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The Investigation of Levels of Stress, Anxiety, Depression, and Sleep Quality in the Different Leisure Activities During the COVID-19 Pandemic

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ABSTRACT

According to the world health organization is, globally, that there have been 223,022,538 confirmed cases of Covid-19 including 4,602,882(studied for this paper on 10 September 2021) in Thailand, reported to WHO, between 3 January 2020 and 10 September 2021, infected people, 1,352,953 cases, and 13920 deaths. According to the Thailand ministry of public health, on 17 July, the first time that there were more than 10,000 cases. One of the issues is mental health such as stress, anxiety, and depression. These issues might affect sleep quality. In Thailand, regulations for quarantines at home, which contributed to more popularity in many leisure activities, but this study selected nine activities. Therefore, this research was to investigate the level of stress, anxiety, depression, and sleep quality in the different leisure activities during the Covid-19 pandemic and examine how leisure activity has relationships with sleep quality, correspondingly the aim of this study that how long each activity, the factor of sleep quality affected reducing its time of stress, anxiety, and depression. As the result, meditation activity had only a highly significant value in the score of SPST and DASS surveys (p-value= 0.01) by having the lowest means. The leisure activities have significantly a relationship with sleep quality (p-value= 0.05). There was a negatively significant correlation with the spent time for reduction of anxiety, meditation, global PSQI score, sleep latency, daytime dysfunction, step disturbance and sleep quality (p-value= 0.01, 0.05), while sleep quality had a positively significant value with the time for reduction of depression.

Introduction

Nowadays, there are many significant problems around the world that one of the most current problems is the Covid-19 situation, and according to the world health organization is, globally, that there have been 223,022,538 confirmed cases of Covid-19 including 4,602,882(studied for this paper on 10 September 2021)[1]. In Thailand, reported to WHO, between 3 January 2020 and 10 September 2021, infected people, 1,352,953 cases, and 13920 deaths [2]. According to the Thailand ministry of public health, on 17 July, the first time that there were more than 10,000 cases. [3]

STRESS, ANXIETY AND DEPRESSION

Stress is the different meaning, based on individual [5]. The first contributor to defining the meaning is Han Selye, he said, “Stress is the non-specific response of the body to any demand,” and correspondingly stress can occur in every occupation such as businessperson which has stress with constant pressure [5]. In the present, the development of stress questionnaires is widely recognized. For example, the Perceived stress questionnaire (PSQ) is valid that is used to assess stress [6]. In Thailand, we are familiar with SPST-20 model to evaluate stress, and many researchers have

use the model to figure out the involved factor with extreme stress in university students, studied in Bangkok Metropolitan. Interventions should be directly executed among university students to reduce stress, especially amid those students who have many issues such as sexual experience, mildly educated parents and having inflicted with parents. The definition of anxiety is unambiguous in the literature although the descriptive characteristics are well confined and easily recognizable, the definition's anxiety was predicted that is going to affect with a negative event, supplemented by feelings of dysphoria or physical symptoms of strain [7]. Similarly, depression often was studied with anxiety, owing to their comparably effect of other surrounding factors in society such as cyber-bullying [10], or these symptoms are common in patients with cancer [9]. In addition, the development of stress, anxiety and depression have plenty of forms, but DASS-21 could be familiar with Thais because this is currently used in Thailand, confirming the three factors structure of depression, anxiety, and stress [11]. In Thailand, the citizens have been worried about the Covid-19 vaccine what they have gotten them because the Covid-19 pandemic has spent a significant amount of time from people that they want to go out the site to do some activities, affected by the government having instant legislated the highest measure to control its citizens living at home since 20 July 2021[3]. During the Covid-19 pandemic, many countries have affected the mentality of people. In Iran, the other related research findings that the mental heart of stress, anxiety, and depression were shown in 63.4, 42.1, and 52.1% of the population, respectively, by using the DASS-21 questionnaire [4].

ACTIVITY

The leisure activities have become increasingly common things which people were interested in, owing to having more free time. In addition, the researcher chose nine activities that were consumed by people in the age of Covid-19, and these activities consisted of meditation, reading, feeding, exhibition, exercise, listening to songs, watching movies, or learning quotes in social media, using social media, and playing game. The purpose was to find the activity which would affect minority to stress, anxiety and depression, or the best relaxing activity, the earlier study about engaging self-care activities that it can decrease the emotional stress [12]. The later research illustrated that stress levels tended to be lower for allotment gardeners from higher deprivation areas and conducted participants who participated in outdoor and indoor activity which he compared between ages [16]. Based on this, the earlier study revealed that individuals engaged in more often enjoyable activities could be better psychological and physical functioning [17]. Meditation or mindfulness are classified in leisure activity due to exploiting the practical frequency to have the benefits, which there are many lessons for learning Buddhist, but the criterion of practice is that spending time for at least 6 months, after then it would be mindfulness among unexpected situations [13]. The impact of meditation is important in diverse ways such as reduction of psychology [14]. In other words, the previous study showed that mindfulness can decrease the level of stress in cancer patients after studying for 7 weeks, and these consequences were supported 6 months later [15]. Additionally, other activities have expected that could affect mental health such as social media. Depending on the earlier research studied in adolescents how they perceived social media as the negative effect to mental disorder, as a result, social media had the negative impact on those young people [18]. However, other papers showed social media with benefits and harmful and increasing of self-esteem and belongingness were affected from social networking [19], but they argued that this might provide a false of security.

