
How to cite this article:
Bhimani N, Baruah M. The Early Bird Catches the Rank: A Study of Chronotype, Learning Styles, and Performance in Medical Entrance Exams. IAP J. Med. Educ. Res. 2026;3(1):15-19.

Date of Submission: 2026-03-24
Date of Acceptance: 2026-05-08

A B S T R A C T

Background: Competitive medical entrance exams in India, like NEET, are high-stakes events scheduled uniformly in the morning. The interplay between a student's internal body clock (chronotype), their preferred way of learning (learning style), and their success in such exams is not well understood.

Objectives: To investigate the correlation between chronotype (morning/evening preference), VARK learning styles, and All India Rank (AIR) in the NEET exam among medical aspirants.

Methods: This cross-sectional study included 81 medical aspirants (51.9% female) from coaching institutes in Maharashtra. Participants completed validated questionnaires to assess their chronotype (Morningness-Eveningness Questionnaire) and learning style preferences (VARK). Their self-reported NEET All India Rank (AIR) was used as the measure of academic performance. Statistical analysis was performed using ANOVA, t-tests, and multivariate regression.

Results: Morning chronotypes significantly outperformed evening types, achieving a mean rank of 42,187 versus 62,416 ($p=0.042$). Kinesthetic learning was the predominant modality (37.2%). A strong positive correlation was found between morningness and a kinesthetic learning preference ($r=+0.78$, $p<0.001$), while eveningness was correlated with an auditory preference ($r=-0.61$, $p<0.001$). Female aspirants performed better than their male counterparts (mean rank: 41,847 vs. 58,234; $p = 0.038$) and were more morning-oriented. In multivariate analysis, chronotype score emerged as the strongest independent predictor of a better rank ($\beta = -0.34$, $p = 0.003$).

Conclusion: A significant association exists between being a morning-oriented, kinesthetic learner and achieving a superior rank in the morning-scheduled NEET exam. These findings highlight a potential circadian bias in high-stakes testing and have important implications for creating personalized learning strategies and fostering greater educational equity.

Keywords: Chronotype, Circadian Rhythm, VARK, Learning Styles, Academic Performance, NEET, Medical Education

Introduction

The journey to becoming a doctor in India is largely defined by success in high-stakes, single-day entrance examinations like the National Eligibility cum Entrance Test (NEET). With over 1.5 million aspirants vying for a limited number of seats, even a slight performance edge can translate into a rank difference of tens of thousands. These examinations are traditionally scheduled during fixed morning hours, a factor whose impact on student performance is often overlooked.

Our bodies operate on a 24-hour internal clock, or circadian rhythm, which creates individual preferences for wakefulness and activity known as chronotypes. These range from morning-types ("larks"), who peak early, to evening-types ("owls"), who function best later in the day.[1] Research has shown that chronotype can significantly influence cognitive performance, with a "circadian mismatch" occurring when an individual's peak time is out of sync with a scheduled task.[2]

Simultaneously, educational theory emphasizes that students learn through different modalities. The VARK model categorizes these as visual, auditory, read/write, and kinesthetic preferences.[3] While the "matching" of teaching to a student's preferred style is debated, understanding these preferences can help students adopt more effective study strategies, such as tailoring their study environments and techniques to align with their dominant learning style.

Despite the critical role of NEET, there is a paucity of research in the Indian context examining how a student's chronotype and learning style interact to influence their rank. This study was conducted with the following objectives:

- To determine the distribution of chronotypes and VARK learning styles among NEET aspirants.
- To analyze the correlation between chronotype, learning style, and NEET All India Rank (AIR).
- To investigate gender differences in these parameters.
- To identify predictors of superior academic performance in this high-stakes environment.

We hypothesized that morning types would have a distinct advantage in the morning-scheduled exam, that kinesthetic learning would be common among these practical-minded students, and that both factors would be independent predictors of a better rank.

Methods

Study Design and Population

This cross-sectional study was conducted from April 2021 to April 2022. Medical aspirants preparing for the NEET exam were recruited from multiple coaching institutes across Maharashtra, India, using a convenience sampling method.

Inclusion Criteria

Students aged 17-20 years who were enrolled in NEET preparation and had appeared for the NEET exam were included. Exclusion Criteria: Students with incomplete questionnaire responses, self-reported sleep disorders, or those on medications affecting sleep were excluded.

Sample Size

A total of 81 participants met the criteria and were included in the final analysis. This sample size provided 80% power to detect a moderate effect size at α=0.05.

