

Original Research Article

Unravelling the links between chronotype, body mass index, and self-regulatory eating behavior: preliminary insights from an urban Kolkata study

Kaninika Roy^{1*}, Sayani Das¹, Sangita Mazumder²

¹Department of Dietetics and Nutrition, NSHM Knowledge Campus, Kolkata, West Bengal, India

²Department of Computing and Analytics, NSHM Knowledge Campus, Kolkata, West Bengal, India

Received: 26 June 2025

Revised: 06 August 2025

Accepted: 08 August 2025

*Correspondence:

Dr. Kaninika Roy,

E-mail: kaninika.roy@nshm.com

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ABSTRACT

Background: In urban Kolkata, a cross-sectional study was conducted to explore the under-researched connections between chronotype, body mass index (BMI), and self-regulatory eating behavior (SREB) among 156 adults aged 18 to 60 years. As urbanization in India leads to a rise in obesity and metabolic disorders, it is essential to comprehend how circadian preferences affect eating habits and weight management.

Methods: A cross-sectional design was used, employing the reduced morningness-eveningness questionnaire (rMEQ) to determine chronotypes. The self-regulation of eating behavior questionnaire (SREBQ) was used to assess eating behavior. BMI was categorized into four groups: underweight, normal weight, overweight, and obesity. Chi-square tests and logistic regression were performed to analyse the associations.

Results: Result showed no significant correlation between chronotype and BMI ($p=0.34$). Evening chronotypes displayed lower SREB compared to morning and intermediate types; however, this difference was not statistically significant ($p=0.17$). Logistic regression indicated that individuals with intermediate chronotypes had significantly greater odds of exhibiting self-regulation compared to those with evening chronotypes (OR: 7.77, $p=0.005$). Participants with postgraduate education showed improved SREB ($p=0.037$).

Conclusions: Individuals with intermediate chronotypes demonstrate superior self-regulation in eating behaviors compared to those with evening chronotypes, underscoring the importance of circadian alignment in dietary practices. No direct association was established between chronotype and BMI, indicating a need for further longitudinal research to inform targeted dietary interventions.

Keywords: BMI, Chronotype, Circadian rhythm, Eating behavior, Public health, Self-regulation

INTRODUCTION

Urbanization and rapid lifestyle changes in India have led to a surge in obesity and related metabolic disorders. Concurrently, disrupted sleep patterns and altered circadian rhythms have become prevalent, raising concerns about their potential impact on weight management. Understanding how chronotype, as a marker of circadian preference, influences BMI and eating behaviors in this population could provide valuable

insights into the development of targeted interventions for obesity prevention and management.

The circadian rhythm refers to the series of biological and metabolic processes that occur within a 24-hour period.¹ The suprachiasmatic nucleus (SCN) in the hypothalamus plays a pivotal role in regulating this rhythm. Individuals can be categorized into three primary chronotype: morning-types (M-types), evening-types (E-types), and neither/ intermediate-types (N-types).² Morning

chronotypes typically retire early in the evening and rise early in the morning, showcasing peak performance during the early hours. Conversely, evening chronotypes tend to stay up late, struggle with early wakeups, and exhibit higher performance later in the day. Several factors, including genetic makeup, age, ethnicity, and gender, influence an individual's chronotype.³

Variations in chronotype can have significant health implications. Studies indicate that chronotype is linked to an increased risk of various illnesses, including metabolic syndrome, type 2 diabetes mellitus (DM), cardiovascular diseases (CVD), and depression, as well as its impact on obesity.⁴⁻⁸ Evening chronotypes, characterized by a delayed circadian phase, are associated with impaired glycaemic control, metabolic dysfunction, a higher risk of cardiovascular diseases, obesity, and psychiatric disorders.⁹⁻¹¹ Consequently, individuals with evening preferences are at higher risk of morbidity and mortality compared to those with morning preferences.¹² This increased risk is frequently linked to chronic circadian misalignment, where an individual's internal clock is not synchronized with external work and social demands. Evidence suggests that evening chronotypes tend to have a higher BMI, poorer dietary habits, and lower levels of physical activity.¹¹

