PREDICTION OF INTENTION TO CHANGE SLEEP BEHAVIOR AMONG UNDERGRADUATES: SOCIAL MEDIA AND PERCEPTION OF QUALITY OF SLEEP

Aungkana Jattamart[1,*] and Achaporn Kwangsawad[2]
[1,*, 2] Department of Business Information Technology, Faculty of Business Administration
Rajamangala University of Technology Rattanakosin Wang Klai Kangwon Campus, Thailand

ABSTRACT

The purpose of this study was to predict the intention of undergraduate students that use social media to change their sleep behavior and understand the perception of quality of sleep by applying the I-Change Model (ICM) as a framework for education. The causal relationship of the factors studied were analysed based on structural equation modelling (SEM) with SmartPLS 3 software. The results show that to increase their intention to change their sleeping habits, students must be advised about the benefits of sleep and the dangers that may arise from sleep problems, including recommendations regarding the frequency of social media use appropriate for each day. In addition, student motivation, the right amount of social media, and attention to quality of sleep are important factors in predicting students intention to change sleep behavior.

Keywords: Sleep quality, Intention to Change, Social media, I-Change model.

1. INTRODUCTION

The current situation of the spread of communicable diseases is likely to occur easily and quickly. People are at increased risk of acquiring various pathogens; even more serious are some new communicable diseases, which are caused by a new strain of viruses, such as coronavirus (COVID-19), resulting in insufficient vaccines for treatment. As a result, the epidemic rate continues to increase until it is a global epidemic and leads to public health problems [1]. Finally, the World Health Organization (WHO) announced on March 11, 2020, that the epidemic of the new strain of the coronavirus is a "pandemic" [2].

Taking good care of health is the most convenient and necessary method to prevent infection. Good health can be achieved by eating healthy food, exercising regularly, and getting enough sleep each day. However, there have been reports that sleep problems have become a global epidemic [3], with each person having different sleep problems. One of them is insufficient sleep, which can be encountered by people of all ages and has a dramatic effect during major life transitions [4]; college students are at a particularly high risk of sleep problems [5]. There are a series of nationally-representative cohort studies report that females adolescents have a shorter sleep time than males [6].

According to a report from Stock, et al. [7], teenage campus life changes often coincide with a decrease in healthy behavior, which includes sleep problems. Previous studies have shown that most students spend less than 6.5 hours asleep per night (25%) [8], while experts recommend 7–9 hours of sleep per night for good health and well-being [9].

Inadequate sleep has many negative effects on students, including daytime sleepiness [10]. According to previous research, there is a relationship between poor sleep quality and poor student achievement [11] [12]. Insufficient sleep also increases the risk of chronic diseases, such as obesity, diabetes, and depression [13]. Especially coronary heart disease (CHD), one of the non-communicable diseases (NCD) that is a leading cause of death worldwide [14].

Insufficient sleep occurs for many reasons. A study by Lund, et al. [8] found that emotional and academic stress negatively affected sleep, while Meng, et al. [15] show that sound in the environment is an influential factor affecting students' sleep. In addition, the results of previous research show that phone usage [16] and technology can affect sleep quality [17], especially in women, who often get insomnia after using Facebook [18]. Therefore, it is essential to gain a better understanding of the sleep behavior of adolescents during this life transition and of the use of technology and how it affects the quality of sleep in order to prevent the development of public health problems.

Although there has been researched that used the I-Change Model (ICM) [19] to study intention to change health behaviors, it was only a study of social media interventions on health behavior in depressed patients [20]. There has been no study to find correlations in sleep behavior modification in students. Cassoff, et al. [21] research studied adolescences intention to go to bed earlier by using ICM as a framework for education but ignored the relevant technology factors and did not analyze the causal relationship between the studied factors.

This research has been designed to fill the gap by focusing on the prediction of undergraduate students intention to change sleep behavior in terms of using social media and perception of the quality to sleep. The results can be acted as a guideline to provide knowledge

Manuscript received on April 3, 2020; revised on June 5, 2020.
*Corresponding author E mail: aungkana.jat@rmutr.ac.th Department of Business Information Technology, Faculty of Business Administration, Rajamangala University of Technology Rattanakosin Wang Klai Kangwon Campus, Thailand.

about health education and how the use of technology affects the quality of sleep.

2. LITERATURE AND THEORETICAL FRAMEWORK

This article contains the following literature and theoretical framework.

2.1 Sleep Behavior

Healthy behavior is something that occurs within a person and is an act that involves care, prevention, promotion, treatment and manage their health through eating, exercise, and sleeping habits. The National Sleep Foundation advises that the optimal duration of sleep for teens should be 7–9 hours per night. If limitations occur, the optimum time should be around 6 hours per night [9] but recent studies show that most students spend less than 6.5 hours asleep per night [8].

Adams and Kisler [17] developed a model to explain the variables affecting sleep disorders in adolescents; they found that sleep problems caused by chronotypes (body secretion of substances during the day) and negative emotionality. In addition, many researchers have tried to find other causes of this problem; Lund, et al. [8] found that emotional and academic stress harmed sleep, while Meng, et al. [15] discovered that sound in the environment also influences sleep.

