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Self-report on the occurrence of insomnia and the habit of taking multivitamins against academic stress among students in the early period of COVID-19 pandemic

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Abstract
This study intends to determine the occurrence of insomnia and the habit of taking multivitamins against learning stress among students during the early stages of the Covid-19 pandemic. Data were obtained in two times from 308 students in East Jakarta, Indonesia, applying a descriptive quantitative approach through the Rasch Model and inferential statistics via the Bayesian Anova. The result showed that the use of multivitamins and the existence of insomnia have been proved to be linked to the incident of stress among students during the early periods of the pandemic. Although the use of multivitamins is helpful to minimize stress, students consuming this commodity are likely to experience by stress up to 40 times higher than those that experience in insomnia. This condition becomes higher assuming the students, in addition to having insomnia, are also not accustomed to receiving multivitamins. The implications of this study, including considerations for better investigation of this issue, have been discussed and concluded.

Keywords: Getting multivitamins; the existence of insomnia; academic stress; pandemic COVID-19; self-report; college students.

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Introduction

COVID-19 is defined as an illness caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, formerly known as 2019-nCoV) which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. This virus was reported to the World Health Organization (WHO) on December 31, 2019; and on January 30, 2020, WHO declared COVID-19 a global health emergency with an adverse effect on people and the economy. Numerous countries imposed lockdown rules, which almost stalled their economies with the entire human race, afraid of the dire consequences of this unexpected change (Donaldson & Mitton, 2020). Almost everyone was quarantined at home to achieve maximum social and physiscal distancing as well as curb the risk of transmission. Irrespective of the fact that it was energy-consuming and led to several challenges, these rule was observed by many parties (Rumpler, Venkataraman, & Göransson, 2020; Santamaria et al., 2020). The Covid-19 pandemic has become the biggest threat to physical and mental health due to the psychological distress associated with an economic crisis, threats of unemployment, or fear of losing family members. The data emerging from various countries show that people are more vulnerable to stress and often experience anxiety due to the pandemic (Bartoszek, Walkowiak, Bartoszek, & Kardas, 2020).

However, during the early period of the pandemic, Indonesians were forced to work, study, and carry out worship services from home. This has affected all aspects of lives, including college students. Campuses were shutdown, and the study from home policy implemented, thereby resulting in the virtual mode (online). E-Learning is the most effective means of rendering academic services (Hasan & Bao, 2020).

Some students thought studying from home sounded like "great fun", however, they were unable to cope with online learning (Yeasmin et al., 2020), and this triggered a series of crisis (Thomas & Rogers, 2020).

According to (Jiang, 2020), undergraduates lack adequate knowledge and perceptions of COVID-19 as well as its impact on their mental health. This is also exacerbated by financial problems experienced by students during the Pandemic (Aristovnik, Keržič, Ravšelj, Tomaževič, & Umek, 2020). Several variables are presumed to affect the students' mental health of students during this period, although, numerous studies carried out in other countries stated that students mostly felt the problem of psychological stress (Deng et al., 2020; Khan et al., 2020; Saladino, Algeri, & Auriemma, 2020; Tee et al., 2020; Xiong et al., 2020).

The factors that trigger learning stress in students leads to frustration, conflict, pressure, changes, and self-imposed. These are also evident in various aspects, namely (a) physiological, (b) cognitive, (c) emotions and (d) behavior (Gadzella, 1994). The type of stress experienced by the students during the COVID-19 pandemic requires special attention and further analysis. This is due to the fact that it affects the immune system, which aids to fight diseases (McKay & Asmundson, 2020). Apart from stress, certain habits that weaken the immune system are unhealthy lifestyles, lack of sleep (insomnia), exercise, multivitamins and loss of appetite, including excessive consumption of alcohol and smoking habits.

Subsequently, studies to determine the relationship and the possibility of stress emerging from the occurrence of insomnia and the consumption of multivitamins among college students during the early phase of the epidemic in several regions have not been properly carried out. (Ren et al., 2020) reported that the pandemic also affected sleep patterns and insomnia, which leads to stress (Ramón-Arbués et al., 2020) and is expected to affect student academic achievement (Aldrin Joshua, Ganapathy, & Keerthi Sasanka, 2020). It was further suggested that taking multivitamins and supplements helps to reduce stress (Molina-López et al., 2020; Patil & More, 2020). In addition, its consumption is extremely important because it aids to boost endurance. Several studies have proven that adaptive behavior and a healthy lifestyle tend to boost a person's immune system, thereby reducing the risks or chances of getting infected with SARS-CoV-2, therefore, this is perceived as an effort to prevent this disease (Makhanova & Shepherd, 2020).