Recently, differences in susceptibility to environments that promote obesity have become more apparent.^{13,14} It is proposed that a person's capacity for self-regulation and their ability to resist food temptations may significantly influence this variation, potentially leading to healthier weight management and dietary habits. Research indicates that effective self-regulation of eating behaviors can bridge the gap between one's intentions and actual behaviors, thus supporting the achievement of dietary goals.¹⁵

Various studies have extensively explored the connections between chronotype, nutrients, and dietary habits. Research indicates that individuals with evening chronotypes are more inclined to skip meals, consume lower amounts of fruits and vegetables, indulge in high sugary drinks, have high alcohol intake, and struggle with controlling portion sizes.¹⁶ These findings raise the question of whether evening chronotypes exhibit inadequate self-regulation of eating behavior, resulting in the adoption of unhealthy dietary patterns. Self-regulation involves the ability to manage one's behaviors, thoughts, emotions, and surroundings to support the achievement of specific goals.¹⁵

The evidence presented lays the groundwork for suggesting that individuals with evening chronotypes may struggle to regulate their eating habits. In the bustling metropolis of Kolkata, balancing environmental factors such as work schedules and social commitments often complicates the maintenance of a healthy diet. Nonetheless, developing self-regulation skills could potentially lead to better dietary practices and healthy

body weight. To explore this theory, it is essential to examine the connections between various chronotypes and the ability to resist tempting foods in relation to body weight. As far as we are aware, very few research has delved into the link between chronotype and self-regulatory eating behaviour in Indian population, particularly in Kolkata. Hence, the primary objective of this research was to evaluate the correlations between chronotype, BMI and the self-regulation of eating behavior among adults of Kolkata.

METHODS

Study design and participants

This cross-sectional study was conducted in different part of West Bengal with the participation of 156 adults between May 2025 to mid-June 2025. Exclusion criteria included individuals under 18 years of age and those over 60 years, as well as pregnant or breastfeeding participants, individuals with chronic illnesses, those taking any medications, and those diagnosed with psychiatric disorders. The questionnaire was made available in English and disseminated through a Google form link via WhatsApp and email. The rMEQ questionnaires and SREB questionnaires and demographic questionnaire are included. Both close ended questionnaire and open-ended questionnaire were included.

Power analysis

A power analysis was conducted using G*Power 3.1 for a chi-square test with a medium effect size ($w=0.3$), $\alpha=0.05$, and power $=0.80$. The analysis indicated a required minimum sample size of 87 participants. Our study included 156 participants, which was well above the required sample size. This suggested that our study was sufficiently powered to identify significant relationships between chronotype, BMI, and self-regulatory eating behavior.

Morningness-eveningness questionnaire

The morningness-eveningness questionnaire (MEQ) is widely recognized as the standard tool for assessing chronotype.² Developed by Horne and Östberg in 1976, the MEQ has undergone rigorous validation and is extensively utilized in research.² To enhance participant compliance, a shorter 5-item version known as the reduced morningness-eveningness questionnaire (rMEQ) was employed in the current study. The rMEQ has demonstrated reliability, good psychometric properties, and convergent validity.¹⁷ Comprising five Likert-type questions, the reduced questionnaire generates scores ranging from 4 to 25. Questions 1 to 3 inquired about participants' preferred wake-up time, subjective alertness levels during the day and night, while question 4 assessed the time of day when they feel most productive. Question 5 directly addressed their morningness or eveningness

preferences. The overall score, which spans from 4 (indicating extreme eveningness) to 25 (indicating extreme morningness), categorized individuals into five distinct chronotype classifications: 'definitely morning' type, 'moderately morning' type, 'neither (intermediate)' type, 'moderately evening' type, and 'definitely evening' type.¹⁷ Consistent with earlier studies, the classifications were simplified into morning type, neither (intermediate) type, and evening type to avoid the issue of having categories with insufficient sample sizes, as highlighted by various research findings.¹⁸⁻²⁰