SLEEP QUALITY

Sleep quality is a process to investigate several symptoms contributing to severe sleep quality that influences various medical disorders such as stress, anxiety, and depression. [23] During the Covid-19 pandemic exactly, the economy in many nations has been failed. Sleep quality can describe two reasons, firstly, it is normal in our society, the another is essential for related two mental health as stress and anxiety [20]. Development of instrument of sleep quality evaluation, the Pittsburgh sleep quality index (PSQI), which was used in this study, announced that its ability to indicate the different groups of patients and suggested in many research applications such as psychiatry [20]. In Thailand, there have been consumed this tool to monitor sleep quality in Thais. For example, the previous study presented, the elderly in Thailand had a better score after this test than they had engaged in relaxing activities [21].

This paper aims to find and compare the nine leisure activities in each level of stress, anxiety, and depression, and how they would affect sleep quality. In addition, how sleep quality would affect the level of such mental health. Furthermore, finding the spent time for reducing this mental health.

Methods

Participants & Procedure

The research sample included 1283 respondents from Thais. This study was the online distribution which was randomly selected from an online application such as Facebook and Instagram. It had spent for two weeks to gather information, and this online questionnaire had just done almost 10-15 minutes. Eliminating data to just 1007 participants, which is why those respondents could not fully answer all questions. The sample consisted of age groups were divided into 4 groups which was the period of generation of people [24] that comprised the baby boomer [54-72] (n= 292), gen x [38-53] (n=230), gen y [21-37] (n=313) and gen z [8-20] (n=172), and three gender group were male (n=699), female (n=250) and LGBTQ+(n=58). The sample consisted of nine activities to reduce such mental disorders, firstly, meditation (n=208), reading (n=39), feeding (n=54), exhibition(n=31), exercise (n= 49), listening to music (120), watching online media, using social media (n=193), and the last one is game (n=81). Most of the participants have experience with such activities for at least four years, 60.9%, while the figures of respondents who have experienced these relaxing activities for more than 6 months, 22.2%. The spending time of participants tended to be used for more than 30 minutes, 15 minutes and 1 hour per day 29.4%, 25.2% and 20.3% respectively, while the period that lower than 5 minutes, 10 minutes and 15 minutes had 5.3%, 5.46% and 10.6%, and over 2 hours had only 3.6%.

Measures

This research surveyed 4 hypotheses:
The meditation group in the nine activities will have the least impact on stress, anxiety, and depression during Covid-19.

(ii): The meditation group in the nine activities will have the relation of the seven components of subjective sleep quality.

The nine activities will correlate with the spent time for reducing emotional stress, anxiety, and depression.

(iv): The seven parts of sleep quality will have a relationship with the spent time for reducing emotional stress, anxiety, and depression.

Instrument & Tool

The Suan Prung Stress Test-20 (SPST-20). The 20 items of Suan Prung stress assessed the level of stress amid the nine activities. Participle was asked the frequency of self-administered through the last 6 months. The rating scale defines four levels of stain: (i) 0-24 [mild], (ii) 25-42 [moderate], (iii) 43-62 [high], and (iv) over 63 [severe stress].

The depression, anxiety, and stress Scale - 21 Items (DASS-21) are comprised of three self-report scales developed to examine the emotional states of stress, anxiety and depression. Each of the three scales DASS-21 scales consists of seven items. The stress scale is defined to levels of chronic nonspecific arousal such as difficulty relaxing, nervous arousal, and being irritable/ over-reactive and impatient. The anxiety scale determines autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, and inertia.

QI) is a self-administered questionnaire, which assesses subjective sleep quality during the recent month. The PSQI consists of 7 components, having a range of score 0-3): sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and day dysfunction. The total of 7 components score generates a global score of subjective sleep quality.

The latent factors were used to assess the spent time for reducing irritability, anxiety, and depression. There were 10 latent factors that were divided following the definition of the sentence in the SPST-20 and DASS-21 questionnaires. Each of the ten latent factors comprised of the time for reducing such mental disorders: (i) below 5 minutes; (ii) below 15 minutes; (iii) below 30 minutes; (iv) below 1 hour; (vi) below 2 hours; (vii) over 3 hours. The SPST-20 consisted of the four latent factors, hidden in the first, second (the same latent for first and second question), twelfth, fourteenth and fifteenth, questions of SPST-20. The DASS-21 had the 6 latent factors, distributed to the eighth, ninth, eleventh, thirteenth, fifteenth, sixteenth and eighteenth questions in DASS-21.