This study aims to determine the effect of consuming multivitamins and insomnia, which lead to academic stress among college students at the beginning of the COVID-19 pandemic. In addition, their stress levels, and the items that determined these conditions based on self-reporting of the stress scale used in this study were also analyzed.

Method

Research design and procedures

This study adopted a quantitative approach with a causal-comparative design, a continuous dependent (Learning Stress) and 2 independent variables that are categorical (1) the incident of insomnia (Yes/No), and (2) consumption multivitamins (Yes/No) were utilized. In this research, academic stress is defined as several conditions and stimuli that affect the physical and psychological conditions of students that engaged in the Study from Home during Large-Scale Social Restrictions (PSBB), which is measured based on the Academic Stress score. Meanwhile, the habit of consuming multivitamins and the incident of insomnia is generally defined based on the self-report or personal declaration which stated whether the student had experienced the two conditions (independent variables) during the PSBB COVID-19.

The target populations were students from private universities in East Jakarta. The sampling procedure was carried out using stratified random approach. In order to improve accuracy and achieve the major objectives of this study, the needs of participants were estimated with the help of G*Power software and average effect size (d) =.06 was realized for the learning stress variables, setting α err prob =.05, power (1 - beta) =.80, and df = 1 for the 4 groups investigated. There are 80% chances of rejecting the null hypothesis, and at least 125 participants need to be involved in this research (critical value F = 3,920).

Furthermore, data were collected, with the aid of an inventory designed online using Google Form. The instrument is distributed by utilizing social media networks such as Facebook, Twitter, Instagram, and Whats App Messenger. In addition, data collection was carried out for two days, from May 21 to 22, 2020. The timing was based on the belief that the target participants had experienced the Study from Home policy, however campuses in East Jakarta started E-learning at the end of March 2020.

The respondents were not forced to participate in this study, and those involved were offered certain entries to confirm that they participated in this research. Subsequently, out of the total participants that

filled out the inventory provided, 100% volunteered to participate in this study, and none of them filled out the instruments.

Participants

Data were obtained from 308 students from various universities in East Jakarta with an average age of 19.41. However, 57 (18.51%) of them stated that they reside in boarding houses (rent), while the remaining 251 (81.49%) stay in private homes, either with their parents or immediate family. Furthermore, 190 (61.69%) students attended the regular A program, while 66 (21.42%) and 52 (16.89%) participated in the regular A program, and employee classes, respectively. The demographic aspects included in this study were (1) the incident of insomnia suffered by students, and (2) consumption of multivitamins. The participants were requested to prepare self-reports related to these two aspects starting from when the large scale social restrictions (PSBB) was implemented in Jakarta, Indonesia. The respondents' profiles from the demographic aspect are shown in Table 1.

Table 1. Profile of Respondents (N = 308)

Aspect	Respondent	(%)	Mean	S. E	S. D	Reliability
Consumption of Multivitamins						
No	200	64,93	52.56	.66	8.43	.82
Yes	108	35,07	49.63	.96	9.04	.84
Insomnia incidents						
No	125	40,59	48.98	.81	8.04	.80
Yes	183	59,41	53.28	.71	8.80	.83

Note: The mean, S.E., S.D., and Reliability values are based on the calculation of the Academic Stress Score of Students in the Rasch Model.

Instrumentation

The level of academic stress experienced by the participants was measured with a changed Student Life Stress Inventory (SLSI) proposed by (Gadzella, 1994). The main version of SLSI has 51 items and 9 categories, namely (1) frustration, 7 items, (2) conflicts, 3 items, (3) pressures, 4 items, (4) changes, 3 items, (5) self-imposed, 6 items, (6) physiological reaction, 14 items, (7) emotional reactions, 4 items, (8) behavioral reactions, 8 items, and (9) cognitive appraisal, 2 items. The computation of the reliability score for the SLSI primary version is 0.76 for all subjects,.78 for male, and .76 for female.

The key version of the SLSI modification process is carried out in two major stages namely (1) a qualitative translation procedure and expert judgment by 1 linguist (Indonesian), and 1 psychologist; and (2) limited field trials to obtain quantitative estimates. Expert judgment focuses on the suitability of items with constructs, alternative answers were provided, in the context of this study. In addition, 17 changed items were realized from the 51 key versions of the SLSI items.

The changed version of SLSI (SLSI ID Ver. 01) uses a 4-point Likert-rating scale with score weights for favorable items, namely Always (4), Often (3), Sometimes (2), and Never (1); and the reverse scoring pattern for the unfavorable ones. Seventeen items in the SLSI ID Ver. 01 was tested on 50 students that were categorized as an independent group, which are not involved of this research.