In addition, the results of previous research show that the use of phones [16] and technology are affecting sleep quality because students will wake up at night to check messages; these sleep quality problems can lead to mental health problems (depression/anxiety) [17]. In particular, women tend to experience stress after using social media (Facebook), resulting in insomnia [18].

2.2 Social Media Usage

Despite ongoing studies on the benefits of applying information technology to health care, the use of social media has reported that to have a link to mental health problems, particularly negative emotions [22] and depression [23]. In addition, there is a link between negative emotions and using social media (Facebook), which causes insomnia [18].

Zhao, et al. [24] studied adolescent intention to reduce the use of electronic devices before going to bed by using the theory of planned behavior (TPB) to explain the relationship between attitudes and subjective norms (SN). The results of their first study show that attitudes and perceived behavioral control (PBC) were related to the intention to reduce the use of electronic devices before bed. This led to their second study, which experimented with behavioral intervention within the sample. They found that reducing the use of electronic devices before bed can help to improve the quality of sleep in adolescents.

2.3 I-Change Model

The I-Change Model (ICM) is a concept that describes the integrated behavioral change of an individual resulting from the combination of attitude, social influence, and self-efficacy (ASE model). This concept explains that behavioral change is the result of the willingness and ability of an individual. Health behaviors influenced by predisposing factors, information factors, awareness factors, motivation factors, statement of intentions, ability factors, and barriers [19]. The structure of the ICM illustrated in Figure 1.

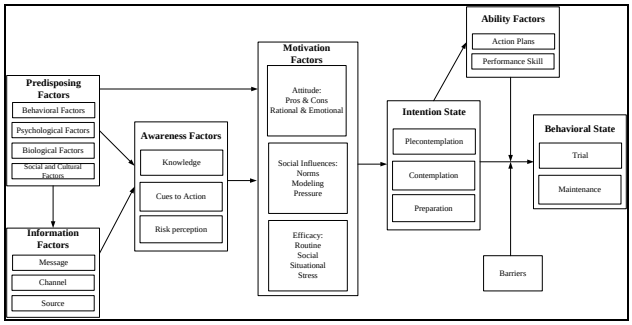

Figure 1. Structure of the I-Change Model (ICM)

Many previous studies have adopted ICM as a basis for explaining behavioral changes, such as smoking-cessation behaviors, in order to understand the factors that influence smoking intentions [25] [26] [27], and to study factors that influence exercise acceptance in people with health problems. In order to understand the motivation that leads to behavioral changes in terms of healthy exercise, it was found that the tools or processes used for motivation must be effective at a reasonable cost [28]. Previous studies have shown that ICM accepted in explaining health behavior change. Therefore, ICM is appropriate for this study to explain psychosocial factors related to the process of health behavior change through evaluating personal intentions.

3. RESEARCH MODEL AND HYPOTHESES

3.1 Research model

This research is a study of the prediction of undergraduate students intention to change sleep behavior in terms of using social media and perception the quality of sleep by applying ICM as a study framework to explain the underlying information factors (INF), awareness factors (AWN), motivation factors (MOT), and barriers (BAR) that affect the intention to change sleep behavior. The proposed research model is shown in Figure 2.

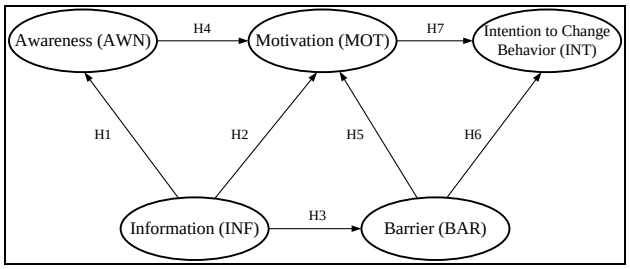

Figure 2. Proposed research model

3.2 Hypotheses

The hypotheses of related factors in accordance with the ICM framework are as follows.

3.2.1 Predisposing factors

Predisposing factors are the demographic characteristics of respondents, such as gender, age, education year, regular bedtime, average daily sleep time, types of active social media, and time spent using social media per day.

3.2.2 Information factors

Information factors relate to the level of information received about behavioral health changes, consisting of the message, source, and channel [29]; for example, the report of van der Wulp, et al. [30] found that information and advice from midwives plays a key role in decisions about alcohol consumption during pregnancy. Therefore, this study will explain information and recommendations regarding the proper use of social media and the importance of quality of sleep for students. The following hypotheses are proposed:

H1 : Information factors (INF) have a positive impact on students awareness factors (AWN).

H2 : Information factors (INF) have a positive effect on students motivation factors (MOT).

H3 : Information factors (INF) have a positive effect on students barriers (BAR).

3.2.3 Awareness factors

Awareness factors related to awareness of being healthy, which is assessed by 1) knowledge about behavior that causes danger to health; 2) cues to action to change behavior, such as the frequency of using internet and personal satisfaction [31]; and 3) risk perceptions when performing inappropriate behavior [32]. This study explains the importance of awareness in terms of the use of social media and the quality of sleep that is appropriate for students. Therefore, its hypothesis is as follow:

H4 : Awareness factors (AWN) have a positive effect on students motivation factors (MOT).