Self-regulation of eating behavior questionnaire

The self-regulation of eating behavior questionnaire (SREBQ) was employed to assess an individual's capacity for self-regulating their eating habits. This questionnaire has undergone validation and has demonstrated strong reliability in achieving its intended objectives.¹⁵ The assessment comprised five items with response options that range from 1 (never) to 5 (always). It begins with a list of 13 frequently desired foods, followed by the inquiry: "do you find any of the following foods appealing (meaning, do you wish to consume more of them than you believe is appropriate)?" Participants can select all the foods they find appealing. The next two questions asked whether they plan to manage their intake of these appealing foods and if they intend to follow a healthy diet. These questions aimed to filter out participants who lack healthy dietary intentions from the SREBQ. As a result, only those with healthy dietary intentions were permitted to complete the SREBQ, and their ability to self-regulate in maintaining these intentions was subsequently assessed. The mean score thresholds were as follows: a score of less than 2.8 indicates low self-regulation, a score between 2.8 and 3.6 indicates moderate self-regulation, and a score above 3.6 indicates high self-regulation of eating behavior.¹⁵

Self-structured questionnaire for demographic data

The questionnaire incorporated socio-economic factors and personal inquiries. It included questions regarding individuals' personal information such as name, age, gender (male/female), socio-economic factors like educational attainment (e.g., never attended school, primary or intermediate school, high school, diploma, graduate or master's degree), as well as employment status (employee or non-employee) and shift work. All participants provided their consent and agreed to disclose their personal information.

Anthropometric measurement

Participant's weight and height were reported by the participants. BMI was calculated by formula weight (kg) divided by height (m)². It is used as a measure of fatness in adult. The BMI of participants were derived into six categories. Below 18.5 kg/m² (underweight), 18.5-22.9

kg/m² (normal weight), 23.0-24.9 kg/m² (overweight), 25-29.9 kg/m² (obese I), and above 30 kg/m² (obese II).²¹

Statistical analysis

Data was utilized by using the statistical package for the social sciences (SPSS). Descriptive statistics like frequency and percentages were used to demonstrate the demographical data, that is age of students, gender, education of participants, employment and shiftwork of participants. BMI were also described by using percentage. Mean and standard deviation were used to present numerical variable. Chi-square test was also used to calculated analysis about association between chronotype and BMI, shift work with BMI, and chronotype with self-regulatory eating behaviour as well. This association reveals the hypothetical situation about this factor among 18-60 years of age. Eligibility for the SREB required participants to express a commitment to maintaining a healthy diet. Consequently, those who did not intend to follow a healthy dietary regimen were categorized separately. The significance level was established at 0.05.

RESULTS

Socio-demographic characteristics

A total of 156 individuals completed the survey questionnaire. The socio-demographic profile of the participants is presented in Table 1. Out of the total participants, 112 (71.8%) were aged between 18 and 29 years, 23 (14.7%) were aged between 30 and 40 years, 21 (13.4%) were aged between 41 and 60 years. Both male and female participants were included in the study, with 96 (61.5%) females and 60 (38.5%) males. The majority of the participants were female, accounting for 61.5% of the total. Each participant was involved in various levels of education, such as undergraduate studies, pursuing a master of science degree, etc. The distribution of educational levels among the participants was as follows: 53.2% were graduates, 33.3% were postgraduates, and 13.5% held a HS degree. In terms of occupation, 23.1% of the participants were students, 34.6% were employed, and 42.3% were unemployed. Regarding body mass index (BMI), the majority of participants, accounting for 32.7%, fell into the obese category. 13.5% were classified as underweight, 29.5% were in the normal and 24.4% were in overweight categories.

Chronotype and associated factor

Table 2 displays the distribution of chronotype among the participants. Based on rMEQ questionnaire, 31% participants were classified as morning chronotype, 24% as the evening chronotype, and the majority, 45%, fell into the intermediate or neither type category, meaning they are neither morning nor evening chronotype (n=48; n=38; n=70 respectively).

Table 1: Demographic profile of participants (n=156).

