

A Study on the Analysis of “Sedentary Behavior Combined with Late-Night Studying” Among College Students and Health Interventions

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Abstract: With the changes in learning and lifestyle brought about by the digital age, a sedentary lifestyle combined with late nights has become a common pattern of behavior among college students, posing a dual threat to their physical and mental health. This study focuses on the combined behavior of “prolonged sitting and staying up late” among college students. In response to the “Healthy China” initiative and health education policies in higher education institutions, it aims to investigate the current status, causes, and influencing factors of this dual behavior, analyze its underlying mechanisms, and develop a streamlined, easily implementable health intervention system to pilot and validate its effectiveness. The study employed methods such as questionnaires, in-depth interviews, and statistical analysis, following a closed-loop process of “research—design—pilot—optimization.” This approach addressed the limitations of single-behavior studies and resolved challenges in implementing interventions, thereby providing empirical support and scalable solutions for health management in higher education institutions and helping to improve the physical and mental well-being of college students.

Keywords: Prolonged Sitting; Staying Up Late; Coupling Behavior; Health Interventions; Behavioral Analysis

1. Introduction

1.1 Research Background and Significance

1.1.1 Research background

With the transformation of learning and lifestyles in the digital age, “sedentary behavior” and “staying up late” have become two widespread behavioral patterns among today's

college students. On the one hand, online courses, the use of electronic devices, and prolonged sitting while studying in dorm rooms have significantly increased the duration of sedentary behavior; On the other hand, procrastination, socializing and entertainment, and irregular sleep schedules have led to frequent late nights. These two factors reinforce each other, creating a vicious cycle of “prolonged sitting and late nights,” which poses a dual threat to college students' physical health (such as cervical and lumbar spine issues and weakened immunity) and mental health (such as anxiety and difficulty concentrating).

1.1.2 Policy basis

To thoroughly implement the latest policy requirements, including the “Healthy China 2030” Outline, the Ministry of Education’s Guidelines on Health Education in General Higher Education Institutions, and the “Guiding Opinions on Comprehensively Promoting the Development of Healthy Schools” issued by the Ministry of Education and four other departments, the government has explicitly designated the Special Campaign to Improve College Students’ Physical Fitness as a priority for higher education institutions, focusing on pressing issues such as sleep deprivation, excessive sedentary behavior, declining physical fitness, and abnormal psychological and behavioral patterns among college students. Universities are required to strengthen interventions promoting healthy lifestyles, improve campus health management systems, and effectively enhance the physical and mental well-being of college students. Prolonged sitting and staying up late are now common among college students and have become significant risk factors affecting their physical fitness, academic performance, and mental health. Grounded in national health strategies and the practical needs of higher education institutions, this study conducts behavioral research,

mechanism analysis, and studies on low-intensity interventions, and is of significant practical importance and policy relevance.

1.1.3. Significance of the study

From a theoretical perspective, this study introduces the concept of “coupled behavior” into the field of health behavior research among college students, thereby enriching the interdisciplinary perspective at the intersection of behavioral science and health management; At the same time, by integrating the Health Belief Model and the Theory of Planned Behavior, we developed a framework for analyzing the determinants of the coupled behavior of “prolonged sitting and staying up late,” thereby providing a theoretical reference for future studies in this field.

In practical terms, through a survey of the current situation of students at Guangdong University of Science and Technology, we have identified the characteristics and key influencing factors of the “prolonged sitting and late-night studying” behaviors among the university’s students; A lightweight, low-cost campus intervention program was designed and piloted, providing universities with a practical model they can directly adopt for managing student health, thereby helping to improve students’ physical and mental well-being as well as the quality of their academic and daily lives.