3.2.4 Motivation factors

Motivation factors involve individuals assessing the pros and cons of behavior modification, which are assessed by 1) attitude, 2) social influence and 3) self-efficacy [33]. Therefore, this study describes the creation of incentives as being important in modifying the use of social media and increasing the quality of sleep for students. Therefore, the following hypothesis is as follow:

H5 : Motivation factors (MOT) have a positive effect on students intention to change sleep behavior (INT).

3.2.5 Barriers

Barriers that restrict behavioral changes include the sleeping environment, which affects the quality of sleep [1 5] . Therefore, this study focuses on explaining environmental problems that may affect sleep quality. Suitable for students. For this reason, the following hypotheses are proposed:

H6 : Barriers (BAR) have a positive effect on student motivation factors (MOT).

H7 : Barriers (BAR) have a positive effect on student intention to change sleep behavior (INT).

3.2.6 Intention to change sleep behavior

Intention to change sleep behavior (INT) is an expectation of a person's intention to change their sleep behavior Cassoff, et al. [2 1] . This study focuses on students intention to change sleep behavior, assessed by appropriate use of social media and awareness of the quality of sleep and how it affects health.

4. RESEARCH METHOD

4.1 Participants

This research is a cross-sectional study that collected data from a sample of 400 undergraduate students using social media, calculated using Cochran, et al. [34] formula because the exact population number is unknown. Online questionnaires were sent via online social networks such as Line and Facebook. Data were collected from November 2019 to January 2020.

The research process was carried out in accordance with the procedures of human research ethics. The research team attended research ethics training in the social sciences department of Mahidol University, Thailand. The information related to this study will be kept confidential. Answering questions via online surveys does not identify or give information about the respondents, and the data in the questionnaire would be destroyed when the research was complete [35].

4.2 Measurement Instrument

The questionnaire was designed base on the I-Change Model (ICM), consisting of seven parts as follows: Part 1: predisposing factors of the respondents; Part 2: information about undergraduate students have knowledge levels of sleeping that affects to health; Part 3: awareness factors; Part 4: motivation factors; Part 5: barriers factors; Part 6 is a question about the intention to change sleep behavior; and Part 7 is a recommendation. A total of 27 questions using five-level criteria were used for data analysis, as shown in Table1.

Table 1: Measurement items questionnaire.

Construct	*Item*	*Survey Item*	*Source*
Predisposing factors	-	Gender, age, education, experience of using social media, faculty, total time per day of using social media, average sleep time	Adapted from Cassoff, et al.

Construct	*Item*	*Survey Item*	*Source*
		per day, usual bedtime and accommodation	[21]
Information (INF)	INF 1	I have received advice about good health and sleeping habits from lecturers, friends and relatives.	Adapted from van der Wulp, et al. [29] van der Wulp, et al. [30]
	INF 2	I have received information about health, sleeping habits that are healthy for the online media.	
	INF 3	Suggestions from the lecturers, friends and relatives make me pay more attention to the quality of sleep.	
	INF 4	Suggestions from other people on social media have made me pay more attention to sleep quality.	
	INF 5	I have searched for information about health, sleeping habits that are healthy for the online media.	
Awareness (AWN)	AWN1	I acknowledge that the use of social media affects sleep time.	Adapted from Pajor, et al. [31] Walthouwer, et al. [32]
	AWN2	I acknowledge that excessive use of social media affects sleep time.	
	AWN3	I acknowledge that not getting enough sleep can affect my daily activities.	
	AWN4	I acknowledge that not getting enough sleep can affect my studies.	
Motivation (MOT)	MOT1	People involved encourage me to pay attention to proper sleep habits.	Adapted from Cheung, et al. [33]
	MOT2	If I use social media at the right time, it helps to have more time to sleep.	
	MOT3	The support from lecturers, friends and relatives helped me pay more attention to the quality of sleep.	
Barriers (BAR)	BAR1	Sleeping in a hot room affects my sleep quality.	Adapted from Meng, et al. [15]
	BAR2	Sleeping in a room with too much lighting affects my sleep quality.	
	BAR3	The noise in the room affects the quality of my sleep.	
	BAR4	The noise from the outside affects the quality of my sleep.	
	BAR5	The atmosphere of the bedroom affects the quality of my sleep.	
Intention to change sleep (INT)	INT1	I intend to take care of my health by paying more attention to the quality of sleep.	Adapted from Cassoff, et al. [21]
	INT3	I intend to use social media at the right time to get more sleep.	

4.3 Data Analysis

For the analysis of causal relationships, the partial least squares structural equation modeling (PLS-SEM) was used based on the variance analysis model. Variance-based SEM was tested with SmartPLS version 3.2.9 [36] to test each factor, for the following reasons: 1) PLS-SEM in SmartPLS software does not operate under restrictive assumptions on data distributions since it is non-parametric [36]; 2) PLS-SEM is effective in predicting relevant components to test the theory of research [37], which is very popular in a variety of research groups, including the study of social media user behavior [38], the study of corporate information systems [39], and the study of health behavior from a disease prevention perspective [40]; 3) PLS-SEM can analyze the results of the measurement model and the structural model at the same time; and 4) PLS-SEM can display test results for content accuracy and classification accuracy with statistics of composite reliability (CR) and average variance extracted (AVE) [41].