In the field test, the Rasch Model, which served as an Item Response Theory approach (Tennant, McKenna, & Hagell, 2004) was used to test the psychometric properties of the SLSI ID Ver. 01. The WINSTEPS Software Version 4.5.1 (J. M. Linacre, 2019) was used to compute data from the instrument test results. Psychometric property tested with the SLSI ID Ver. 01. includes estimates of (1) Item and Person Reliability, (2) Item Fit, (3) Unidimensionality, and (4) Rating Scale Analysis. Unlike the Classical Test Theory, the Rasch Model measures latent variables, where raw ordinal data is transformed into logit (log odd unit) using a probability function in order to ensure accuracy of the estimates and it is linear to both the person and item being investigated (Tennant, et al., 2004; Wu, Tam, & Jen, 2016).

Item Fit

The results from the test carried out on 17 items SLSI ID Ver. 01 shows that 6 of them are misfit. It simply means that the items offered did not match with the ideal model. They possess MNSQ and ZSTD outfit score that are not within the range of +0.5 and +1.5 logit, as well as -1.9 and +1.9 logit. Therefore, it was not included in the significant aspect of this research. Subsequently, only 11 items were in the SLSI ID Ver. 01. which is suitable for measurement and has a logical estimate (John Michael Linacre, 1995; J. M.

Linacre, 2010, 2019, 2020; Smith, Rush, Fallowfield, Velikova, & Sharpe, 2008; Sumintono & Widhiarso, 2014).

Reliabilities of item and person

The summary of the information concerning the item and person reliability test results from the SLSI ID Ver. 01, including the item reliability score (.94) which is included in the very high category, is shown in Table 2. This means that the items used in the SLSI ID Ver. 01 defines the latent trait and the students' level of learning stress. The person reliability score (.84) is also reported to be good, and this shows a consistent pattern of responses from participants that took the SLSI ID Ver trial. 01. Furthermore, both reliability scores (item and person) are consistent with the Cronbach's Alpha reliability coefficient (85), and this shows that SLSI ID Ver. 01 is a reliable instrument (See Appendix I).

Tabel 2. Item and Person Reliability of SLSI ID Ver. 01 (N=50)

	Mean Logit (SD)	Separation Index	Reliability	α Cronbach	S.E. Mean	Real RMSE
Person	.15	2.27	.84	.85	.19	.53
Items	.00	4.03	.94		.31	.24

Note: The 17 items tested, and 6 items were not included in this analysis because of indicated misfit. This calculation applies to only 11 items that are fit based on the Rasch Model computation.

Furthermore, the amount of Separation Index shows that the SLSI ID Ver. 01 used in this study is feasible in grouping the ability of items (2.27) and person (4.03). The separation index values range from 0 (undefined) to infinity (more complex groups); and the greater the value of separation index is better and more reliable (Boone, Staver, & Yale, 2013).

Unidimensionality and rating scale analysis

The Principal Component Analysis (PCA) test showed the Unidimensionality value of the SLSI ID Ver. 01 of 51.7% (See Attachment II). This shows that, empirically, SLSI ID Ver. 01 only measures one particular construct, namely the level of student academic stress, where the PCA value is > 40%. (Brentani & Golia, 2007; Fisher, 2007). Furthermore, testing on the Rating Scale Analysis via Andrich Threshold on the alternative (choice) answers displayed in the SLSI ID Ver. 01 indicates that there is no threshold disordering, that is, respondents' confusion in distinguishing the level of answer choices on a scale (See Appendix III). This is confirmed by the increase in the value of Andrich Threshold monotomically, namely from Never, Sometimes (-3.58), Often (+1.24), and Always (+3.31).

Data analysis

The data analysis phase begins by transforming ordinal academic stress scores of students into logit intervals using the Rasch Model computation via WINSTEPS software. (J. M. Linacre, 2019). According to (Boone, et al., 2013) The "Measure" value in the logit person is an ideal measure because it is linear and is an equal interval to perform inferential (parametric) statistical analysis. In addition, we also use the Rasch Model to explain (1) a description of the stress levels of the students, and (2) the items that are the most difficult and easiest for the students to answered.

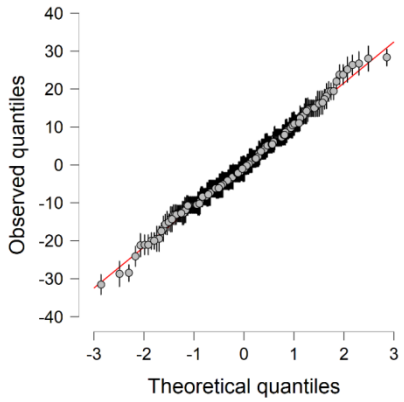

Figure 1. Q-Q Plot for normality test data to fulfill inferential test assumptions

The major hypotheses in this study are (1) H0 = the habit of consuming multivitamins has no chance to explain the importance of normally distributed of data to fulfill the assumptions of the Bayesian Anova test. Figure 1 contains information if the residual data is normally distributed. It appears that the residual data consistently follows the line linearly. Furthermore, to determine the differences between groups tested using the Post-hoc Test.