Statistical Analysis

The researcher analyzed the data by using the SPSS program for free 31 days and the PSPP program for free analysis application.

The stress (SPST-20), stress (DASS-21), anxiety and depression scores were assessed by One way ANOVA to test these scores with the nine activities. In this process, using the post hoc test to determine the different activities groups with Scheffe.

The study contained the ten latent factors, reporting the spent time for reducing emotionally mental heart stress, anxiety, and depression. These latent factors were converted by using factor analysis (FA) the principal component method with a varimax rotation, conducted on data provided from 1007 participants to reduce the figures of latent factors. Spearman rank correlation was used in this study to find the correlation between the spent time for reducing and the nine activities, and

Results

Descriptive analysis

Variables		(DASS-21)		Depression	Variables		Stress (SPST-20)
Normal					Mild		
	Frequency	592	480	465		Frequency	37
	Percent	58.8	47.7	46.2		Percent	3.7
Mild					Moderate		
	Frequency	86	79	126		Frequency	311
	Percent	8.5	7.8	12.5		Percent	30.9
Moderate					High		
	Frequency	127	201	178		Frequency	359
	Percent	12.6	20.0	17.7		Percent	35.7

Entirely 1007 individuals filled fully the questionnaire. As results illustrated for DASS-21 in **Table 1**, over half of the participants have experienced normal stress levels. But 14% and 6.1% of participants have severe and extremely severe stress, respectively. 47.7% of participants have a normal anxiety level, 16.1% have extremely severe anxiety. Correspondingly, 14.5% of participants have extremely severe depression, but 46.2% of participants have normal depression. Furthermore, the levels of stress of SPST-20 were shown that 35.7% of participants have high stress, and 30% of participants have moderate or severe stress.

One way ANOVA analysis

Using ANOVA compare the mean test by post hoc test, considering each activity group, this test found stress (SPST), stress (DASS), anxiety, and depression level altered in different activity groups (**Table 2**). This table presented only significant values (It can be needed other data.). The mean stress (SPST), stress (DASS), anxiety, and depression level score for meditation participants was 38, 8.2, 5.8 and 6.8 respectively, which is significantly the lowest compared with the other activities, but the score was forty-six for participants exercise activity that did not vary significantly. The scores of responders with meditation activity were 8.2, 5.6 and 6.8 in stress (DASS), anxiety and depression, respectively, which these scores did not vary significantly based on reading activity exercise activity. In addition, the SPST score of exercise activity did not have a significant value with meditation activity.

Using ANOVA compare mean test by post hoc test with Scheffe, considered each activity group, this test found stress (SPST), stress (DASS), anxiety, and depression level alter in different activity groups (**Table 3**). This table presented only significant values (It can be needed other data.). The mean stress (SPST), stress (DASS), anxiety, and depression level score for meditation participants was 38, 8.2, 5.8 and 6.8 respectively, which is significantly the lowest compared with the other activities, but the score was 46 for participants exercise activity that did not vary significantly. The scores of responders with meditation activity were 8.2, 5.6 and 6.8 in stress (DASS), anxiety and depression, respectively, which these scores did not vary significantly based on reading activity exercise activity. In addition, the SPST score of exercise activity did not have a significant value with meditation activity.

Variables	DASS-21	Stress	Anxiety	Depression	Variables		Stress(SPST-20)
Normal					Mild		
	Frequency	592	480	465		Frequency	37
	Percent	58.8	47.7	46.2		Percent	3.7
Mild					Moderate		
	Frequency	86	79	126		Frequency	311
	Percent	8.5	7.8	12.5		Percent	30.9
Moderate					High		
	Frequency	127	201	178		Frequency	359
	Percent	12.6	20	17.7		Percent	35.7
Severe					Severe		
	Frequency	141	85	92		Frequency	300
	Percent	14	8.4	9.1		Percent	29.8
Extremely Severe							
	Frequency	61	162	146			

Furthermore, consuming ANOVA compare the mean test by post hoc test with LSD, considered the relationship each activity group with seven components including global scores (**Table 4**). The mean Sleep duration, Quality for meditation participants was 38, 8.2, 5.8 and 6.8 respectively, which is significantly the lowest compared with the other activities, but the score was 46 for participants exercise activity that did not vary significantly. The scores of responders with meditation activity were 8.2, 5.6 and 6.8 in stress (DASS), anxiety and depression, respectively, which these scores did not vary significantly based on reading activity exercise activity. In addition, the SPST score of exercise activity did not have a significant value with meditation activity. The mean scores of each activities group illustrated that there were highly significant with almost sleep quality components, though only use of medication had no significant with the leisure activities by the scores mean was 0.23 and p-value= 0.757.