For this reason, PLS-SEM is most suitable for this study and the results of the PLS-SEM analysis presented in the form of measurement models and structural models.

5. RESULTS

5.1 Sample characteristics

The study consisted of 400 participants, with most respondents being female (57.5%), aged between 18-20 years (27.50%) with 3-6 years of online media experience (48.80%). Most of them study at the Faculty of Business Administration (40.75%). The time spent on social media is 4-6 hours per day (54.00%). The usual bedtime is from 01.01 am (45.50%). The average bedtime per day is 5- 7 hours (41.00%) and 39.00 percent stay alone. The demographic characteristics of the participants are listed in Table 2.

Table 2: **Baseline Demographic Characteristics of Participants.**

Characteristics	**Number**	**Percentage**
Gender		
Male	170	42.50
Female	230	57.50
Age (years)		
Less than 18 year	13	3.30
18-20	110	27.50
21-23	160	40.00
24-26	36	9.00
27 years and above	81	20.30
Experience of using Social media (years)		
Less than 1 year	14	3.50
1-3	32	8.00
3-6	195	48.80

Characteristics	Number	Percentage
6 years and above	159	39.80
Faculty		
Education	12	3.00
Engineering	44	11.00
Liberal Arts	35	8.75
Architecture	15	3.75
Industrial	131	32.75
Business Administration	163	40.75
Total time per day of using Social media (hours)		
Less than 1 hours	7	1.80
1-3	43	10.80
4-6	216	54.00
6 hours and above	134	33.50
Average sleep time per day (hours)		
less than 5 hours	32	8.00
5-7	164	41.00
8-10	112	28.00
10 hours and above	92	23.00
Normal bedtime		
Less than 21.01	16	4.00
21.01-23.00	80	20.00
23.01-01.00	122	30.50
01.01 and above	182	45.50
Accommodation		
Single room	156	39.00
Room for rent with friends	126	31.50
home	118	29.50

5.2 Measurement model

The variables used in the research were high quality and met the weight criteria of Hair Jr, et al. [42]. Considering the loading value must be higher than 0.70, it can be seen in Table 3 that the weight value is between 0.749 and 0.960. And the composite reliability (CR) values are between 0.891-0.960 (with the criteria of not less than 0.7). Cronbach's α values are between 0.813-0.949, and these values are in accordance (with criteria not less than 0.7). The Average Variance Extracted (AVE) values are between 0.732-0.920 (with the value of not less than 0.5).

At the same time, the average variance extracted (AVE) of each component that meets the criteria of 0.50 found that values between 0.732 and 0.920 can reflect the variables in each element; they are well related internally and can explain the measurement model in their composition very well, as shown in Table 4.

Table 3: **Internal Consistency, Reliability and Convergent Validity of the Measurement Model.**

Construct	Items	Loading)> 0.70(	Cronbach's α)> 0.70(	Composite Reliability (> 0.70)	AVE (>0.50)
Information)INF(	INF 1	0.902	0.949	0.960	0.829
	INF 2	0.915			
	INF 3	0.910			
	INF 4	0.918			
	INF 5	0.908			
Awareness	AWN1	0.918	0.940	0.957	0.847

Construct	Items	Loading)> 0.70(	Cronbach's α)> 0.70(	Composite Reliability (> 0.70)	AVE (>0.50)
Information)INF(	INF 1	0.902	0.949	0.960	0.829
	INF 2	0.915			
	INF 3	0.910			
	INF 4	0.918			
	INF 5	0.908			
)AWN(	AWN2	0.917			
	AWN3	0.927			
	AWN4	0.919			
Motivation)MOT(	MOT1	0.907	0.813	0.891	0.732
	MOT2	0.749			
	MOT3	0.902			
Barriers)BAR(	BAR1	0.828	0.919	0.939	0.756
	BAR2	0.842			
	BAR3	0.892			
	BAR4	0.895			
	BAR5	0.889			
Intention to change sleep (INT)	INT1	0.960	0.912	0.958	0.920
	INT3	0.958			

Table 4: **Fornell–Larcker criterion analysis.**

Construct	Correlation Matrix				
	INF	AWN	MOT	BAR	INT
Information)INF(	**0.911**				
Awareness)AWN(	0.444	**0.920**			
Motivation)MOT(	0.659	0.790	**0.856**		
Barriers)BAR(	0.377	0.797	0.714	**0.870**	
Intention to change sleep (INT)	0.613	0.659	0.777	0.685	**0.959**

From Table 4, it can be explained that the square root of the mean variance of the extracted components is higher than the correlations with other elements, such as perceptual factors. The square root of the AVE is 0.920, which is higher than the united value. The relationship between other components between 0.444 and 0.797 and the obstacle factors had the square root of the AVE equal to 0.870, which is higher than the correlations of other components that have the correlation value between 0.377 and 0.714, etc. Therefore, the model is classified correctly and is able to analyze the structural equation model, as shown in Table 5.