Demographical characteristics	Frequency	Percent
Age (years)		
18-29	112	71.8
30-40	23	14.7
41-60	21	13.4
Gender		
Male	60	38.5
Female	96	61.5
Education		
High school	21	13.5
Graduation	83	53.2
Post-graduation and above	52	33.3
Employment		
Employed	54	34.6
Unemployed	66	42.3
Student	36	23.1
Body mass index		
Normal	46	29.5
Underweight	21	13.5
Overweight	38	24.4
Obese	51	32.7
Having healthy dietary intension	156	100

Table 2: Factors related to chronotype (n=156).

Factors	Chronotype (%)			P value
	Morning	Intermediate	Evening	
BMI				
Underweight	7 (14.6)	5 (7.1)	9 (23.7)	0.34
Normal	13 (27.1)	21 (30)	12 (31.6)	
Overweight	12 (25)	18 (25.7)	8 (21.1)	
Obese	16 (33.3)	26 (37.1)	9 (23.7)	
Age				
18-29 years	34 (70.8)	49 (70)	29 (76.3)	0.023*
30-40 years	3 (6.3)	16 (22.9)	4 (10.5)	
41-60 years	11 (22.9)	5 (7.1)	5 (7.1)	
Self-regulation of eating behaviour				
Low	9 (18.8)	17 (24.3)	10 (26.3)	0.17
Medium	31 (64.6)	35 (50)	25 (65.8)	
High	8 (16.7)	18 (25.7)	3 (7.9)	
Sex				
Male	23 (47.9)	25 (35.7)	12 (31.6)	0.25
Female	25 (52.1)	45 (64.3)	26 (68.4)	
Education				
Higher secondary	6 (12.5)	12 (17.1)	3 (7.9)	0.23
Graduation	29 (60.4)	37 (52.9)	17 (44.7)	
Post-graduation	13 (27.1)	21 (30)	18 (47.4)	
Employment				
Students	6 (12.5)	15 (21.4)	15 (39.5)	0.036*
Employed	17 (35.4)	24 (34.3)	13 (34.2)	
Unemployed	25 (52.1)	31 (44.3)	10 (26.3)	

*-Significant. ANOVA and Chi-square tests were employed. The thresholds for self-regulation of eating behavior are categorized as follows: low is defined <2.8, medium ranges from 2.8 to 3.6, and high is >3.6.

Table 3: Responses from participants regarding the SREBQ.

Questions	Number	Percentage
I give up too easily on my eating intentions		
Always	3	1.9
Often	20	12.8
Sometimes	77	49.3
Rarely	44	28.2
Never	12	7.7
I'm good at resisting tempting food		
Always	17	10.9
Often	25	16.02
Sometimes	68	43.6
Rarely	35	22.4
Never	11	7.05
I easily get distracted from the way I intend to eat		
Always	6	3.8
Often	21	13.5
Sometimes	52	33.3
Rarely	48	30.8
Never	29	18.6
If I am not eating in the way, I intend to I make changes		
Always	7	4.5
Often	15	9.6
Sometimes	60	38.5
Rarely	45	28.9
Never	29	18.6
I find it hard to remember what I have eaten		
Always	6	3.8
Often	22	14.1
Sometimes	43	27.6
Rarely	32	20.5
Never	53	34

Table 2 further investigates the connection between body mass index (BMI), self-regulatory eating behavior (SREB), and chronotype. A majority of participants displayed medium self-regulation ($n=91$; 58.3%). Those with evening chronotypes showed a greater inclination towards low self-regulation (26.3%) in comparison to morning (18.8%) and intermediate types (24.3%), although this difference did not reach statistical significance ($p=0.17$). There were no significant variations in BMI among the different chronotype categories. Moreover, factors such as gender and education level did not correlate with chronotype, while age and employment status were found to be associated with it.

Self-regulation of eating behavior questionnaire

The questionnaire revealed that all participants had healthy dietary intentions, resulting in valid SREBQ scores. The participants' SREBQ scores indicated that 23.1% ($n=36$) had low self-regulation of eating behavior, 58.3% ($n=91$) had moderate self-regulation, and 18.5%

($n=29$) had high self-regulation. The participants' responses to the SREBQ are detailed in Table 3.