Factor analysis

The factor analysis with the principal component method was conducted on the 10 latent factors from SPST-20 and DASS-21 that these latent were constructed and put in these testing (SPST-20, DASS-21) by the researcher, and the model was divided into 3 groups by defined the spent time to reduce mental disorders each question in SPST-20 and DASS-21, but the latent factor which was defined about the period of reducing stress was irrelative with the process of factor analysis. The initiate model consisted of the five latent factors, which means the period of reducing anxiety. KMO of the model was 0.770 and Bartlett's test was significant [x^2 (120) = 1213.605, $p < 0.001$] approving that the information was factorable by (Field 2009), but they were done only the four latent factors. The new factor, therefore, had that KMO of the new model was 0.807 and Bartlett's test was significant [x^2 (120) = 1526.5, $p < 0.001$] approving

(Field 2009). The diagonals of the anti-image correlation matrix were above 0.5 for all items in the new model. The variance of the three components

Table 2 The nine leisure groups were compared stress(SPST-20), stress, anxiety and depression (DASS-21) with comparing mean ANOVA POST HOC test (Scheffe)

Variables		Group	SPST				Stress				Anxiety				Depression			
			Mean ± SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error
(Scheffe)																		
(Descriptive)	Between Groups			<.001				<.001				<.001				<.001		
	Within Groups																	
	Meditation		38.0±14.7				8.2±9.0				5.6±7.8				6.8±8.8			
		Read a book		0.005	-13.38782*	2.8361		0.866	-3.52885	1.78651		0.838	-3.16026	1.54127		0.954	-3.03526	1.86129
		Fed animal		<.001	-17.02885*	2.48233		<.001	-8.87358*	1.56366		<.001	-7.07194*	1.34901		0.013	-7.20335	1.62912
		Exhibition		<.001	-20.77078*	3.12913		<.001	-10.54622*	1.97109		0.003	-8.24876*	1.70052		<.001	-12.40167*	2.0536
		Exercise		0.286	-8.04925	2.58092		0.993	-1.95899	1.62576		0.994	-1.6668	1.40259		0.999	-1.60773	1.69382
		Listening song		<.001	-17.67051*	1.86317		<.001	-9.01987*	1.17364		<.001	-6.09231*	1.01253		<.001	-7.80705*	1.22277
		Watching a movie/ using life media		<.001	-16.25298*	1.55199		<.001	-7.40550*	0.97762		<.001	-4.39920*	0.84342		<.001	-7.05073*	1.01855
		Using social media		<.001	-17.02885*	1.62442		<.001	-9.13188*	1.02325		<.001	-6.39049*	0.88279		<.001	-8.80515*	1.06609
		Game		<.001	-16.84366*	2.12869		<.001	-8.94765*	1.34089		0.003	-5.65218*	1.15683		<.001	-10.17866*	1.39703

* The mean difference is significant at the 0.01 level.

described was 12.9, 10.6, 9.3%, respectively. The cumulative percentages of variance by the four components were 67.2%. The second model consisted of the two latent factors, which means the period of reducing irritability. KMO of the model was 0.5 and Bartlett's test was significant [x^2 (120) = 136.915, $p < 0.001$] approving that the information was factorable by (Field 2009). The diagonals of the anti-image correlation matrix were 0.5 of two items. Commonalities were above 0.5 for all items in this factor analysis model. The variance of the part described 31.6%. The cumulative percentages of variance by the four components were 68.5%. Eventually, the last model about the period to reduce depression, which had the two latent factors. KMO of the model was 0.5 and Bartlett's test was significant [x^2 (120) = 147.022, $p < 0.001$] approving that the information was factorable by (Field 2009). The diagonals of the anti-image correlation matrix were 0.5 of these items. Commonalities were above 0.5 for all items in the new model. The variance of the three components was described at 67.8%. The cumulative percentages of variance by the four components were 67.8%. **Table 5** explained that each group of factor analysis was classed in this table as the same rotated components matrix, and it also was supplied the commonalities of the items. Therefore, this model was named anxiety, irritability, and depression.

Correlation

This model was analyzed using correlation tests by presented to the three components of factor analysis (Anxiety, Irritability and Depression) to illustrate the relationship with activities, shown in **Table 6**. As the results reported, only meditation was significantly involved with the anxiety component, which represents a low positive correlation between meditation and the anxiety component (r=0.212; p-value<0.01).