Results and Discussion

Participant updates

This was carried out to detect which the students fit or match the academic stress score. The reference for determining the students fit refers to the students score that is within the range of +0.5 to +1.5 logit (MNSQ outfit score), and -1.9 to +1.9 logit (ZSTD outfit score) based on the results from the Rasch Model computation (Sumintono & Widhiarso, 2014). However, out of the students that filled out the inventory (N=308), 75 students misfit the predetermined references, therefore, a total of 233 students were involved in this research.

Academic stress score of students

Table 3 shows that out of the 233 students involved in this study, 163 (69.96%) had a moderate academic stress score. Meanwhile, a slight difference in percentage occurs between those that have a low- score of 33 (14.16%) and a high score of 37 (15.88%) of academic stress on students in this study.

Table 3. Categorization of empirical data on the level of academic stress (N = 233, M = 27.5, SD = 5.5)

Category	Criteria	Frequency	Percentage
Low	< 40	33	14.16
Moderate	40 – 63	163	69.96
High	63 <	37	15.88
Total		233	100.00

Note: The measurement criteria in logit units are based on the results from the Rasch Model computation

Furthermore, Table 4 shown a specific level, which includes the measurement of items, Rasch's analysis was successfully used to map the conditions of academic stress of students during the Study from Home policy due to COVID-19. In addition, out of the 11 items tested on students (N = 233), it was empirical discovered that all students felt that they had less time for refreshing themselves (Item No.6, Measure = 34.85 logit, S.E model = .92). On the contrary, it is difficult for students to agree on the minimum outcome of "passing through" in certain subjects (Item No. 10, Measure = 70.54 logit, S.E Model = 1.04) (See Appendix IV).

Table 4: Mapping results from academic stress of students based on the order of difficulty levels on the SLSI ID Ver item. 01

No	Items of SLSI ID Ver.01	Measure
10.	As long as they pass the course, that's enough for them	70.54
11.	The current study load is detrimental to their health.	59.82
1.	They feel less initiative than other people.	58.48
5.	The numerous problems they encountered made them feel hurt.	57.26
7.	The current study load makes them irritable (angry).	51.98
4.	They thought the lecturers did not understand the pressure they encountered.	51.23
3.	They find it difficult to study because the class schedule is extremely tight	50.66
8.	They lack confidence in their abilities.	50.57
9.	It was difficult for them to concentrate during the lecture.	49.45
2.	They were confused because they had too many courses works to carry out.	37.59
6.	They feel less time was spent on refreshing.	34.85

Note: All measure in logit.

In Table 5, most of the students admitted that they were not used to taking multivitamins (66%) and suffered from insomnia disorders (57.5%). Based on this, it is understood that there are certain problems

related to healthy living habits experienced by students, such as the high percentage of those that do not take multivitamins, while the incident of insomnia needs to be resolved.

Table 5: Percentage of multivitamin consumption habits and the incident of insomnia suffered the students

	The habit of consuming multivitamins		**Experiencing on Insomnia Events**	
	No	Yes	No	Yes
Valid	154 (66%)	79 (34%)	99 (42,5%)	134 (57,5%)
Missing	0	0	0	0

The relationship between insomnia and consumption of multivitamins as well as its effect on the academic stress of students.

Table 6 shows in detail all the models tested in this study. Column P (M) explains the similarities between the prior distributions of the four models tested, thereby causing them to be at the same initial confidence level, which is 0.200.

Table 6. Comparison between models

Models	P(M)	P(M | data)	BF M	BF 10	error %
Null model	0.250	0.011	0.033	1.000	
Konsumsi multivitamin + Insomnia	0.250	0.513	3.160	46.880	0.895
Insomnia	0.250	0.433	2.286	39.529	7.301e -9
Konsumsi Multivitamin	0.250	0.044	0.137	3.984	2.819e -7

Table 6 shows that the consumption of multivitamins and the incident of insomnia proved to be extremely strong in relation to the occurrence of learning stress in students (BF10 = 46,880). There is also powerful evidence related to the occurrence of learning stress for students suffering from insomnia (BF10 = 39,529)., therefore the behavior of those that only consume multivitamins is shown to be moderate in relation to the occurrence of learning stress (BF10 = 3.984).