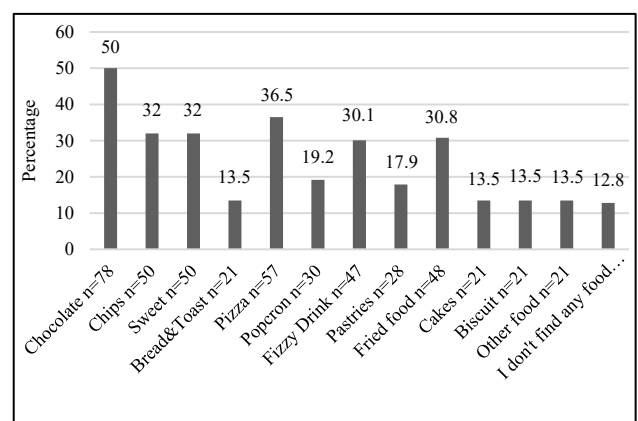


Figure 1: Responses from the participants to the inquiry “do you find any of the following food tempting (that is, do you want to eat more of them than you think you should)?”

Figure 1 illustrates that 12.8% (n=20) of participants reported not finding any food tempting. The most tempting foods were chocolate (n=78; 50%), pizza (n=57; 36.5%), sweets (n=50; 32%), and fried foods (n=48; 30.8%).

Chronotype, gender, employment, BMI and SREB

Table 4 illustrates the relationship between food items that participants find tempting and their chronotype and gender. The results indicate a notable correlation between the temptation of soft drinks and chronotype ($p=0.03$). While not statistically significant, individuals with an

evening chronotype showed a greater tendency to find foods such as chocolate, bread/toast, pastries, fried foods, and cake appealing and hard to resist compared to those with a morning or intermediate chronotype. Conversely, participants with a morning chronotype exhibited the least vulnerability to these temptations.

Moreover, Table 4 also analyzes the connection between gender and the perception of food temptations. Women were significantly more inclined than men to view chocolate ($p=0.008$) and bread/toast ($p=0.049$) as tempting. On the other hand, men rated cake as significantly more tempting than women did ($p=0.018$).

Table 4: Association between the types of foods that participants find appealing, as influenced by their chronotype and gender.

Food participants find to be tempting	Chronotype			P value
	Morning N (% from morning type)	Intermediate N (% from intermediate type)	Evening N (% from evening type)	
Chocolate	19 (39.6)	36 (51.4)	23 (60.5)	0.15
Chips	10 (20.8)	26 (37.1)	14 (36.8)	0.14
Sweets	17 (35.4)	24 (34.3)	9 (23.7)	0.44
Bread/ toast	6 (12.5)	7 (10)	8 (21.1)	0.27
Pizza	16 (33.3)	27 (38.6)	14 (36.8)	0.84
Popcorn	8 (16.7)	16 (22.9)	6 (15.8)	0.58
Frizzy drink	11 (22.9)	18 (25.7)	18 (47.3)	0.03*
Pastries	8 (16.7)	12 (17.1)	8 (21.1)	0.85
Fried food	13 (27.1)	19 (27.1)	16 (42.1)	0.22
Cake	5 (10.4)	8 (11.4)	8 (21.1)	0.29
Biscuit	7 (14.6)	9 (12.9)	5 (13.2)	0.96
Food participants find to be tempting	Sex		P value	
	Male	Female		
Chocolate	22 (36.7)	56 (62.2)	0.008*	
Chips	15 (25)	35 (38.8)	0.136	
Sweets	18 (30)	32 (35.5)	0.66	
Bread/ toast	4 (6.7)	17 (18.8)	0.049*	
Pizza	20 (33.3)	37 (41.1)	0.51	
Popcorn	7 (11.7)	23 (25.5)	0.059	
Frizzy drink	16 (26.7)	31 (34.4)	0.456	
Pastries	5 (8.3)	23 (25.5)	0.13	
Fried food	13 (21.7)	35 (38.8)	0.051	
Cake	13 (21.7)	8 (8.8)	0.018*	
Biscuit	7 (11.7)	14 (15.5)	0.60	

Chi-square test used. *Significant at level 0.05

Table S1 examines the relationship between BMI categories and the perception of tempting foods. With the exception of bread/toast ($p=0.049$), no significant correlations were identified between BMI and the foods deemed tempting by participants.