ationship between the sleep quality index and the same factor analysis compo-

Variable	Division (Number)	Global score sleep quality		Sleep duration		Quality		Use of sleeping medication		Step disturbances		Daytime dysfunction		Habitual sleep efficient		Sleep latency	
LSD		Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value	Mean±SD	p-value
Activity	Meditation (208)	5.45±3.315	<0.001	1.32±0.920	0.374	0.97±0.725	<0.001	0.23±0.710	0.757	1.34±0.698	0.027	0.68±0.809	<0.001	0.08±0.267	0.017	0.84±0.957	<0.001
	Read a book (39)	4.85 ± 2.422		1.05 ± 0.759		1.08 ± 0.703		0.13 ± 0.339		1.10 ± 0.680		0.59 ± 0.715		0.03 ± 0.160		0.87 ± 0.833	
	Fed animal (54)	6.43 ± 2.660		1.07 ± 0.887		1.24 ± 0.642		0.26 ± 0.650		1.52 ± 0.693		1.02 ± 0.739		0.02 ± 0.136		1.30 ± 0.861	
	Exhibition (31)	7.52 ± 2.999		1.32 ± 0.871		1.48 ± 0.811		0.23 ± 0.717		1.61 ± 0.761		1.35 ± 0.877		0.03 ± 0.180		1.48 ± 0.890	
	Exercise (49)	5.92 ± 3.656		1.02 ± 0.989		1.14 ± 0.816		0.31 ± 0.769		1.35 ± 0.694		0.96 ± 0.789		0.02 ± 0.143		1.12 ± 0.949	
	Listening song (120)	6.71 ± 2.736		1.23 ± 0.857		1.40 ± 0.653		0.17 ± 0.524		1.43 ± 0.603		1.15 ± 0.827		0.04 ± 0.201		1.29 ± 0.999	
	Watching a movie/ using life media (232)	6.41 ± 2.878		1.16 ± 0.898		1.36 ± 0.755		0.16 ± 0.520		1.44 ± 0.586		1.03 ± 0.811		0.01 ± 0.093		1.25 ± 0.958	
	Using social media (193)	6.60 ± 3.009		1.21 ± 0.985		1.29 ± 0.728		0.19 ± 0.583		1.45 ± 0.636		1.07 ± 0.848		0.03 ± 0.174		1.37 ± 0.943	
	Game (81)	6.83 ± 3.130		1.17 ± 0.972		1.43 ± 0.821		0.16 ± 0.535		1.42 ± 0.668		1.26 ± 0.919		0.01 ± 0.111		1.37 ± 0.941	

* The mean difference is significant at the 0.05 level.

nents, resulted in the anxiety component having a very negatively weak correlation with global PSQI score (r= -0.154; p-value<0.01), sleep latency (r= -0.122; p-value<0.01), daytime dysfunction (r= -0.133; p-value<0.01). similarly, step disturbances had a very negatively weak relationship with the anxiety components (r=-0.084; p-value= 0.007), and the last one was that sleep quality had a very negatively weak correlation with the anxiety component (r=-0.070; p-value= 0.026). Meanwhile, the depression component had a very negatively weak correlation with sleep quality (r= -0.064; p-value= 0.041).

Table 3 Consideration of each leisure activity and stress, anxiety and depression (SPST, DASS respectively) group.

Discussion

The purpose of the study is to present and reveal a comparison of the nine leisure activities in each level of stress, anxiety, and depression, and how they would affect sleep quality. According to table 2, it demonstrated that meditation activity had high significance with the other leisure activities in the score of the STSP-20 and DASS-21 questionnaire. In other words, this study aims to find the leisure activities which might be associated with reduced levels of stress, anxiety and depression, and this research paid attention to meditation activity to support that people during Covid-19 could reduce the level of such mental disorders, according to most of the participants have experienced to practice for at least for 4 years (n= 172; 82.7%) [**Table 8**]. The result is relevant to the previous research in that they scrutinized the impact of mindfulness-based on stress reduction (MBSR), participating with sixteen patients through functional

[illegible] coding self-referential, valence, and orthographic features of social trait adjec- [illegible] completed neuroimaging. As a result, MBSR represented that gaining self-esteem, positive self-endorsement and activity in brain network the related to attention regulation, and reducing anxiety, negative self-endorsement and activity in brain systems involved in conceptual-linguistic in comparison of baseline [22]. In addition, the presence of sleep quality would affect the level of such mental health, studying in the nine leisure activities. The result found the highly significant value with almost all components, associated with the other research demonstrated that the Japanese and British Civil servants were the more doing leisure activities, better sleep quality [23]. The other aim of the paper was to find the spent time for reducing this mental health. The result was not satisfactory because only meditation in nine leisure activities had the significant value with the anxiety component which this part need to have more time for collecting the sample of time for reducing. In addition, the author studied the spent time for reducing this mental health with sleep quality components, illustrated that only three components (habitual sleep, use of sleeping medication and sleep duration) can not show a significant correlation with the anxiety component. Thus, future research has to study more about the spent time for reducing this mental health.