Table 7: Description of learning stress scores in terms of the incident of insomnia and student multivitamin consumption

					95% Credible Interval	
Multivitamin Consumption	Insomnia	Mean	SD	N	Lower	Upper
No	No	50.210	11.834	55	47.011	53.409
	Yes	54.707	10.088	99	52.694	56.719
Yes	No	47.049	9.272	44	44.230	49.868
	Yes	51.507	13.413	35	46.899	56.114

Table 7 shows that the average students' learning stress score is lower when they do not have insomnia. However, it kept getting lower when the students did not have insomnia, and still went ahead to take multivitamins (M = 47,049, CI = 44,230 - 49,868). The average student learning stress score was higher when they suffered from this disorder and did not take multivitamins (M = 54,707, CI = 52,694 - 56,719). In addition, this is shown in Figure 2.

Figure 3 shows that the difference in academic stress scores of students that did not have insomnia and those that experience it seems to be further apart. Furthermore, the difference in academic stress scores of students that did not take multivitamins with those that consumed it was close, as shown in Figure 3 and Figure 4.

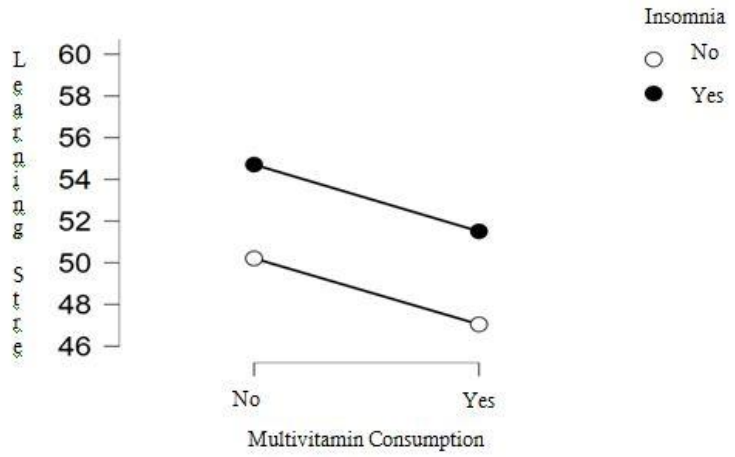

Figure 2: Academic Stress Scores of students in terms of Insomnia Incidence and Multivitamin Consumption Behavior

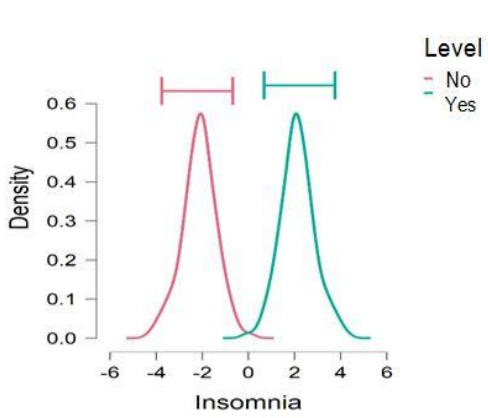

Figure 3: Posterior insomnia mode

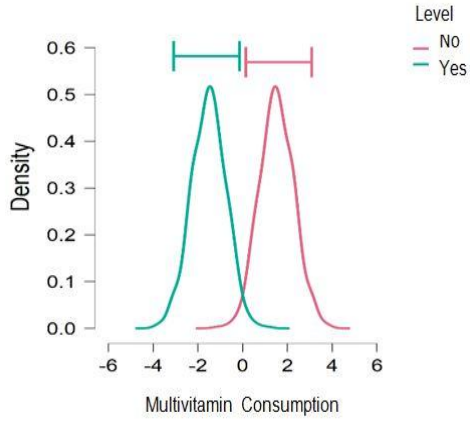

Figure 4: Posterior Model of Multivitamin Consumption

The Post Hoc test in Table 8 shows that the group of students that did not consume multivitamin was 4 times more likely to experience on academic stress than those that took the drugs (Posterior Odds = 3.98). However, updating from the previous odds (Prior Odds = 1.00) to the latter state (Posterior Odds = 3.98) shows moderate evidence (BF10, U = 3.98).

Table 8: Post hoc comparisons of multivitamin consumption variables

		Prior Odds	Posterior Odds	$BF_{10, U}$	error %
No	Yes	1.00	3.98	3.98	2.82e -7

Note. The posterior odds have been corrected by multiple testing and fixed to 0.5 prior probabilities that the null hypothesis holds across all comparisons (Westfall, Johnson, & Utts, 1997). Individual comparisons are based on the default t-test with a Cauchy (0, r = 1/sqrt (2)) prior. The "U" in the Bayes factor denotes that it is incorrect.

