Quantitative Analysis on Late-Night Impulse Buying Among Young People

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Abstract: In today's society, staying up late has become a typical occurrence for young people. The impact of sleep deprivation on impulse control emotion management, and decision-making has been the subject of numerous prior research, but few studies have further explored the relationship between staying up late and shopping activities. Based on a common phenomenon in today's society, this article explores the relationship between young people's habit of staying up late and the speed of shopping decision speed. This paper conducts benchmark regression, ordinal regression and interaction test, and shows that staying up late will significantly affect the shopping decisions speed. When consumers stay up later, they will make shopping decisions faster. In addition, individual income and emotional influences, as well as merchant promotions, also have different effects on shopping decisions speed. This study offers fresh ideas for sellers as well as a fresh viewpoint on consumer behavior research.

1 INTRODUCTION

Nowadays, staying up late has become the norm for many people. Especially for young generation, due to the pressure of study, work and personal habits, more and more people will choose to extend their entertainment time at night. However, staying up late not only affects an individual's physical and mental health, but may also have a profound impact on their consumption behavior. Behavioral economics and psychology research shows that sleep deprivation may affect people's emotional regulation, decision-making ability and impulse control, which may lead to significant differences in shopping behavior between people who stay up late and those who have normal schedules. For example, Salfi et al. (2020) found that sleep-deprived people were more likely to choose immediate gratification over long-term benefits when making decisions. Medical and biological research consistently demonstrates that insufficient sleep has adverse effects on cognitive function, decision-making ability, and physical fitness (Barnes et al., 2011). In current research, many scholars tend to investigate the connection between sleep deprivation and people's emotional regulation, decision-making ability and impulse control. For example, Khan et al. (2023) pointed out that sleep reduction could lead to cognitive impairment. Zhang et al. (2021) also mentioned that insufficient sleep could impair cognitive performance. This article will further explore the connection between staying up late and impulsive consumption behavior, aiming to explore whether the habit of staying up will significantly affect the speed of individuals' shopping decisions late at night, whether this effect will be moderated by the individual's income level, and the impact of merchants' promotional activities and individual emotions on the shopping decisions speed. Exploring shopping behavior from the perspective of daily living habits provides a new perspective for consumer behavior research, and also provides reference suggestions for retailers.

Based on questionnaire survey data, this study uses benchmark regression, ordinal regression and interaction test to explore the impact of staying up late habits on shopping decision speed. First, the variables are defined and benchmark regression is used to derive the relationship between the variables. Then, the results are robustly tested through ordered regression and interaction term tests. Next, this article will first review previous literature, focusing on the definition and impact of sleep deprivation; followed by a detailed introduction to the research methods of this article, including data sources, variable definitions, and analysis methods; finally, it will

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summarize the research conclusions and put forward suggestions.

2 LITERATURE REVIEW

2.1 Relevant Studies on the Conceptualization of Sleep Deprivation

The term 'sleep deprivation' characterizes a state in which people do not get enough sleep for a variety of reasons, including personal behaviors and external environmental conditions (Harrison et al., 2000). The age determines the recommended amount of sleep: children need 9-11 hours, teens who aged 14-18 need 8-10 hours, and adults usually need at least 7-8 hours every day (Kim et al., 2022). On this basis, Harrison et al. (2000) indicated that a person suffering from sleep deprivation frequently sleeps for fewer than 6 hours every night. Total sleep deprivation (TSD) and partial sleep deprivation (PSD) are the two categories into which researchers divide sleep deprivation according to its duration. The hallmark of TSD is the total incapacity to sleep for a full 24 hours. On the contrary, a sleep duration below a certain threshold is referred to as PSD, which represents a more comprehensive definition of sleep deprivation (Reynolds et al., 2010).