Conclusion

In this study, we indicated a leisure activities group to examine and compare the level of stress, anxiety, and depression during the Covid-19 prevalence in Thailand. The research illustrated that the meditation activity had a highly significant value which had the lowest mean of both SPST and DASS, found in table [2], and it shown that people who have practiced meditation for at least 4 years (n=172;82.7 %), found in table[], affected minority mental health during daytime dysfunction, and sleep latency components had highly significant value with the nine leisure activities (p-value= <0.001), and the other components as step disturbances and habitual sleep efficient had significant value (p-value=0.05), while there were no relationships with sleep duration and use of sleeping medication between these leisure activities. In the next analysis, the correlation between the leisure activities and the spent time for reducing stress, anxiety, and depression, shown that it had only meditation activity which had a significant value, but this was a very weak relationship with only the spent time for reduction of anxiety (r=; p-value=), table 5, but it can resolve that the impact of meditation activity with the spent time for reducing anxiety was to exploit the lower time. Meanwhile, the other leisure activities did not correlate with the spent time for reducing stress, anxiety, and depression. The other model correlation between sleep quality and the spent time for reduction of anxiety illustrated that global PSQI score, sleep latency, daytime dysfunction and step disturbance had a highly significant value with the spent time for reduction of anxiety (r=-0.154**, -0.122**, -0.133** and -0.084** ; p-value= 0.01 respectively), and there was a very weakly negative correlation with the time, which this model concluded the components affected mildly to the lower spent time for reduction anxiety, table [6]. The sleep quality component had a significant value with the spent time for reduction both of anxiety and depression; however, there was a very negatively weak correlation with the spent for reducing anxiety (r= -0.070, 0.064; p-value= 0.05), but the positively weak with the spent time for reducing depression, concluded two different reasons that the sleep quality component affects minorly to the lower spent time for reducing anxiety; in contrast, the same factor affected mildly with the higher spent time for reduction of depression. In future research, I suggest that it should exploit more time to study this subject because it needs to have insight data, which means to require more evidence that can prove the spent time for reduction of this mental health

re compared with sleep quality with comparing mean ANOVA Post hoc test

Variables	Group	SPST				Stress				Anxiety				Depression			
		Mean ± SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error	Mean+- SD	p-value	Mean Difference (I-J)	Std. Error
(Scheffe)																	
Read a book		51.4±12.4				11.7±8.8				8.7±8.0				9.8±9.4			
	Meditation		0.005	13.38782*	2.8361		0.866	3.52885	1.78651		0.838	3.16026	1.54127		0.954	3.03526	1.86129
Fed animal		55.0±18.6				17.0±11.5				12.6±11.3				14.0±11.4			
	Meditation		<.001	17.02885*	2.48233		<.001	8.87358*	1.56366		<.001	7.07194*	1.34901		0.013	7.20335	1.62912
Exhibition		31.0±58.7				18.7±10.2				13.8±10.3				19.2±11.9			
	Meditation		<.001	20.77078*	3.12913		<.001	10.54622*	1.97109		0.003	8.24876*	1.70052		<.001	12.40167*	2.0536
Exercise		46.0±17.0				10.1±9.8				7.2±8.4				8.4±9.8			
Listening song		55.6±15.7				17.1±10.0				11.9±8.7				14.6±10.7			
	Meditation		<.001	17.67051*	1.86317		<.001	9.01987*	1.17364		<.001	6.09231*	1.01253		<.001	7.80705*	1.22277
Watching a movie/ using life media		54.2±16.5				15.6±10.5				10.0±8.7				13.8±10.9			
	Meditation		<.001	16.25298*	1.55199		<.001	7.40550*	0.97762		<.001	4.39920*	0.84342		<.001	7.05073*	1.01855
Using social media		55.0±17.7				17.3±11.4				11.9±9.6				15.6±11.9			
	Meditation		<.001	17.02885*	1.62442		<.001	9.13188*	1.02325		<.001	6.39049*	0.88279		<.001	8.80515*	1.06609
Game		54.8±15.4				17.1±9.8				11.2±8.1				16.9±11.1			
	Meditation		<.001	16.84366*	2.12869		<.001	8.94765*	1.34089		0.003	5.65218*	1.15683		<.001	10.17866*	1.39703

* The mean difference is significant at the 0.01 level.

Part matrix

Items	Anxiety	Irritability	Depression	Commonalities
LODS	0.821			0.674
LTDS	0.827			0.684
LFODS	0.839			0.704
LSIDS	0.791			0.626
LTHSPST		0.824		0.678
LSEDS		0.824		0.678
LTFOSPST			0.827	0.684
LFIDS			0.827	0.684

Table 6 The correlation between the nine leisure groups and factor analysis.