Furthermore, Table 9 shows that the group of students that suffered from insomnia were 40 times more likely to experience on academic stress than those that did not experience this sleep disorder (Posterior Odds = 39.53). The renewal value from the previous odds (Prior Odds = 1.00) to the later state (Posterior Odds = 39.53) shows an extremely strong evidence (BF10, U = 39.53).

Table 8: Post hoc comparisons of multivitamin consumption variables

		Prior Odds	Posterior Odds	BF $_{10, U}$	error %

Tabel 9. Post hoc comparisons of insomnia variable

		Prior Odds	Posterior Odds	BF $_{10, U}$	error %
No	Yes	1.00	39.53	39.53	7.30e -9

Note. The posterior odds have been corrected by multiple testing and fixed to 0.5 prior probabilities that the null hypothesis holds across all comparisons (Westfall, Johnson, & Utts, 1997). Individual comparisons are based on the default t-test with a Cauchy (0, r = 1/sqrt(2) prior. The "U" in the Bayes factor denotes that it is incorrect.

This study aims to determine the relationship between the behavior of taking multivitamins and the incidence of insomnia and its effect on academic stress of students. The descriptive analysis shows that the scores of academic stress of students are in the medium category, while the level of item analysis realized through Rasch modelling, item No. 10 stated that "As long as individuals pass a course, that's enough for them" and it is the item with the highest difficulty level among all others (70.54 logits). This shows that irrespective of the difficult conditions caused by the Covid-19 Pandemic, students still have the zeal to excel or have the best results in any course. This is extremely encouraging because they are engaged in self-regulated learning, therefore they need to overcome all forms of learning difficulties which occurs presently. A study carried out by Hudaifah (2020) shows that it is an important component for learners at every level of education because it is related to problem-solving abilities, thereby achieving optimal learning outcomes.

Meanwhile, item No. 6 reported that "students feel that they don't have enough time for refreshing" it is the item with the least difficulty level among all others (34.85 logit) on the SLSI ID Ver. 01. This shows that students need entertainment facilities "outside" and of course this is something difficult to find amidst strict PSBB in the DKI Jakarta region. A research carried out by Mahato (2017), and Kim (2017) stated that freedom of students' association such as participating in various sports activities or relating with friends from various cultural backgrounds is an essential aspect for developing positive academic change on universities.

The results from testing the primary hypothesis in this research also show that the consumption of multivitamins and the incidence of insomnia is proven to be extremely strong in relation to the occurrence of academic stress of students. It is important to consume a multivitamin that is beneficial to the body in the aspect of reducing stress levels (Harris et al., 2011; Mohr, Muller, & Siegfried, 2002). Ford et al. (2018) reported that taking a multivitamin tends to support brain metabolism and ward off oxidative stress. It is a well-known fact that the human body absorbs large amounts of oxygen, and there is a possibility that this process triggers free radicals and creates oxidative stress, which occurs when several free radicals and body defences (antioxidants) are imbalanced (Noya, 2018) thereby causing sickness and this disrupts the psychological condition. This is consistent with the study carried out by Gruenwald, Graubaum, and Harde (2002), which also stated that multivitamin compounds suppress stress and fatigue in a person.

In accordance with this study, students that have insomnia have a prime chance of experiencing academic stress. This finding is consistent with a recent study carried out by Shechter et al. (2020) and Puzino, Amatrudo, Sullivan, Vgontzas, and Fernandez-Mendoza (2020) which stated that lack of sleep is an early sign of stress and anxiety and it is readily recognized. People that suffer from insomnia are more susceptible to stress (Albasheer et al., 2020; Haynes et al., 2020; Hsu & Chang, 2020; Richardson & Gradisar, 2020), and this has the potential to trigger suicidal thoughts (Liu et al., 2020).

Although this study shows the relationship between the consumption of multivitamins and the incident of insomnia as well as its effect on learning stress in students, it was discovered that insomnia is the strongest determinant of the occurrence of academic stress of students. In this research, students that consumed multivitamins were 40 times more likely to experience stress supposing they suffered from insomnia, and it was estimated to be even higher assuming they are not accustomed to taking this supplement. Furthermore, during the Covid-19 Pandemic period, it became more complicated and uncertain, thereby leading to an increase in mental health problems suffered by students. The studies carried out by Verma (2020) and Majumdar, Biswas, and Sahu (2020) stated that sleep disturbances,

anxiety and depression occurred from mild to moderate levels in several college students in India during the Covid-19 Pandemic period. The two studies also reported that stress was the most common factor that causes anxiety, as well as headaches, insomnia, digestive problems, hormonal imbalances, and fatigue that occur in both men and women. In addition, people that were quarantined are expected to suffer emotional disturbances, irritability, insomnia, depression, and post-traumatic stress symptoms (Kathirvel, 2020).