1.2 Current State of Research at Home and Abroad

1.2.1 Current state of research abroad

Staying up late is common among college students in China. Yang Wenzhe’s research found that 52% of college students go to sleep after midnight, and 19% go to sleep after 2 a.m., the motivations for staying up late can be categorized into six dimensions: personal needs, emotional regulation, entertainment and leisure, social needs, academic improvement, and conformity; smartphone dependence, academic pressure, and the influence of roommates are the primary external factors [1]. Based on grounded theory, Yang Wenjing investigated university students’ perceptions of the health risks associated with staying up late, providing qualitative research support for understanding the logic behind this behavior [2]. Ai Juan, Zhang Bofan, and others have confirmed that “revenge sleep deprivation” is significantly associated with smartphone addiction and time management skills; it is essentially a

compensatory response to a loss of control over one’s daytime schedule [3]. Chen Chen pointed out that staying up late can lead to physical and mental health issues such as a weakened immune system, an increased risk of cardiovascular disease, and difficulties regulating emotions [4]. At the intervention level, domestic scholars have proposed a three-dimensional prevention and control mechanism encompassing “individuals, schools, and families,” exploring intervention strategies in areas such as self-management, school management, and parental guidance.

1.2.2 Current state of research abroad

Theoretical frameworks in other countries are more well-developed. Kroese et al. were the first to propose the concept of “sleep procrastination,” defined as the behavior of delaying bedtime despite the absence of external obstacles and in the face of foreseeable negative consequences, thereby establishing a core conceptual foundation for research on staying up late [5]. Drawing on the Theory of Planned Behavior and the Theory of Compensatory Control, Nauts et al. demonstrated that the motivation to stay up late drives sleep procrastination by reinforcing behavioral intentions [6]. Research by Shao and Yu indicates that nighttime screen use disrupts adolescents’ circadian rhythms and is a key factor contributing to staying up late [7]. Correa-Iriarte et al. verified the mediating relationship between problematic mobile phone use, sleep quality, and sleep procrastination, and developed a self-regulation training system that effectively reduces the extent of sleep procrastination [8].

1.2.3 Development trends

Based on a review of domestic and international research, existing findings exhibit the following characteristics: First, the focus on specific behaviors is narrow; domestic studies primarily concentrate on staying up late, while international research centers on sleep procrastination theory, with relatively few collaborative studies addressing “sedentary behavior” or the combined “sedentary behavior + staying up late” pattern. Second, intervention models are rudimentary; the existing three-dimensional prevention and control framework—covering “individuals, schools, and families”—relies mainly on conceptual advocacy and lacks precise, actionable intervention tools and mechanisms for evaluating effectiveness; Third, there is a lack of

localized interventions. While self-regulation training systems from abroad have proven effective, they have not yet been validated or adapted for the context of domestic universities. This study focuses on the dual behaviors of “prolonged sitting and staying up late” among college students. Drawing on domestic and international theories of sleep procrastination and a three-dimensional prevention and control framework, and grounded in the actual circumstances of our university’s students, we have developed a streamlined, practical health intervention program. We will validate and evaluate its effectiveness through a pilot study to address gaps in existing research and provide practical guidance for health management in higher education institutions.

1.3 Research Questions and Research Approach

Based on the above analysis, this paper aims to address the following four core research questions. First, addressing the mismatch between campus health initiatives and student needs. Currently, health management in higher education institutions generally follows a “one-size-fits-all” approach, which overlooks individual differences and students’ actual needs. This results in measures that are out of touch with students’ realities and low participation rates. Through surveys and in-depth interviews, this project accurately identifies students’ health needs and behavioral challenges. Based on the findings, it designs intervention plans to align measures with students’ needs from the outset. Second, addressing the issues of poor implementation and lack of sustainability in health management measures. Traditional health initiatives often involve complex procedures and high barriers to entry, making it difficult for students to maintain them over the long term. This project develops lightweight, low-barrier, and easy-to-implement intervention strategies—such as flexible exercise sessions at different times, reminders to break up prolonged sitting, and posture correction courses—that are fully tailored to the campus environment and students’ daily routines. This reduces the difficulty of implementation and enhances students’ willingness to participate and their long-term commitment. Third, addressing the lack of data-driven support and the subjectivity in campus health management. Current health management practices largely

rely on experiential judgment and lack systematic data support. This project collects data through methods such as questionnaires, pre- and post-tests, and process records, and evaluates intervention effectiveness using descriptive statistics and paired-sample tests, thereby driving the transition of health management from experiential judgment to data-driven decision-making. Fourth, it addresses prominent health issues among college students, such as prolonged sitting, late-night studying, and poor posture. In response to real-world challenges—including excessive sedentary time, widespread late-night studying, and cervical and lumbar discomfort—this project establishes a multidimensional health intervention system covering exercise, daily routines, and posture. Through scientific guidance and continuous monitoring, it helps students develop healthy behavioral habits and tangibly improves their physical and mental well-being.