Table 5: **Loadings and Cross-loadings.**

Construct	Items	INF	AWN	MOT	BAR	INT
Information)INF(	INF 1	**0.902**	0.439	0.621	0.360	0.601
	INF 2	**0.915**	0.407	0.586	0.328	0.556
	INF 3	**0.910**	0.395	0.595	0.325	0.533
	INF 4	**0.918**	0.378	0.594	0.348	0.554
	INF 5	**0.908**	0.400	0.604	0.352	0.543
Awareness)AWN(	AWN1	0.429	**0.918**	0.711	0.738	0.622
	AWN2	0.429	**0.917**	0.746	0.702	0.610
	AWN3	0.424	**0.927**	0.731	0.739	0.598
	AWN4	0.349	**0.919**	0.721	0.756	0.595
Motivation)MOT(	MOT1	0.486	0.767	**0.907**	0.671	0.676
	MOT2	0.785	0.436	**0.749**	0.395	0.637
	MOT3	0.448	0.800	**0.902**	0.743	0.682
Barriers)BAR(	BAR1	0.344	0.723	0.633	**0.828**	0.605
	BAR2	0.326	0.721	0.658	**0.842**	0.607
	BAR3	0.306	0.673	0.601	**0.892**	0.597
	BAR4	0.352	0.676	0.613	**0.895**	0.606
	BAR5	0.306	0.664	0.591	**0.889**	0.559
Intention to change sleep (INT)	INT1	0.586	0.658	0.747	0.677	**0.960**
	INT3	0.590	0.605	0.744	0.637	**0.958**

5.3 Structural model

The test of the structural equation model from the 5,000 resampling data using the bootstrap method by generating generate an approximate estimation to increase confidence in the analysis of the construct relationship and validate [42]. The multicollinearity with a VIF value found that the causal variable does not have a relationship higher than the criteria of 5 when considering the path coefficients and the p-value that meets the criteria. It was found that the test results accept all hypotheses. Hypothesis H1 is accepted: Information Factors (INF) have a positive influence on Awareness Factors (AWN) at a significant level of 0.001 (β = 0.444, t = 10.051); H2 is accepted: Information Factors (INF) have a positive influence on Motivation Factors (MOT) at the significant level of 0.001 (β = 0.378, t = 10.520); H3 is accepted: Information Factors (INF) have a positive influence on the Barrier (BAR) at the significant level of 0.001 (β = 0.377, t = 7.702); H4 is accepted: Awareness Factors (AWN) have a positive influence on Motivation Factors (MOT) at a significant level of 0.001 (β = 0.459, t = 6.621); H5 is accepted: Motivation Factors (MOT) have a positive influence on intention to change sleep (INT) at the significant level of 0.001 (β = 0.587, t = 10.071); H6 is accepted: Barrier (BAR) have a positive influence on Motivation Factors (MOT) at the significant level of 0.001 (β = 0.206, t = 3.431) and H7 is accepted: Barrier (BAR) have a positive influence on intention to change sleep (INT) at a significant level of 0.001 (β = 0.266, t = 4.426). The results are shown in Table 6.

Table 6: **Hypothesis Testing.**

Hypotheses	Relationship	β	t-value	p- value	VIF	Supported
H1	INF ->AWN	0.444	10.051	0.000***	1.000	Supported
H2	INF -> MOT	0.378	10.520	0.000***	1.248	Supported
H3	INF -> BAR	0.377	7.702	0.000***	1.000	Supported
H4	AWN -> MOT	0.459	6.621	0.000***	2.934	Supported
H5	MOT -> INT	0.587	10.071	0.000***	2.038	Supported
H6	BAR -> MOT	0.206	3.431	0.001***	2.746	Supported
H7	BAR -> INT	0.266	4.426	0.000***	2.038	Supported

Note: *** = p < 0.001, β= Path Coefficients, INF = Information Factors, AWN = Awareness Factors, MOT = Motivation Factors, BAR = Barrier and INT = Intention to change sleep

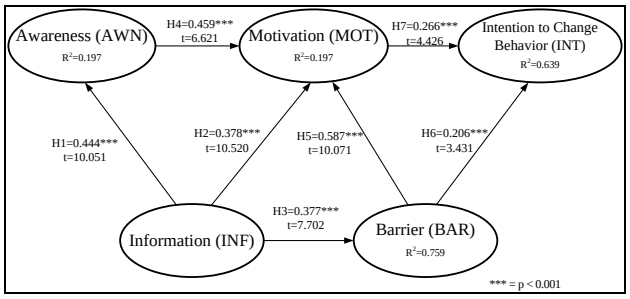

Figure 3. Proposed research model

The analysis of the structural equation model found that the information factors described the coefficient of determination (R^2) of awareness factors at 19.7%, the R^2adj was equal to 19.5% (low), the information described the coefficient of determination (R^2) of barriers is to be 14.2%, R^2adj was equal to 14.0% (low). Motivation and barriers described the coefficient of determination (R^2) of intention to change sleep at 63.9%, R^2adj was equal to 63.7% (medium). Awareness, information and barrier described the coefficient of determination (R^2) of motivation (R^2) at 75.9%, R^2adj was equal to 75.7% (high), as shown in Table 5.