There are many factors in life that can lead to lack of sleep. Kevin et al. (2007) pointed out that insufficient sleep can occur for medical, psychological, environmental, occupational or socioeconomic reasons. For certain groups, the reasons for sleep deprivation are more specific. For example, for students, the primary causes for poor sleep are school pressure, social media and streaming applications, and social ties. The data comes from a sample of 183 people who responded was gathered. 42.4% of responders were men, and 57.6% of them were women. 81% were in the 19-21 age range, 12% were in the 16-18 age range, and the remaining respondents were in the 22-25 age range. Mumbai-based Shri Yashwantrao Junior College students and degree college students made up the sample (Khemka et al., 2020).

2.2 Relevant Studies on the Impact of Sleep Deprivation

Numerous studies have verified the detrimental effects of sleep deprivation. In brain imaging investigations of subjects who had sleep deprivation, researchers discovered that the prefrontal cortex had the most drop in metabolic rate. Lack of sleep may impair one's capacity for conscious decision-making, or executive function, as the prefrontal cortex is crucial to this process (Barnes et al., 2011). Zhang et al. (2024) also pointed out that sleep deprivation can significantly affect people's decision-making ability, memory and emotions, and showed that sleep deprivation can effectively promote sales in live broadcast rooms and stimulate consumers' impulse purchases. This reflects that the effects of sleep deprivation are supported by different disciplines. Mullett-Gillman et al. (2015) examined TSD and pointed out that sleep up late will modify economic strategy by changing the choice strategy. TSD resulted in an overall decline in choosing strategy in the gains domain, which was caused by both an increase in satisficing information (pWIN) and a drop in maximizing information (rEV). Instead than reducing the amount of information used in economic decision-making overall, TSD caused participants to rely on different types of information. There is also a certain negative feedback impact from sleep deprivation itself and the loss of self-control (Exelmans et al., 2017). Participants' executive function scores dropped dramatically following sleep deprivation, which showed up as reduced planning and decision-making skills, among other things (Pesoli et al., 2022). Lack of sleep impairs one's capacity to control one's emotions. People who don not get enough sleep are more or less sensitive to emotional cues, which makes it harder for them to control and regulate their emotions. When faced with stress and difficulties, this could result in increased emotional dysregulation, which would then affected their social relationships and productivity at work (Shermohammed et al., 2020). In a similar vein, William D.S. (2010) noted in earlier studies that sleep deprivation can have a special impact on cognitive processes that depend on emotional information. Sleep deprivation leads to poor memory, schematic thinking, which can lead to bad decisions, and mood disturbances, symptoms that coincide with a slowdown in the metabolism of brain tissue, especially in the motor language centers, prefrontal, frontal, and occipital cortices, and thalamus (Orzeł-Gryglewska, 2010). Namni et al. (2009) used chronic sleep restriction experiments to simulate the type of sleep loss experienced by many people whose illnesses and lifestyles lead to sleep fragmentation and premature sleep loss, and showed that sleep loss specifically affects cognitive functions, including working memory, executive attention and vigilance,

psychomotor and cognitive speed, and higher-order cognitive skills.

The above studies point out that sleep deprivation can lead to a decrease in self-control and affect decision-making. However, they did not further explore the mechanism between staying up late and impulsive consumption. The article which endeavors to address the gap in this field will further focus on young people aged 18-25 and study the relationship between staying up late and impulsive consumption, and offer a fresh viewpoint for researching consumer behavior and the digital economy.

3 REGRESSION ANALYSIS OF LATE-NIGHT CONSUMPTION IMPULSIVITY

3.1 Data Sources

The research utilized a quantitative approach and collected data via a structured questionnaire to investigate the late-night impulsive consuming behavior of young adults aged 18-25. A total of 113 survey results were gathered, with the majority of the questionnaire being distributed on Credamo and WJX to youth groups in various geographical areas. In the questionnaire, the following variables are mainly collected: The habit of staying up late, shopping decision speed, income, the influence of promotional activities and the impact of emotion. The details of these variables will be further explained in the following sections.