To address the above issues, this study follows a closed-loop research framework consisting of the following steps: “review of policies and literature → investigation of the current situation and analysis of mechanisms → development of intervention strategies → pilot implementation and evaluation of outcomes → synthesis and dissemination of findings.”

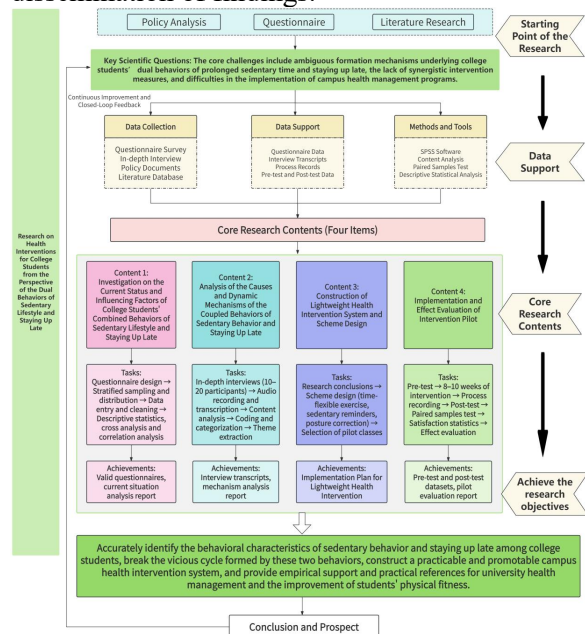


Figure 1. Technical Roadmap for This Study First, we will clarify the research context and theoretical foundation through policy analysis and literature review. Second, we will use questionnaire surveys and in-depth interviews to

identify the current status, influencing factors, and formation mechanisms of dual behaviors among college students. Based on this, we will develop a streamlined, practical campus health intervention system; Subsequently, pilot classes will be selected to implement the intervention, and pre- and post-tests will be conducted to evaluate effectiveness and optimize the program; finally, a research report, academic paper, and scalable implementation plan will be produced to provide empirical support for health management in higher education institutions. The specific technical approach is illustrated in Figure 1.

2. Theoretical Foundation and Analytical Framework

2.1 Definition of Key Concepts

- (1) Sedentary behavior: Refers to static behavior in a sitting or lying position during waking hours with an energy expenditure of ≤ 1.5 metabolic equivalents. In this study, the criteria were defined as an average of ≥ 2 hours of continuous sitting per day and a total daily sedentary duration of ≥ 6 hours.
- (2) Staying up late: This refers to going to bed after 1:00 a.m. and getting less than 7 hours of sleep per day, including both voluntary late nights (for entertainment or socializing) and involuntary late nights (due to academic work or stress).
- (3) Coupled behaviors: In this study, this refers to the dual unhealthy lifestyle characterized by the mutual reinforcement and co-occurrence of “prolonged sitting” and “staying up late.” These two behaviors overlap significantly in terms of timing and behavioral patterns, creating a vicious cycle.
- (4) Health intervention: A process that helps individuals improve unhealthy lifestyles and establish healthy behavioral habits through educational guidance, behavioral reminders, environmental support, and peer supervision.

2.2 Theoretical Foundation

- (1) The Health Belief Model (HBM): This model posits that an individual’s perception of disease risk and their assessment of the benefits and barriers to behavior change directly influence their health-related behavioral choices, providing a theoretical foundation for the cognitive intervention in this study.
- (2) Theory of Planned Behavior (TPB): This

theory emphasizes the influence of attitudes, subjective norms, and perceived behavioral control on behavioral intentions, and can be used to analyze the driving factors behind college students’ “sedentary and late-night” behaviors.