Additionally, Table S1 investigates the link between employment status and food temptations. The analysis revealed no significant relationship between employment status and participants' preferences for these foods.

Factors that predict high self-regulation of eating behavior

A multivariate logistic regression analysis was performed to identify the factors predicting high self-regulation of eating behavior. Intermediate chronotypes have significantly higher odds of the self-regulation of eating behavior compared to evening types, which suggests that individuals with intermediate chronotypes might have different behavioural or physiological patterns influencing the outcome. Individuals with higher

secondary education have significantly lower odds of high self-regulation in eating behavior compared to those with post-graduation or higher education (reference).

Age, gender, BMI, and employment did not show significant associations with the SREB, indicating that they may not be strong predictors in this context.

Table 5: Factors that predict high self-regulation of eating behavior.

Variables	Categories	SE	P value	Odds ratio	95% CI
Age in years	18-29	0.698	0.750	0.800	(0.204,3.143)
	30-40	1.237	0.086	0.120	(0.011,1.352)
	41-60	Reference			
Gender	Male	0.531	0.230	1.891	(0.668,5.352)
	Female	Reference			
BMI	Underweight	0.730	0.444	1.749	(0.418,7.316)
	Normal	0.600	0.564	1.414	(0.436,4.587)
	Overweight	0.654	0.782	0.835	(0.232,3.005)
	Obese	Reference			
Education	Higher secondary	1.182	0.037*	0.086	(0.008,0.867)
	Graduation	0.512	0.579	0.753	(0.276, 2.052)
	Post-graduation or above	Reference			
Employment	Students	0.584	0.415	1.609	(0.512,5.053)
	Employed	0.587	0.738	0.822	(0.260,2.594)
	Unemployed	Reference			
Chronotype	Morning	0.774	0.178	2.837	(0.623,12.926)
	Intermediate	0.736	0.005*	7.7743	(1.829,32.779)
	Evening	Reference			

Multivariate Logistic Regression analyses were employed. Self-regulation of eating behavior (SREB) is categorized based on scores, with low SREB defined as a score of ≤ 3.6 and high SREB defined as a score > 3.6 . *Significant at level 0.05.

DISCUSSION

This research constitutes a fundamental examination of the correlation between chronotype and self-regulatory eating behavior (SREB) in people residing in Kolkata. Our findings demonstrate that individuals with an intermediate chronotype display superior self-regulation in dietary habits compared to those with an evening preference. This indicates that individuals with intermediate chronotypes may encounter reduced circadian misalignment, facilitating enhanced self-regulation. Their adaptable alignment with societal patterns and everyday requirements may facilitate the preservation of healthy eating habits.

Our findings notably differ with research in Saudi Arabia, which revealed that morning types had much greater self-regulation in eating behaviors- 85% more than evening types.²² Various variables may explain this disparity.²³ The limited sample size of our study may restrict the generalizability of the findings, necessitating more research with bigger cohorts. Furthermore, our study utilized a cross-sectional strategy, which collects data at a singular moment, hence constraining causal conclusions among chronotype, BMI, and SREB. Future longitudinal research may yield more profound insights into these interactions. Furthermore, genetic and ethnic variables undoubtedly affect chronotype, and the scarcity of comprehensive study on Indian communities hinders direct comparisons with other demographic groups.³

In addition to chronotype, our research showed schooling as a key predictor of elevated SREB. This indicates that

elements outside circadian cycles, including cognitive awareness, lifestyle decisions, and socio-environmental factors, may significantly influence self-regulated eating patterns. This corresponds with developing viewpoints that self-regulation is not exclusively governed by chronotype but is influenced by a wider array of psychological and environmental factors.²³

Our findings indicate that evening chronotypes are more inclined towards unhealthy meals, especially soft drinks, while morning chronotypes display reduced susceptibility to these temptations. This aligns with previous research¹⁶ that correlates eveningness with increased fat consumption and suboptimal dietary practices. A credible reason is the timing of food intake- individuals with an evening chronotype tend to postpone meals, which has been associated with a higher consumption of high-fat foods and decreased nutritional quality.^{24,25} Epidemiological data indicate that early breakfast consumption correlates with increased fiber intake, while late-night eating is associated with elevated saturated fat consumption.^{26,27}