3.2 The Introduction of Variables

3.2.1 Dependent Variables

The dependent variable of the paper is shopping decision speed (Shopping_Speed), which is divided into three levels (Thinking over 1 hour, Thinking under 1 hour, Quick purchase). To simplify statistics and analysis, each level will be assigned a number from 1 to 3 in sequence. The larger the number, the shorter the shopping decision speed it represents. And Immediate purchase is considered impulse consumption.

3.2.2 Independent Variables

The habit of staying up late (Sleep_Habit): In the present study, Sleep_Habit means how late people usually stay up, it is associated with sleep deprivation. The study will further examine that whether later sleep time affect brain and make more impulsive decisions. As the dependent variable, it is also allocated a number to refer your habit of staying up late, and the specific reference is as Table 1:

Table 1. The coding of Sleep_Habit

Sleep_Habit	Coding
Before 23:00	1
23:00-1:00	2
1:00-3:00	3
After 3:00	4

3.2.3 Control Variables

Income: It is obvious that one of the factors affecting shopping decision speed is income. Consequently, income is included as a control variable. It is sorted as Table 2:

Table 2. The coding of Income

Income	Coding
< 500 Yuan	1
500-1000 Yuan	2
1000-2000 Yuan	3
2000-5000 Yuan	4
5000+ Yuan	5

The influence of promotional activities(Promotion): Merchants often use promotional activities to attract consumers. Regarding as external factor, this article will explore the impact of promotional activities on inducing impulse buying. 0 means not affected, 1 means affected.

The impact of emotion(Emotion): Sometimes people will shop without a reason just because they like it. So the impact of emotion will be regarded as internal factor. Lack of sleep can affect healthy people's mood and cognition (Thompson et al., 2022). Tomaso et al. (2021) also refer to the impact of sleep deprivation on emotions. This essay will discuss whether this preference will be amplified to promote impulse buying when you are in a state of staying up late. Consistent with promotional activities, unaffected is marked as 0 and affected is marked as 1.

3.3 The Descriptive Descriptions of Variables

Table 3. The results of the descriptive descriptions

Variable	Obs	Min	Max	Mean	Std.Dev.
Shopping_Speed	113	1	4	2.11	0.712
Sleep_Habit	113	1	3	2.30	0.823
Income	113	1	5	3.86	1.149
Promotion	113	0	1	0.70	0.461
Emotion	113	0	1	0.69	0.464

From Table 3, this paper show that both shopping decision speed and the habit of staying up late are in a medium state, and there are certain differences between individuals. And the income of the respondents is generally high and varies greatly from person to person. Promotions and the emotional influence also have an impact on most respondents.

3.4 Benchmark Linear Regression

Table 4. The results of baseline model

Model Variable	(1) Shopping_Speed	(2) Shopping_Speed
Intercept	1.290*** (0.287)	0.488 (0.352)
Sleep_Habit	_____	0.366*** (0.102)
Income	0.165** (0.063)	0.192** (0.060)
Promotion	-0.038 (0.159)	0.036 (0.152)
Emotion	0.581*** (0.158)	0.400* (0.158)
R^2	0.169	0.258
Adjusted R^2	0.146	0.231
F	7.396 ($p < 0.001$)	9.402 ($p < 0.001$)
N	113	113

Note: $p < 0.001$(***), $p < 0.01$(**), $p < 0.05$(*)

The linear model of this paper is shown below:

$$Shopping\_Speed = \beta_0 + \beta_1 Sleep\_Habit + \beta_k control_k$$

β_k means the estimated coefficient obtained from the linear regression, while $control_k$ refers to each control variable.

Model(1) represents the baseline model that does not contain core independent variable(Sleep_Habit). Table 3 shows that Income and Emotion have a significant positive impact in this case, but promotion has an insignificant negative impact. The f value and p value show that the overall regression model is significant at this time, which means that the results are effective (See Table 4).