- (3) Self-regulation theory: This theory posits that individuals achieve behavioral change through goal setting, behavioral monitoring, and feedback, and provides concrete methodological guidance for the design of the intervention program in this study.

3. Research Design and Methods

3.1 Survey Participants

This study surveyed current students at Guangdong University of Science and Technology. Using stratified random sampling, the study covered students from different grades, majors, and genders. A total of 350 questionnaires were distributed, and 326 valid responses were collected, resulting in a response rate of 93.1%.

3.2 Questionnaire Design

The questionnaire used in this study consists of three sections: basic information (gender, grade level, duration of sedentary behavior, time taken to fall asleep, etc.); current behavioral patterns (average daily duration of sedentary behavior, frequency of staying up late, duration of sleep, etc.); and influencing factors (academic stress, smartphone dependence, dormitory environment, level of self-control, etc.). The questionnaire employed a 5-point Likert scale for reliability and validity testing. Cronbach’s alpha coefficient was 0.82, indicating good reliability; the KMO value was 0.78, meeting validity criteria.

3.3 Interview Design

Ten students with different behavioral characteristics were selected for semi-structured interviews. The interviews focused on daily patterns of sedentary behavior and staying up late, influencing factors, willingness to change, and barriers to change. Each interview lasted 20–30 minutes and was transcribed and coded using thematic analysis.

3.4 Design and Implementation of the Intervention Program

Two classes (30 students each) were selected as pilot groups, with one serving as the intervention

group and the other as the control group. The intervention program lasted four weeks and included the following components:

First, health education: weekly dissemination of information on the dangers of prolonged sitting and staying up late;

Second, behavioral reminders: setting timed reminders to break up prolonged sitting and checking in to confirm that electronic devices were put away before bed;

Third, light exercise, including stretching during breaks and simple exercises in the dormitory;

Fourth, peer supervision, establishing health check-in groups to provide mutual support and encouragement.

3.5 Data Analysis Methods

Statistical analysis was performed using SPSS 26.0 software, including descriptive statistics, cross-tabulation, correlation analysis, and paired t-tests, to compare behavioral changes before and after the intervention.

4. Analysis of the Current Status of “Sedentary Behavior Combined with Late-Night Studying” Among College Students

4.1 Basic Characteristics of the Sample

In this survey sample, males accounted for 48.5% and females accounted for 51.5%; the proportions of students from freshman to senior year were 26.4%, 28.2%, 24.5%, and 20.9%, respectively, as shown in Figure 2.

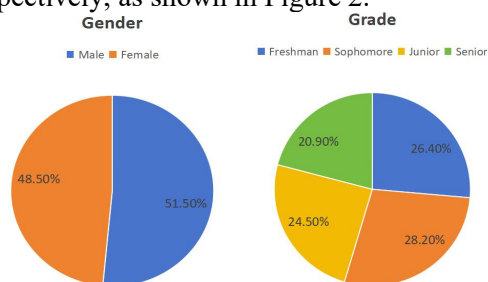


Figure 2. Survey Data from This Study

4.2 Analysis of the Current Situation

Survey data shows that prolonged sitting is a significant issue among students at this university, with 62.3% of students sitting for eight hours or more per day. This behavior primarily occurs while studying in dorm rooms, attending online classes, and using electronic devices. Only 18.7% of students get up to move around every hour, and most sit for more than two hours at a time. Prolonged sitting also leads

to various physical discomforts, with neck pain, lower back discomfort, and stiffness in the shoulders and neck being the most common health issues.

Staying up late is equally common: 67.2% of students do not fall asleep until after 1:00 a.m., and 71.5% get less than seven hours of sleep per day. Mobile phone entertainment is the primary cause of staying up late, followed by academic pressure, anxiety, and disturbances in the dormitory environment. More than half of the students experience a decline in mental well-being after staying up late, exhibiting adverse effects such as reduced concentration, mental fatigue, and irritability.