This study also emphasizes several important aspects, including the consumption of multivitamins as well as the recommended healthy sleep patterns for students in order to avoid learning stress during the COVID-19 pandemic. Murphy (2020) reported the potentials for psychological fatigue during this period, and it requires the awareness of students in order not to aggravate their condition. This study also firmly conforms that the mental health status of students during this pandemic is extremely vulnerable to psychological disorders (Shahyad & Mohammadi, 2020).

The findings from this research further emphasize that the mental health of students during the pandemic needs to be considered and addressed. However, till date, no one knows for sure when this phase intends to end, therefore, vigilance to avoid being exposed to the disease while maintaining health protocols remains a priority. Besides, there is a need for anticipatory steps towards the possibility of mental health problems that tend to occur, such as stress, insomnia, depression, and anxiety, when students carry out academic activities. This condition needs to be primarily considered, as well as the campus and the family environment in order to help students adapt to the situation. Finally, these conditions strictly require the sturdy of alternative ways that do not sacrifice both the physiological and psychological aspects of students while studying in universities.

Conclusion

Based on the primary findings in this study, it was concluded that the habit of consuming multivitamins and the incident of insomnia is closely related to the occurrence of academic stress of students during the COVID-19 pandemic. Those that do not take multivitamins are 4 times more likely to experience academic stress. Meanwhile, the groups of students that suffer from insomnia were 40 times more likely to experience on academic stress. Students are expected to avoid factors that trigger insomnia and boost their stamina by taking a multivitamin. In addition, there is a need for increased awareness and family functions to support the changes experienced by students during this period. This research sheds more light on aspects related to multivitamin consumption, insomnia, and academic stress in college students. However, other variables that are thought to contribute to learning stress such as unhealthy lifestyles, lack of exercise, alcohol consumption and smoking were not included in this study.

Based on the tested variables, certain requirements need to be considered, in utilizing these results as materials for in-depth or further analysis. First, based on self-report, the quantity of multivitamin consumed by students, the intensity of its use, and sources which specifically contributes to the possibility of reducing academic stress of students were not determined. Second, the type of insomnia suffered by the students, and its contribution to the possibility of increasing their academic stress of students is unknown. Third, this research only relies on self-reports obtained from the results of a 2-day rapid survey carried out in the first two months of the pandemic. Therefore, it is necessary to measure the stress scores in the forth coming months. Fourth, implementing large-scale social restrictions (PSBB) policy varies in Indonesia. However, comparative studies are required to measure academic stress of students in other regions, and this requires many respondents. Fifth, the variable insomnia is perceived as an impact of stress. These two factors need to be carefully analyzed. Sixth, the experimental design is recommended for further analysis in order to boost the accuracy of this study, regarding the help model needed for students to adjust to the COVID-19 pandemic or face similar situations.

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The Appendix

Appendix I. Tryout Summary of SLSI ID Ver. 01

SUMMARY OF 50 MEASURED PERSON

	TOTAL SCORE	COUNT	MODEL MEASURE	S.E.	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	27.8	11.0	.15	.49	.99	-.07	1.00	-.03
SEM	.8	.0	.19	.01	.07	.16	.07	.15
P.SD	5.6	.0	1.31	.04	.49	1.11	.49	1.06
S.SD	5.6	.0	1.32	.04	.49	1.12	.49	1.07
MAX.	38.0	11.0	2.48	.71	3.04	3.30	3.11	3.37
MIN.	14.0	11.0	-3.71	.46	.34	-2.00	.33	-2.02

REAL RMSE .53 TRUE SD 1.20 SEPARATION 2.27 PERSON RELIABILITY .84
MODEL RMSE .49 TRUE SD 1.21 SEPARATION 2.48 PERSON RELIABILITY .86
S.E. OF PERSON MEAN = .19

PERSON RAW SCORE-TO-MEASURE CORRELATION = 1.00
CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .85 SEM = 2.17

SUMMARY OF 11 MEASURED ITEM

	TOTAL SCORE	COUNT	MODEL MEASURE	S.E.	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	126.5	50.0	.00	.23	.99	-.05	1.00	-.01
SEM	6.1	.0	.31	.00	.06	.32	.07	.33
P.SD	19.4	.0	.98	.01	.19	1.02	.21	1.04
S.SD	20.4	.0	1.03	.01	.20	1.07	.22	1.09
MAX.	163.0	50.0	1.41	.24	1.33	1.62	1.33	1.62
MIN.	99.0	50.0	-1.84	.22	.68	-1.79	.69	-1.65