In Model(2), the regression results show some changes when Sleep_Habit is added. Consistent with the hypothesis, Sleep_Habit has a significant positive impact on Shopping_Speed, as the core independent variable. It means that the later people stay up, the quicker shopping decision people will make. For income and promotion, Adding Sleep_Habit increase their estimated coefficient, which is equivalent to amplifying their positive effects on shopping decision speed. However, the effect of promotion is still not significant. It is also worth noting that after adding Sleep_Habit, the influence and significance of the emotional effect both decrease. The fact that the effect of emotional influence is absorbed by the habit of staying up late may show that there is a certain relationship between the two, that is, staying up late itself will affect consumers' emotions, thereby affecting the speed of shopping decisions. These also support the previous conclusion that staying up late will affect the brain, which in turn affects self-control and decision-making ability, and ultimately makes people behave more impulsively. The increase in the f-value of Model(2) indicates that its overall regression model is more statistically significant than that of Model(1). The increase in also increases the explanatory power of the model. These also further reflect that Sleep_Habit and Shopping_Speed are closely related.

3.5 Ordinal Regression

Table 5. The results of ordinal regression

Variable	Parameter Estimates
Intercept	_____
Sleep_Habit	1.121*** (0.318)
Income	0.556** (0.176)
Promotion	0.056 (0.425)

Emotion	1.020* (0.431)
Pseudo R^2	0.300 (Nagelkerke)
F	34.128 (p < 0.001)
N	113

Note: p < 0.001(***), p < 0.01(**), p < 0.05(*)

In this study, shopping decision speed, staying up late habits and income are defined as ordered variables, and promotion and emotional impact are defined as dummy variables. The use of ordinal regression can further test the significance of these variables on shopping decision speed and the robustness of the results.

The data in the above Table 5 show that the results of the ordinal regression are basically consistent with the results of the benchmark regression. The habit of staying up late, income and emotional influence still show significant positive effects, while the impact of promotion on shopping decision speed is still weak. Pseudo and F also show that the model has a certain explanatory power and is significant overall.This further verifies its robustness.

3.6 Interaction Test

In previous studies, it was found that income has a significant positive impact on shopping decision speed. However, in order to avoid the influence of income as a confounding variables on the independent variable of staying up late, this study continues to use interaction tests to verify whether income affects the influence of staying up late on shopping decision speed.

Table 6. The results of interaction test

Variable	B	SE	t	p	VIF
Sleep_habit	0.373	0.103	3.623	< 0.001	1.144
Income	0.193	0.060	3.192	0.002	1.025
Sleep_Income	-0.043	0.088	-0.490	0.625	1.067

Note: Sleep_Income = Centered_Sleep_Habit * Centered_Income

Centered_Sleep_Habit = Sleep_Habit - MEAN(Sleep_Habit)

Centered_Income= Income - MEAN(Income)

In Table 6, the central variable is first calculated to reduce the impact of collinearity to ensure the validity of the experimental results. Then the interaction term Sleep_Income is constructed and OLS regression is performed. The data in the table shows that the p value is 0.625, so income has no significant moderating effect on the relationship between staying up late and shopping speed. That is, regardless of income, people who stay up late may make shopping decisions in a similar way.

4 CONCLUSION

This paper examines the late-night impulse consumption behavior of young people, focusing on the impact of staying up late on impulse consumption decisions. Through regression analysis of the questionnaire, this paper found that the habit of staying up late has a significant impact on impulsive consumption decisions. The later you stay up late, the more likely you are to make impulsive decisions. In addition, the article also noted that the role of emotional influence is affected by the habit of staying up late, which shows that staying up late affects people's emotions and thus affects shopping behavior, which also supports the previous theory of sleep deprivation. And most people are influenced by both promotions and their income, but the latter is more important than the former.

This study provides suggestions for merchants on how to better invest time in sales activities in the current digital economy era to obtain higher profits. This constitutes the practical contribution of this study.

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