Nevertheless, our study revealed no significant evidence connecting chronotype and BMI. This corresponds with prior studies demonstrating no association between chronotype and BMI. For example, multiple cross-sectional investigations, including a comprehensive Finnish study with 4421 individuals and a Norwegian population-based study comprising 6413 participants, revealed no association between BMI and chronotype.^{28,29} An analysis of 36 studies indicates that whereas evening chronotypes frequently exhibit detrimental food habits, both chronotypes generally have comparable total calorie

consumption.²⁴ In contrast, a subsequent study including 54 participants demonstrated that evening chronotypes exhibited a notable increase in BMI after 8 weeks, despite no correlation being seen at baseline.¹⁹ These findings highlight the necessity for more research to elucidate the long-term effects of chronotype on weight regulation.

Furthermore, our research revealed that gender disparities influence food desires. Women indicated a broader array of meals as enticing, such as chips, ice cream, popcorn, and pastries, whereas men had a stronger inclination towards cake. This is consistent with current data indicating that emotional eating exhibits a stronger correlation with intuitive eating in women compared to males.³⁰ One potential explanation is that women may encounter heightened appetites for chocolate and sweets, especially during the premenstrual phase.^{29,31,32} Furthermore, studies indicate that exercise exerts a more pronounced appetite-suppressing effect in men compared to women, potentially influencing disparities in food temptation and dietary self-regulation.³³

These findings offer significant insights into the interplay between chronotype, SREB, and dietary choices, while also underscoring the intricacy of regulating eating behaviors. Multiple elements, including circadian rhythms, psychological influences, lifestyle choices, and environmental conditions, combine to shape an individual's capacity for dietary self-regulation.^{34,35} Comprehending these connections can facilitate the development of more efficacious dietary interventions and tailored nutrition programs.

Future research should investigate the interaction between chronotype, psychological characteristics, and environmental impacts to further the knowledge of eating behaviors. Although our sample size was adequate for the power analysis, longitudinal studies would be especially beneficial in clarifying the impact of chronotype on self-regulation over time and its interaction with lifestyle and behavioural patterns.

This study presents several limitations. Firstly, the cross-sectional design of the study gathers data at a singular moment, which hinders the ability of researchers to establish causal relationships between chronotype, BMI, and self-regulatory eating behavior (SREB). Secondly, the sample size poses a limitation. Although the 156 participants exceeded the minimum threshold established by the power analysis, this relatively small sample may limit the applicability of the results to a wider population. Furthermore, the reliance on self-reported weight and height by participants may lead to inaccuracies in the BMI calculations. The study also highlighted that the lack of extensive research on Indian populations complicates direct comparisons with other demographic groups.

CONCLUSION

In conclusion, although our study could not establish a clear correlation between chronotype and self-regulatory eating behavior, the identification of intermediate

chronotype as a predictor of enhanced self-regulation offers significant insights. These findings underscore the necessity for a more sophisticated approach to comprehending chronotype and its interplay with lifestyle factors. Understanding the significance of flexible and adaptable circadian rhythms in self-regulation may enhance dietary management and overall health promotion techniques.

ACKNOWLEDGEMENTS

We extend our sincere thanks to all the participants for their valuable time and contribution to this study.

Supplementary material

Association between the foods that participants consider tempting in relation to their BMI and employment status Supplementary material (Table S1): Available at: https://drive.google.com/file/d/1PPVZNecGI_PetHoL62Qwoukxauo8A5UP/view.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of NSHM Knowledge Campus, Kolkata (Ref No.: NSHMKOL/IEC/5/2025/PR-21)

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Cite this article as: Roy K, Das S, Mazumder S. Unravelling the links between chronotype, body mass index, and self-regulatory eating behavior: preliminary insights from an urban Kolkata study. *Int J Community Med Public Health* 2025;12:4148-56.