The results of checking the model fit according to the criteria of Hair Jr, et al. [42] and Henseler, et al. [43]. Stone-Geisser Q^2 with blindfolding for motivation (MOT) is equal to 0.548, which is at a high level. The intention to change behavior (INT) is equal to 0.583, which is at a high level. Awareness (AWN) is 0.165, which is in the middle and the barrier variable (BAR) is equal to 0.105, which is a low level. The result is greater than 0, indicating that the constructs of the model have predictive relevance and the standardized root mean square residual (SRMR), which in the acceptable criteria must be lower than 0.08, in this model is equal to 0.076. All of this shows that the model is a good fit.

6. DISCUSSION

This study is designed to fill the gaps in previous studies by explaining the causal factors in order to predict the intention of undergraduate students to change their sleep behavior in terms of using social media and their perceived quality of sleep. From the results in Table 5 and Figure 3, it can be seen that all hypotheses are accepted. This explains as follows.

Information factors have a positive impact on awareness factors, motivation factors and barriers. It is also found that information factors can motivate students to focus on their use social media to get the best quality sleep at the highest level, which shows that gaining information and advice regarding the appropriate use of social media and the importance of quality of sleep in students plays an important role in motivation [30]. Therefore, we suggest that students should be advised on sleep benefits and the dangers that may be caused by sleep problems.

From figure 3, awareness factors have a positive impact on motivation factors, in terms of understanding how social media affects quality of sleep, it can be seen that

awareness of good health helps motivate students to focus on the use of social media and the quality of their sleep [32].

Motivation factors have a positive effect on the intention to change sleep behavior by using the right amount of social media and paying greater attention to the quality of sleep. It shows that motivation factors plays a very important role in predicting students intention to change sleep behavior. This is consistent with the study of Zhao, et al. [24], who found that attitude, which is one factor in evaluating motivation, is related to the intention to reduce the use of electronic devices before bed. This intention helps to improve the quality of sleep in teenagers.

However, we found that the barrier has a positive influence on motivation factors and intention to change sleep behavior in terms of the importance of social media use and the quality of sleep that students have. We can explain that environmental problems in their accommodation are also factors that affect the quality of sleep of students [15].

The main findings of this study show that advising students about the long-term and short-term effects of inadequate sleep should receive special attention. Because sleep problems can affect academic performance, health and wellbeing in the long run. The student sleep problems are something that the concerned parties should pay great attention to. Whether it is internal and external environment problems, especially the sound environment, Meng, et al. [17] which parents and families should take part in solving these problems. At the same time, emotional and academic stress, Including spending too much time on social media is a problem that must be resolved together. This may require the cooperation of families and teachers in providing advice and motivation for students to see the benefits of quality sleep. It will help to change the behavior of sleeping in a better direction.

However, this study found some limitations. First, the data has analyzed from the self-assessment report of the sample. May result in receiving bias data and affecting data analysis. Second, the sample lacked in demographic diversity. The samples were chosen from one university. For this reason, the results of the study cannot be representative of all student groups in Thailand. Finally, this study does not explain psychological factors (stress, depression) and personal behaviors (exercise, drinking alcohol, eating food), which may be related to the quality of sleep that is suitable for students. Therefore, future research should be investigated for these factors.

7. CONCLUSION

The study predicts undergraduates students' intention to change sleep behavior in terms of social media use and perception of the quality of sleep. We used ICM theory as a conceptual framework for creating behavior prediction models. The results of the study show that if students need to increase their level of intention to change their sleep behavior, they must be advised on the benefits of sleep and the potential dangers of sleep problems, including recommendations regarding the frequency of social media use that is appropriate for each day. In addition, motivation for students to use the right amount of social media and their attention to the quality of sleep is an important factor in predicting students' intention to change their sleep behavior. Our findings show that the perception of the quality of sleep is essential for teenagers during the transition into university. In addition helping to prevent potential health hazards, it also helps to build good, long-term healthy habits.

REFERENCES

[1] C.-C. Lai, T.-P. Shih, W.-C. Ko, H.-J. Tang, and P.-R. Hsueh, "Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges," *International journal of antimicrobial agents*, p. 105924, 2020.

[2] W. H. Organization. (2020, 17). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. Available: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

[3] S. Stranges, W. Tigbe, F. X. Gómez-Olivé, M. Thorogood, and N.-B. Kandala, "Sleep problems: an emerging global epidemic? Findings from the INDEPTH WHO-SAGE study among more than 40,000 older adults from 8 countries across Africa and Asia," *Sleep*, vol. 35, no. 8, pp. 1173-1181, 2012.

[4] M. Basta, G. P. Chrousos, A. Vela-Bueno, and A. N. Vgontzas, "Chronic insomnia and the stress system," *Sleep medicine clinics*, vol. 2, no. 2, pp. 279-291, 2007.

[5] K. Peltzer and S. Pengpid, "Nocturnal sleep problems among university students from 26 countries," *Sleep and Breathing*, vol. 19, no. 2, pp. 499-508, 2015.

[6] J. Maslowsky and E. J. Ozer, "Developmental trends in sleep duration in adolescence and young adulthood: evidence from a national United States sample," *Journal of Adolescent Health*, vol. 54, no. 6, pp. 691-697, 2014.