Table correlation

Variables	Anxiety		Irritability		Depression	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Meditation	.123**	<.001	0.002	0.957	0.028	0.383
Read	-0.029	0.362	-0.004	0.892	-0.013	0.691
Fed animal	0.015	0.626	-0.008	0.809	-0.021	0.496
Exhibition	-0.049	0.118	-0.001	0.962	-0.023	0.458
Exercise	-0.022	0.478	-0.021	0.501	0.019	0.55
Song	-0.016	0.622	-0.002	0.961	-0.033	0.292
Movie	-0.03	0.334	0.012	0.696	0.008	0.812
Social	-0.018	0.559	0.03	0.341	0.025	0.433

Variables	Anxiety		Depression		Irritability	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Global PSQI Score	-.154**	<.001	0.006	0.855	0.036	0.252
Habitual sleep efficient	-0.051	0.108	-0.033	0.289	-0.021	0.515
Sleep latency	-.122**	<.001	0.053	0.094	0.061	0.052
Daytime dysfunction	-.133**	<.001	-0.015	0.626	0.014	0.646
Step disturbances	-.084**	0.007	0.032	0.315	0.025	0.435
Use of	-0.034	0.276	0.031	0.32	0.059	0.062

Table 8 Frequency of spending time on the nine leisure activities.

	TWAC				Total
	< 6 month	< 1 year	< 2 year	> 4 year	
Meditation	21	8	7	172	208
Read a book	13	3	0	23	39
Fed animal	17	10	3	24	54
Exhibition	4	3	4	20	31
Exerzise	12	9	4	24	49
Listening song	31	8	5	76	120
Watching a movie/ using life media	63	34	19	116	232
Using social media	44	23	19	107	193
Game	19	8	3	51	81
	224	106	64	613	1007

Limitations

It is my experience which this is my first time to research in this subject, affected to neglect some information.

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References

1. Coronavirus disease 2021 (COVID-19) Dashboard overview Global. [https://covid19.who.int/].
2. Coronavirus disease 2021 (COVID-19) Dashboard overview. Thailand situation. [https://covid19.who.int/region/searo/country/th]
3. COCID-19 2020: the sequence of circumstances about map infographic the number of infected and died in Thailand and the world. [https://www.bbc.com/thai/thailand-52090088]
4 Khademian F, Koohjani Z and Khademian Z. 2021. An investigation of depression, anxiety, and stress and its relating factors during COVID- 19 pandemic in Iran. BMC Public Health. 21:275: [accessed 2021 September 18] https://doi.org/10.1186/s12889-021-10329-3
5. Fink G. 2016. Stress: Concepts, Cognition, Emotion, and Behavior: Handbook of Stress Series. Melbourne. [accessed 2021 September 20].
6. S.Levenstein, C.Prantera, V.Varvo, M.L.Scribano, E.Berto, C.Luzi, A.Andreoli. 1993. Development of the perceived stress questionnaire: A new tool for psychosomatic research. ScienceDirect. [accessed 2021 October 15]; Volume37(1):19-32.
https://www.sciencedirect.com/science/article/abs/pii/0022399993901205?via%3Dihub.
doi.org/10.1016/0022-3999(93)90120-5
(S. Levenstein et al. 1990)
7. Perrotta G. 2019. Anxiety Disorders: Definitions, Contexts, Neural Correlates And Strategic Therapy. JJ Neur Neurosci. [accessed 2021 September 20]; Volume6(1):042.
https://www.researchgate.net/publication/344425850_Anxiety_Disorders_Definitions_Contexts_Neural_Correlates_And_Strategic_Therapy.
(Perrotta G 1990)
8. Srichan P, Ruanjai T, Khunthason S, Apidechkul T. 2020. Factors Associated with High-to-Severe Stress among University Students in Northern Thailand. J Med Assoc Thai. [accessed 2021 September 15]; Volume103(6):594-603.
http://www.jmatonline.com/index.php/jmat/article/view/10877 doi.org/10.35755/jmedassocthai.2020.06.10877
(Srichan P et al. 2020)
9. Miller, Kimberley MD; Massie, Mary Jane MD. 2006. Depression and Anxiety. The cancer journal. [2020 September 19]; Volume 12(5):388-397.
https://journals.lww.com/journalppo/Abstract/2006/09000/Depression_and_Anxiety.8.aspx9.
(Miller et al. 2006)
10. Cooper L, Nugent W, Russell K. 2015. Cyberbullying: A literature review of its relationship to adolescent depression and current intervention strategies. Journal of Human Behavior in the Social Environment. [accessed 2021 September 19]; Volume 26(1):37-45
https://doi.org/10.1080/10911359.2015.1059165.
(Cooper L et al. 2015)