5. Analysis of Factors Influencing Coupling Behavior and Its Formation Mechanisms

5.1 Influencing Factors

Influenced by multiple factors, including the external environment, academic demands such as heavy coursework, thesis writing, and preparing for internships force students to spend long hours sitting at their desks. The accumulation of tasks and procrastination further contribute to delayed sleep schedules. Various forms of online entertainment easily lead to device dependency, constantly encroaching on rest and activity time and creating a vicious cycle of unhealthy habits. In dormitory life, inconsistent daily routines and nighttime noise disturbances, combined with peer influence, further contribute to the prevalence of staying up late. At the same time, campus settings such as online classes and indoor study sessions inherently favor a sedentary lifestyle, lacking mechanisms to encourage students to get up and move around, making it difficult to guide them toward adopting a dynamic and healthy lifestyle. At the same time, their own internal issues are among the key factors driving these unhealthy lifestyle habits. Most students have weak self-discipline, lack a scientific approach to time management, tend to be sluggish and disorganized, and are unable to independently regulate their daily routines and activity schedules. There is a widespread misconception regarding health among students; they underestimate the long-term physical damage caused by prolonged sitting and staying up late, harbor a sense of complacency, and show little willingness to actively correct these habits. Negative emotions such as anxiety and

loneliness lead students to rely on nighttime entertainment to relieve stress, further exacerbating their irregular sleep patterns. Compounded by deeply ingrained sedentary habits and a lack of practical methods for behavioral adjustment, it is difficult for students to independently reverse these unhealthy lifestyles.

5.2 Mechanisms Underlying the Formation of Coupling Behavior

The development of the combined behavior of “prolonged sitting and staying up late” among college students is the result of the combined effects of external environmental pressures, the influence of digital technology, and insufficient individual self-regulation: academic tasks and recreational activities extend the duration of sedentary behavior; the physical fatigue and procrastination caused by prolonged sitting further delay bedtime; and the sleep deprivation resulting from staying up late reduces the motivation to engage in activities and self-control the following day, creating a vicious cycle.

6. Development of a Lightweight Health Intervention Program and Evaluation of Pilot Results

6.1 Objectives of the Lightweight Intervention

Based on the findings of our research and students’ actual needs, we have developed a comprehensive health intervention program that is easy to implement, accessible, and sustainable. The program includes flexible exercise sessions at various times of the day, reminders to break up prolonged sitting and incorporate short bursts of activity, and posture correction exercises for the shoulders, neck, and lower back. The program is specifically designed to fit the campus environment, making it easy for students to maintain over the long term.

6.2 Content of the Intervention Program

First, we must establish a comprehensive intervention system that is streamlined, flexible, and easy to implement. Moving beyond the limitations of traditional campus health management—which relies on “one-size-fits-all” requirements—we have designed a streamlined, four-pronged approach combining flexible, time-slotted exercise; interventions to address prolonged sitting during fragmented periods;

posture correction; and guidance on scientifically sound daily routines. This approach has a low barrier to entry, is easy to maintain, and does not conflict with coursework, significantly improving student acceptance and adherence while better aligning with the practical realities of private undergraduate institutions. Second, by addressing the real-world challenges faced by college students—such as neck and lower back discomfort, insufficient sleep, limited exercise options, and fragmented schedules—we will integrate health interventions into daily academic and campus life. By prioritizing practicality, convenience, and user-friendliness, we will effectively resolve the prominent issues associated with traditional health measures, including misalignment with student needs, difficulties in implementation, and poor compliance.

6.3 Implementation of the Pilot Program

Students in the intervention group completed daily check-in tasks for four weeks, while those in the control group received no intervention. During the intervention, reminders were sent via a WeChat group, and check-in rates were tracked weekly. After the intervention ended, a questionnaire was administered again to compare pre- and post-intervention results.