[7] A. A. Stock, S. Lee, N. G. Nahmod, and A.-M. Chang, "Effects of sleep extension on sleep duration, sleepiness, and blood pressure in college students," *Sleep health*, vol. 6, no. 1, pp. 32-39, 2020.

[8] H. G. Lund, B. D. Reider, A. B. Whiting, and J. R. Prichard, "Sleep patterns and predictors of disturbed sleep in a large population of college students," *Journal of adolescent health*, vol. 46, no. 2, pp. 124-132, 2010.

[9] M. Hirshkowitz *et al.*, "National Sleep Foundation's sleep time duration recommendations: methodology and results summary," *Sleep health*, vol. 1, no. 1, pp. 40-43, 2015.

[10] C. D. Mah, E. J. Kezirian, B. M. Marcello, and W. C. Dement, "Poor sleep quality and insufficient sleep of a collegiate student-athlete population," *Sleep health*, vol. 4, no. 3, pp. 251-257, 2018.

[11] A. J. El Hangouche *et al.*, "Relationship between poor quality sleep, excessive daytime sleepiness and low academic performance in medical students," *Advances in medical education and practice*, vol. 9, p. 631, 2018.

[12] J. R. Prichard, "Sleep Predicts Collegiate Academic Performance: Implications for Equity in Student Retention and Success," *Sleep Medicine Clinics*, vol. 15, no. 1, pp. 59-69, 2020.

[13] H. Owens, B. Christian, and B. Polivka, "Sleep behaviors in traditional-age college students: A state of the science review with implications for practice," *Journal of the American Association of Nurse Practitioners*, vol. 29, no. 11, pp. 695-703, 2017.

[14] S. T. Chatnarong Fukprapi, and Jean Paolo Lacap, "COMBINATION OF ENVIRONMENTAL AND ECONOMIC FACTORS IN CORONARY HEART DISEASE PREVALENCE IDENTIFICATION," *International Journal of Applied Biomedical Engineering*, vol. 12, no. 1, p. 12, 2019.

[15] Q. Meng, J. Zhang, J. Kang, and Y. Wu, "Effects of sound environment on the sleep of college students in China," *Science of The Total Environment*, vol. 705, p. 135794, 2020.

[16] S. Vhaduri and C. Poellabauer, "Impact of different pre-sleep phone use patterns on sleep quality," in *2018 IEEE 15th International Conference on Wearable and Implantable Body Sensor Networks (BSN)*, 2018, pp. 94-97: IEEE.

[17] S. K. Adams and T. S. Kisler, "Sleep quality as a mediator between technology-related sleep quality, depression, and anxiety," *Cyberpsychology, Behavior, and Social Networking*, vol. 16, no. 1, pp. 25-30, 2013.

[18] S. H. Thompson and E. Lougheed, "Frazzled by Facebook? An exploratory study of gender differences in social network communication among undergraduate men and women," *College student journal*, vol. 46, no. 1, pp. 88-99, 2012.

[19] H. de Vries, I. Mesters, H. Van de Steeg, and C. Honing, "The general public's information needs and perceptions regarding hereditary cancer: an application of the Integrated Change Model," *Patient education and counseling*, vol. 56, no. 2, pp. 154-165, 2005.

[20] A. Jattamart and A. Leelasantitham, "The Influence of Social Media Lifestyle Interventions on Health Behaviour: A Study on Patients with Major Depressive Disorders and Family Caregivers," *The Open Public Health Journal*, vol. 12, no. 1, 2019.

[21] J. Cassoff, R. Gruber, G. Sadikaj, and B. Knäuper, "What motivational and awareness variables are associated with adolescents' intentions to go to bed earlier?," *Current Psychology*, vol. 33, no. 2, pp. 113-129, 2014.

[22] A. M. Aladwani, "Compatible quality of social media content: Conceptualization, measurement, and affordances," *International Journal of Information Management*, vol. 37, no. 6, pp. 576-582, 2017.

[23] H. Appel, A. L. Gerlach, and J. Crusius, "The interplay between Facebook use, social comparison, envy, and depression," *Current Opinion in Psychology*, vol. 9, pp. 44-49, 2016.

[24] X. Zhao, X. Feng, R. Garg, and K. M. Kelly, "Reducing late evening bedtime electronic device intentions and use among young adults," *Sleep health*, vol. 5, no. 4, pp. 401-408, 2019.

[25] S. M. Eggers, C. Mathews, L. E. Aarø, T. McClinton-Appollis, A. E. Bos, and H. de Vries, "Predicting primary and secondary abstinence among adolescent boys and girls in the Western Cape, South Africa," *AIDS and Behavior*, vol. 21, no. 5, pp. 1417-1428, 2017.

[26] H. de Vries, S. M. Eggers, and C. Bolman, "The role of action planning and plan enactment for smoking cessation," *BMC Public Health*, vol. 13, no. 1, p. 393, 2013.