Mukhtar F. 2013. Using the Depression Anxiety Stress Scale 21 (DASS-21) [illegible] of Psychology. [accessed 2021 September 19]; Volume48(6);1018-1029.: https://eprints.qut.edu.au/57536/ DOI: 10.1080/00207594.2012.755535
(Oei T et al. 2013)
12: Hricová, M. 2019. The mediating role of self-care activities in the stress-burnout relationship. Health Psychology Report. [accessed 2021 September 22]; Volume8(1):1–9. https://doi.org/10.5114/hpr.2019.89988.
(Hricová, M 2019)
13. Willpowerinstitute: FAQ. Willpower Institute; [accessed 2021 September 24] https://www.meditation.willpowerinstitute.com/FAQ
14. Sedlmeier P, Eberth J, Schwarz M, Zimmermann D, Haarig F, Jaeger S, Kunze S. 2012. The Psychological Effects of Meditation: A Meta-Analysis. Psychological Bulletin [accessed 2021 September 24]; Volume138(6):1139 –1171
https://content.apa.org/record/2012-12792-001 DOI: 10.1037/a0028168
(Sedlmeier et al. 2012)
15. Carlson LE, Ursuliak Z, Goodey E, Angen M, Speca M. 2001 The effects of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients: 6-month follow-up Support Care Cancer [accessed 2021 September 25]; Volume9:112–123.
http://www.sophro-axe.fr/fs/Articles_scientifiques_Mindfulness/6lwba-The_effects_of_a_mindfulness_program_on_mood_and_symptoms_of_stress_in_care_outpatients.pdf
DOI 10.1007/s005200000206
(Carlson LE et al. 2001)
16. Hawkins J L, Thirlaway K J, Backx K, Clayton D A. 2011. Allotment Gardening and Other Leisure Activities for Stress Reduction and Healthy Aging in HortTechnology. the UKPHA Annual Public Health Forum. [accessed 2021 September 25]; Volume21(5).
https://orca.cardiff.ac.uk/53264/1/HortTechnology%20Paper%20-%20JHawkins%20et%20al.%202011.pdf DOI: https://doi.org/10.21273/HORTTECH.21.5.577
(Hawkins J L et al. 2011)
17. Pressman S, Matthews K, Cohen S, Martire L, Scheier M, Baum A, Schulz R. 2009. Association of Enjoyable Leisure Activities With Psychological and Physical Well-Being. Psychosom Med. [accessed 2021 September 25]; Volume71(7):725-732.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2863117/ DOI: 10.1097/PSY.0b013e3181ad7978
(Pressman S et al 2009)
18. O'Reilly M, Dogra N, Whiteman N, Hughes J, Eruyar S, Reilly P. 2018. Is social media bad for mental health and wellbeing? Exploring the perspectives of adolescents. Clinical Child Psychology and Psychiatry. [accessed 2021 September 26]; Volume23(4):601-613.
https://core.ac.uk/reader/199217730?utm_source=linkout https://doi.org/10.1177/1359104518775154
(O'Reilly M et al. 2018)
19. Best P, Manktelow R, Taylor B. 2014. Online Communication, Social Media and Adolescent Wellbeing: A Systematic Narrative Review. Children and Youth Services Review. [2021 September 26]; Volume41(2014):27-36.
https://www.researchgate.net/publication/260756474_Online_Communication_Social_Media_and_Adolescent_Wellbeing_A_Systematic_Narrative_Review
DOI:10.1016/j.childyouth.2014.03.001
(Best P et al (2014)
20. Buysse D J, Reynolds CF, Monk T, Berman SR, Kupfer D. 1989. The Pittsburgh sleeps quality index: a new instrument for psychiatry practice and research. Psychiatry Res. [accessed 2021 September 27]; Volume28(2):193-213.

771/#:~:text=The%20Pittsburgh%20Sleep%20Quality%20Index%3A%20a%20measure%20sleep%20quality%20in%20clinical%20populations. DOI: 10.1016/0165-1781(89)90047-4.
(Buysse D J et al. 1989)
21. [IOGM] Institute of Geriatric Medicine Department of Medical Services, Ministry of Public Health. 2008 . Implement a self-help group for insomnia in the elderly.
(IOGM 2008)
22. Goldin P, Ramel W, Gross J. 2009. Mindfulness Meditation Training and Self-Referential Processing in Social Anxiety Disorder: Behavioral and Neural Effects. J Cogn Psychother. [accessed 2021 October 28]; Volume 23(3):242–257.
https://ucdavis.pure.elsevier.com/en/publications/mindfulness-meditation-training-and-self-referential-processing-i DOI: 10.1891/0889-8391.23.3.242.
(Goldin P et al. 2009)
23. Nasermoaddeli A, Sekine M, Kumari M, Chandola T, Marmot M, Kagamimori S. 2005. Association of Sleep Quality and Free Time Leisure Activities in Japanese and British Civil Servants with better sleep quality and consequently better general well-being. J Occup Health [accessed 2021 October 28]; Volume47(5):384–390 https://www.jstage.jst.go.jp/article/joh/47/5/47_5_384/_pdf DOI: 10.1539/joh.47.384.
(Nasermoaddeil A et al. 2005)
24. dmhnet: Gen Y/Gen Me the group of people who are destined to the world. 2020. Mongkol N: Department of mental health; [acessed 2021 October 3]. https://www.dmh.go.th/news/view.asp?id=1251. (dmhnet...2020)