6.4 Evaluation of Intervention Outcomes

Intervention data show that the intervention group reduced their average daily sedentary time by 1.2 hours and went to sleep 37 minutes earlier, with both metrics showing statistically significant differences. At the same time, the students’ cervical discomfort, physical fatigue, and emotional anxiety were significantly alleviated. No significant improvements were observed in any of the metrics for the control group. The overall adherence rate for daily check-ins during this intervention reached 78.3%, confirming the high acceptance of this health intervention program and its effective implementation.

6.5 Issues with the Intervention and Areas for Improvement

There are still some issues regarding the effectiveness of the intervention; some students have stopped checking in due to heavy academic workload or simply forgetting, and the effectiveness of peer supervision is significantly

influenced by the group atmosphere. A more flexible check-in mechanism could be introduced, incorporating automatic reminders through the campus app, and the scope of the intervention could be expanded to include more classes and dormitories.

7. Conclusions and Recommendations

This study focused on college students at Guangdong University of Science and Technology to investigate the current status, influencing factors, and intervention outcomes of the combined behaviors of prolonged sitting and staying up late. The findings revealed that over 60% of the students at this university exhibit both severe prolonged sitting and staying up late, with the two behaviors showing a strong correlation and forming a vicious cycle. Academic pressure, smartphone dependency, poor dormitory environments, and weak self-management skills are the core factors contributing to this issue. Meanwhile, the lightweight health intervention program designed in this study is highly practical and cost-effective, capable of effectively reducing students' sedentary time, improving sleep schedules, and tangibly enhancing their physical and mental well-being. Additionally, this study has certain limitations due to its homogeneous sample and relatively short intervention period, which warrant further refinement and improvement in future research.

To address the unhealthy lifestyle habits of college students, such as prolonged sitting and staying up late, this study offers recommendations for improvement from three perspectives: universities, students, and families. Universities should optimize course and dormitory management, increase in-person activities, conduct health education, and foster a positive campus environment that promotes healthy daily routines. Students should proactively cultivate a health-conscious mindset, master time management techniques, eliminate procrastination, engage in regular moderate exercise, and develop healthy habits such as maintaining a regular sleep schedule and avoiding electronic devices before bed. At the same time, universities, families, and society must collaborate to foster a cohesive educational environment. Parents should closely monitor their children's daily lives and provide positive guidance on sleep habits; social media platforms

should actively promote knowledge about healthy living and mitigate the negative impacts of harmful online entertainment, thereby comprehensively supporting the physical and mental well-being of college students.

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References

- [1] Yang W Z. Development and Preliminary Application of a Questionnaire on College Students' Motivations for Staying Up Late. Xinyang: Xinyang Normal University, 2025. DOI:10.27435/d.cnki.gxsfc.2025.000093.
- [2] Yang W J. A Study on University Students' Perception of Behavioral Health Risks Based on Grounded Theory: A Case Study of Night Owl Behavior among Students at Lanzhou University. *Society and Public Welfare*, 2026(2): 67–69.
- [3] Ai J, Zhang B F, et al. The Relationship between Revenge-Driven Late-Night Studying and Mobile Phone Addiction and Time Management among Young Students. *Journal of Hebei Youth Management Cadre College*, 2021, 33(2): 15-18.
- [4] Chen C. Staying Up Late: Time Embedding and Disembedding Among Young People. *China Youth Studies*, 2021, 32(8): 29-35.
- [5] Kroese F M, De Ridder D T, EverS C, et al. Bedtime procrastination: introducing a new area of procrastination. *Frontiers in Psychology*, 2014, 5: 611-618.
- [6] Nauts S, Kamphorst B A, et al. The explanations people give for going to bed late: a qualitative study of the varieties of bedtime procrastination. *Behavioral Sleep Medicine*, 2019, 17(6): 753-762.
- [7] Shao L, Yu G. Childhood environmental risk and youth bedtime procrastination: a path model with life history strategy and sense of control as mediators. *Child Abuse & Neglect*, 2024, 150: 106-137.
- [8] Correa-Iriarte S, Hidalgo-Fuentes S, Martí-Vila R M. Relationship between problematic smartphone use, sleep quality and bedtime procrastination: a mediation analysis. *Behavioral Sciences*, 2023, 13(10): 839.