Instruments

- **Chronotype Assessment**: Chronotype was assessed using a modified 19-item Morningness-Eveningness Questionnaire (MEQ).[4] Scores were used to categorize participants as "Definitely Morning," "Rather Morning," "Rather Evening," or "Definitely Evening" types.
- **Learning Styles Assessment**: The VARK questionnaire (Version 8.01) was used to identify learning preferences across Visual, Auditory, Read/Write, and Kinesthetic modalities.[3] A participant's dominant style was defined as the modality with the highest score.
- **Academic Performance**: Academic performance was measured using the participant's self-reported All India Rank (AIR) in the NEET examination, verified with official scorecards where possible. A lower rank number indicates better performance.

Procedure

Participants completed the online questionnaire via Google Forms in a single, supervised session between 4:00 PM and 7:00 PM to minimize circadian bias in their responses. Informed consent was obtained from all participants.

Statistical Analysis

Data were analyzed using SPSS Version 26.0. Descriptive statistics were calculated. Independent t-tests and ANOVA with post-hoc Tukey HSD were used for group comparisons. Pearson's correlation coefficients examined relationships between continuous variables. Multiple linear regression was used to identify independent predictors of academic performance (log-transformed rank). Statistical significance was set at $p < 0.05$.

Results

Participant Characteristics

The study included 81 participants with a mean age of 18.4 years (SD=0.8). The gender distribution was nearly equal, with 42 females (51.9%) and 39 males (48.1%).

Chronotype Distribution

The mean chronotype score for the sample was 3.49 (SD=1.82). As shown in Table 1, 54% of participants were classified as morning-types (combining "Definite" and "Rather Morning"), while 46% were evening-types. Females had a slightly higher, though non-significant, morningness score compared to males (3.64 vs. 3.33, p=0.403).

VARK Learning Style Distribution

Table 2 shows that Kinesthetic learning was the most common dominant style, preferred by 37.2% of students. Multimodal preferences (high scores in more than one category) were observed in 44.4% of the participants.

Correlation Between Chronotype and Learning Styles

Significant correlations emerged between chronotype and learning styles (Table 3). Morningness was very strongly correlated with a kinesthetic preference (r=+0.78) and moderately with a visual preference (r=+0.52). Conversely, eveningness was moderately correlated with an auditory preference (r=-0.61).

Chronotype and Academic Performance

A clear gradient in academic performance was observed across chronotype categories. The mean rank for definitely morning types (34,238) was significantly better than for Definitely evening types (76,439, p=0.008), as detailed in Table 4. The overall correlation between chronotype score and rank (where a lower rank is better) was significant (r = -0.31, p=0.008

Top Performer Analysis

Among the top 12 rank holders (<5,000), 75% (n=9) were morning-types, and 58% (n=7) were female. The mean chronotype score for top performers was significantly higher than for bottom performers (>100,000 rank), (4.2 vs. 3.0, p=0.010).

Gender Differences

Females demonstrated significantly better academic performance than males, with a mean rank of 41,847 compared to 58,234 for males (p=0.038). While no significant gender differences were found in individual VARK scores, females were better represented in the top 10% of rank holders (58% vs. 42%, p=0.040).

Multivariate Predictors of Academic Performance

Multiple linear regression analysis (Table 5) identified chronotype score (β = -0.34, p=0.003) and female gender (β = -0.22, p=0.048) as the only significant independent predictors of a better NEET rank. Kinesthetic score approached but did not reach statistical significance (p=0.063).

Table 1.Chronotype Distribution

Chronotype	Total (N=81) n (%)	Female (n=42) n (%)	Male (n=39) n (%)
Definitely Morning	11 (14.5%)	7 (16.7%)	4 (10.3%)
Rather Morning	30 (39.5%)	15 (35.7%)	15 (38.5%)
Rather Evening	27 (35.5%)	15 (35.7%)	12 (30.8%)
Definitely Evening	8 (10.5%)	3 (7.1%)	5 (12.8%)

Data missing for 5 participants.

Table 2.VARK Learning Style Distribution

Learning Style	Dominant Style (% of respondents)
Visual (V)	21.9%
Auditory (A)	19.7%
Read/Write (R)	21.3%
Kinesthetic (K)	37.2%

Table 3.Correlation Between Chronotype and VARK Scores

Learning Style	Correlation with Chronotype (r)	p-value
Visual	+0.52	<0.001
Auditory	-0.61	<0.001
Read/Write	+0.23	0.048
Kinesthetic	+0.78	<0.001

Table 4.Academic Performance (NEET Rank) by Chronotype

Predictor	Standardized β (Beta)	t-value	p-value
Chronotype score (higher = morning)	-0.34	-3.12	0.003
Gender (Female)	-0.22	-2.01	0.048
Kinesthetic score	-0.19	-1.89	0.063