REAL RMSE .24 TRUE SD .95 SEPARATION 4.03 ITEM RELIABILITY .94
MODEL RMSE .23 TRUE SD .95 SEPARATION 4.19 ITEM RELIABILITY .95
S.E. OF ITEM MEAN = .31

DELETED: 6 ITEMS
ITEM RAW SCORE-TO-MEASURE CORRELATION = -1.00
Global statistics: please see Table 44.
UMEAN=.0000 USCALE=1.0000

Appendix II. Principal Component Analysis of SLSI ID Ver. 01

Table of RAW RESIDUAL variance in Eigenvalue units

	Eigenvalue	Observed	Expected
Total raw variance in observations =	22.7512	100.0%	100.0%
Raw variance explained by measures =	11.7512	51.7%	51.3%
Raw variance explained by persons =	5.3840	23.7%	23.5%
Raw Variance explained by items =	6.3672	28.0%	27.8%
Raw unexplained variance (total) =	11.0000	48.3%	100.0% 48.7%
Unexplned variance in 1st contrast =	2.0197	8.9%	18.4%
Unexplned variance in 2nd contrast =	1.8050	7.9%	16.4%
Unexplned variance in 3rd contrast =	1.5546	6.8%	14.1%
Unexplned variance in 4th contrast =	1.3700	6.0%	12.5%
Unexplned variance in 5th contrast =	1.0804	4.7%	9.8%

Appendix III. Andrich Rating Scale Analysis

SUMMARY OF CATEGORY STRUCTURE. Model="R"

CATEGORY LABEL	OBSERVED SCORE	OBSVD COUNT	%	SAMPLE AVRGE	INFIT MNSQ	OUTFIT EXPECT	OUTFIT MNSQ	ANDRICH THRESHOLD	CATEGORY MEASURE	
1	1	63	11	-1.89	-1.93	1.00	1.00	NONE	(-3.58)	1 Tidak Pernah
2	2	220	40	-.56	-.51	.96	1.00	-2.44	-1.09	2 Kadang-kadang
3	3	179	33	.84	.77	.93	.92	.34	1.24	3 Sering
4	4	88	16	1.97	2.02	1.07	1.08	2.10	(3.31)	4 Sangat Sering

OBSERVED AVERAGE is mean of measures in category. It is not a parameter estimate.

Appendix IV. Items Difficulties Based on Rasch Model Computation

TABLE 13.1 Kenyamanan Belajar Mahasiswa saat Pan ZOU053WS.TXT9 May 31 2020 11:48
INPUT: 308 PERSON 11 ITEM REPORTED: 233 PERSON 11 ITEM 4 CATS WINSTEPS 4.5.3

PERSON: REAL SEP.: 2.23 REL.: .83 ... ITEM: REAL SEP.: 9.80 REL.: .99

ITEM STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTBISERL-EX CORR.	EXACT MATCH EXP.%	OBS%	ESTIM DISCR	ITEM
10	394	233	70.54	1.04	1.12	1.26	1.05	.51	.48	.49	63.5	63.7	.87	Item10
11	488	233	59.82	.94	1.30	2.94	1.25	2.55	.59	.52	51.9	61.0	.71	Item11
1	501	233	58.48	.94	.83	-1.88	.82	-2.04	.36	.52	64.4	60.6	1.21	Item1
5	513	233	57.26	.93	1.27	2.71	1.25	2.50	.57	.53	51.5	60.1	.75	Item5
7	567	233	51.98	.90	.91	-1.03	.91	-.98	.68	.54	57.1	58.4	1.10	Item7
4	575	233	51.23	.90	.88	-1.35	.86	-1.51	.56	.54	60.5	58.3	1.18	Item4
3	581	233	50.66	.89	.96	-.43	.96	-.40	.55	.54	58.8	58.1	1.03	Item3
8	582	233	50.57	.89	1.09	1.01	1.10	1.04	.45	.54	56.7	58.1	.89	Item8
9	594	233	49.45	.89	.81	-2.20	.79	-2.46	.51	.54	61.8	57.1	1.24	Item9
2	723	233	37.59	.90	.79	-2.60	.80	-2.13	.57	.52	66.1	57.3	1.21	Item2
6	751	233	34.85	.92	1.10	1.14	1.06	.61	.46	.50	55.4	59.1	.89	Item6
MEAN	569.9	233.0	52.04	.92	1.01	.0	.99	-.2			58.9	59.3		
P.SD	96.7	.0	9.47	.04	.17	1.9	.16	1.7			4.7	1.9		