[27] I. Elfeddali, C. Bolman, and H. De Vries, "SQ4U—A computer tailored smoking relapse prevention program incorporating planning strategy assignments and multiple feedback time points after the quit-attempt: Development and design protocol," *Contemporary clinical trials*, vol. 33, no. 1, pp. 151-158, 2012.

[28] M. Moreau, M.-P. Gagnon, and F. Boudreau, "Development of a fully automated, web-based, tailored intervention promoting regular physical activity among insufficiently active adults with type 2 diabetes: integrating the I-change model, self-determination theory, and motivational interviewing components," *JMIR research protocols*, vol. 4, no. 1, p. e25, 2015.

[29] N. Y. van der Wulp, C. Hoving, and H. de Vries, "A qualitative investigation of alcohol use advice during pregnancy: experiences of Dutch midwives, pregnant women and their partners," *Midwifery*, vol. 29, no. 11, pp. e89-e98, 2013.

[30] N. Y. van der Wulp, C. Hoving, and H. de Vries, "Correlates of partner support to abstain from prenatal alcohol use: a cross-sectional survey among D utch partners of pregnant women," *Health & social care in the community*, vol. 24, no. 5, pp. 614-622, 2016.

[31] E. Pajor, S. Eggers, K. Curfs, A. Oenema, and H. De Vries, "Why do Dutch people use dietary supplements? Exploring the role of socio-cognitive and psychosocial determinants," *Appetite*, vol. 114, pp. 161-168, 2017.

[32] M. J. L. Walthouwer, A. Oenema, M. Candel, L. Lechner, and H. de Vries, "Eating in moderation and the essential role of awareness. A Dutch longitudinal study identifying psychosocial predictors," *Appetite*, vol. 87, pp. 152-159, 2015.

[33] K. L. Cheung *et al.*, "Understanding the stakeholders' intention to use economic decision-support tools: a cross-sectional study with the tobacco return on investment tool," *Health Policy*, vol. 120, no. 1, pp. 46-54, 2016.

[34] W. G. Cochran, F. Mosteller, and J. W. Tukey, "Statistical problems of the Kinsey report," *Journal of the American Statistical Association*, vol. 48, no. 264, pp. 673-716, 1953.

[35] M. A. Moreno, N. Goniu, P. S. Moreno, and D. Diekema, "Ethics of social media research: common concerns and practical considerations," *Cyberpsychology, behavior, and social networking*, vol. 16, no. 9, pp. 708-713, 2013.

[36] C. M. Ringle, Wende, S., and Becker, J.-M, "SmartPLS 3." Boenningstedt: SmartPLS GmbH," ed, 2015.

[37] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139-152, 2011/04/01 2011.

[38] L. Hassan, A. Dias, and J. Hamari, "How motivational feedback increases user's benefits and continued use: A study on gamification, quantified-self and social networking," *International Journal of Information Management*, vol. 46, pp. 151-162, 2019.

[39] N. Guhr, B. Lebek, and M. H. Breitner, "The impact of leadership on employees' intended information security behaviour: An examination of the full-range leadership theory," *Information Systems Journal*, vol. 29, no. 2, pp. 340-362, 2019.

[40] E. Y. Tweneboah-Koduah, "Social marketing: Using the health belief model to understand breast cancer protective behaviours among women," *International Journal of Nonprofit and Voluntary Sector Marketing*, vol. 23, no. 2, p. e1613, 2018.
[41] M. Salehan, D. J. Kim, and C. Koo, "A study of the effect of social trust, trust in social networking services, and sharing attitude, on two dimensions of personal information sharing behavior," *The Journal of Supercomputing*, vol. 74, no. 8, pp. 3596-3619, 2018.
[42] J. F. Hair Jr, G. T. M. Hult, C. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed. Sage publications, 2017.
[43] J. Henseler, G. Hubona, and P. A. Ray, "Using PLS path modeling in new technology research: updated guidelines," *Industrial management & data systems*, vol. 116, no. 1, pp. 2-20, 2016.

Dr. Aungkana Jattamart received the B.Sci. in Computer Science from Kasetsart University, Nakhon Pathom, Thailand in 2009, M.Sci. in Technology of Information System Management in 2012 and Ph.D. in Information Technology Management in 2019 at the Mahidol University, Nakhon Pathom, Thailand. Currently, she is a lecturer of Department of Business Information Technology, Faculty of Business Administration, Rajamangala University of Technology Rattanakosin Wang Klai Kangwon Camp us, Prachuapkhirikhan, Thailand. Her interests include Healthcare IT, Social Science, Structural Equation Modeling, Information Technology, Human Interaction and Geographic Information System.

Dr. Achaporn Kwangsawad received the B.B.A. in Business Computer from Kasem Bundit University in 1994, an M.Sc. in Information Technology from King Mongkut's Institute of Technology North Bangkok (KMITNB), Bangkok, Thailand in 2005, Ph.D. in Quality Information Technology from Phetchaburi Rajabhat University, Phetchaburi, Thailand, in 2016. Currently, she is the Lecturer at the Business Information Technology, Rajamangala Universite of Technology Rattanakosin, Wangklaikangwon campus, Prachuapkirikhan, Thailand. Her interests include Commercial Electronic Website, Website Optimization, Search Engine Marketing, Health, and Behavior in Social Media.