ANOVA: F(3,67) = 3.87, p = 0.013

Table 5.Independent Predictors of NEET Rank (Multiple Regression)

Chronotype	N	Mean Rank (SD)	Median Rank
Definitely Morning	10	34,238 (41,234)	11,231
Rather Morning	29	44,815 (78,901)	10,920
Rather Evening	25	58,269 (1,42,345)	10,609
Definitely Evening	7	76,439 (1,65,432)	13,946

Model R^2 = 0.28, Adjusted R^2 = 0.23, p = 0.003

Discussion

This study from India reveals a significant and meaningful link between a student's chronotype and their success in the morning-scheduled NEET exam. The core finding is that "morning larks" hold a considerable advantage over "night owls," a difference that translates to tens of thousands of rank positions.

The Morning Advantage: Our results strongly support the "circadian mismatch" hypothesis.[2] Evening-type students, whose peak cognitive hours occur later in the day, are likely at a significant disadvantage when attempting a high-stakes, 3-hour exam at 9 AM. This is consistent with global meta-analyses showing that morning-types outperform evening-types in academic settings, and our study confirms this for the first time in the context of a highly competitive Indian medical entrance exam.[5]The Kinesthetic Connection: The very strong correlation (r=+0.78) between morningness and a kinesthetic learning preference is a novel and important finding. Medicine is, by nature, a kinesthetic field—a "hands-on" discipline involving procedures, patient examinations, and practical skills.[6] It is plausible that students inherently drawn to this kinesthetic aspect of medicine also tend to be proactive, action-oriented morning people.[7] The alignment of their chronotype, learning preference, and the exam's morning schedule may create a synergistic advantage.

Gender and Performance: The superior performance of female aspirants in our study reflects national trends in India. Their slightly higher morning orientation, as noted in meta-analyses, may contribute to this edge.[8] However, their advantage persisted even after controlling for chronotype in regression analysis, suggesting other factors like more disciplined study habits or better stress management are also at play.

Implications for Medical Education:

- **For Students**: Understanding one's chronotype can be empowering. An evening-type student struggling with morning study sessions might benefit from shifting intensive, high-focus learning to later in the day, while using mornings for lighter revision.
- **For Educators and Mentors**: Coaching classes and teachers can help students identify their chronotype and learning style. Guiding an evening-type, auditory learner toward group discussions and recorded lectures in the evening, while suggesting a morning-type, kinesthetic learner practice problems and diagrams first thing, could optimize their preparation.
- **For Policymakers and Exam Boards**: The findings raise a question of equity. Does a single, fixed morning exam time systematically disadvantage a large segment (~46% in our sample) of aspirants? While a complete overhaul may not be feasible, exploring options like two shifts (morning and afternoon) or designing exams that are less sensitive to time-of-day effects on cognition warrants serious consideration to ensure a level playing field.

Limitations

The study's modest sample size from one region limits generalizability. The cross-sectional design can only show association, not causation. Reliance on self-report for rank and chronotype, rather than objective biomarkers, are limitations that should be addressed in future multi-centric, longitudinal research.

Conclusion

This study provides empirical evidence from India that morning chronotype is a significant and independent

predictor of success in the NEET examination. The strong link between morningness and a kinesthetic learning preference further refines this profile of a top performer. These findings are not about labeling students but about understanding individual differences to personalize preparation strategies and spark a necessary conversation about examination scheduling and educational equity in high-stakes testing.

References

1. Roenneberg T, Allebrandt KV, Merrow M, Vetter C. Social jetlag and obesity. Current Biology. 2012 May 22;22(10):939-43.
2. Preckel F, Lipnevich AA, Schneider S, Roberts RD. Chronotype, cognitive abilities, and academic achievement: A meta-analytic investigation. Learning and Individual Differences. 2011 Oct 1;21(5):483-92.
3. Fleming ND, Mills C. Not another inventory, rather a catalyst for reflection. To improve the academy. 1992 Jun;11(1):137-55.
4. Horne JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. International journal of chronobiology. 1976 Jan 1;4(2):97-110.
5. Tonetti L, Natale V, Randler C. Association between circadian preference and academic achievement: A systematic review and meta-analysis. Chronobiology international. 2015 Jul 3;32(6):792-801.
6. Lujan HL, DiCarlo SE. First-year medical students prefer multiple learning styles. Advances in physiology education. 2006 Mar;30(1):13-6.
7. Randler C. Morningness–eveningness, sleep–wake variables and big five personality factors. Personality and Individual differences. 2008 Jul 1;45(2):191-6.
8. Randler C. Gender differences in morningness–eveningness assessed by self-report questionnaires: A meta-analysis. Personality and individual differences. 2007 Nov 1;43(7):1667-75.