

Relationship Between Critical Thinking Skills and Mental Health Status Among University Students

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Received: 30 December 2023 | Accepted: 25 January 2024 | Published: 1 March 2024

DOI: <https://doi.org/10.55057/ijares.2024.6.1.20>

Abstract: *This research delves into the intricate relationship between critical thinking skills and mental health status among university students in Selangor, presenting a nuanced exploration of the dynamic interplay between cognitive aptitude and emotional well-being. Employing a one-stage cluster random sampling method, 132 third-year students participated in the study, contributing to a nuanced understanding of this symbiotic relationship. The research utilized established measures to assess critical thinking skills and mental health status, revealing a noteworthy high level of critical thinking skills among participants. Concurrently, the mental health status was identified as moderate, highlighting potential areas for targeted intervention. Correlation analysis uncovered a significant negative relationship between critical thinking skills and mental health status, suggesting that heightened critical thinking abilities are associated with improved mental well-being. This implies that students with advanced critical thinking skills are likely to experience fewer mental health issues. The study's implications extend comprehensively to stakeholders, emphasizing the need for a holistic approach to student development. Students gain self-awareness, educators learn strategies to enhance students' mental health, and mental health professionals can target interventions more effectively. Parents, as key supporters, are empowered with insights to guide their children's academic and emotional journey. Policymakers can use the findings to advocate for comprehensive mental health programs within educational institutions. In conclusion, this study contributes to the growing body of knowledge by revealing the intricate relationship between critical thinking and mental health among university students, signalling the need for collaborative efforts to nurture a balanced and resilient student population.*

Keywords: Critical Thinking Skills, Mental Health Status, University Students, Correlation Study, Educational Psychology

1. Introduction

The complex interplay between students' mental health and their ability to think critically is becoming more apparent as university campuses hum with the enthusiasm of students' pursuit of knowledge and individual development. University students' academic journeys and personal well-being are influenced by this dynamic relationship, which provides valuable insights for rethinking education and mental health support.

Research has revealed significant variation in the degree of critical thinking proficiency exhibited by university students. Some studies suggest that university applicants should possess

at least moderate critical thinking abilities (Hyytinen et al., 2018). Other research, however, indicates that there is a significant gap between students' critical thinking skills and the expected outcome of a graduate student (Aouaf et al., 2023). Furthermore, it has been observed that the level of critical thinking among university students is low and falls short of expectations (Rabbo, 2019). This variation in critical thinking skills among university students is supported further by a study that discovered that incoming students have a wide range of critical thinking skills (van der Zanden et al., 2020).

In recent years, there has been a discernible rise in the prevalence of mental health conditions among university students, according to recent research. The proportion of full-time undergraduate entrants reporting mental health conditions has increased from 0.7% in 2010-11 to 4.5% in 2021-22 (Smith, 2023). Depression and anxiety are prevalent and widespread among students, with almost half of the 21,000 students surveyed in a 2020 study reporting serious psychological issues (*University Students More at Risk of Depression than Non-Students – Study*, 2023). The mental health status among university students is a critical public health issue that has garnered attention in recent years. Several studies have highlighted the prevalence of mental health disorders, such as depression, anxiety, and stress, among university students (Gogoi et al., 2022; Islam et al., 2022; Kamarulzaman et al., 2023; Prowse et al., 2021). These studies have consistently shown that university students are a vulnerable group for mental illnesses, with high levels of stress, anxiety, and depression being reported. The impact of the COVID-19 pandemic has further exacerbated these issues, with evidence suggesting that the pandemic has led to increased levels of psychological distress and academic burnout among students (Gogoi et al., 2022; Kamarulzaman et al., 2023; Prowse et al., 2021).

Reinstating the concept of critical thinking skills, which is often considered the bedrock of tertiary education, it comprises the capacity to systematically and reflectively consider, synthesise, and assess information (Alsaleh, 2020; Fitriani et al., 2022). As students engage in challenging coursework and diverse perspectives, developing critical thinking skills becomes more than just an academic exercise; it becomes a key to unlocking doors of opportunity (Kamarulzaman, 2017). Numerous studies have found a link between strong critical thinking abilities and academic success (Colley et al., 2012; Elder & Paul, 2011; Noone et al., 2016). Students who are skilled at critical thinking can easily navigate complex subject matter, solve problems creatively, and approach learning with a depth that goes beyond memorization. However, the implications of these skills go beyond the classroom, influencing the very fabric of students' mental health.

The intersection of critical thinking abilities and mental health is ripe for investigation. According to research, students with improved critical thinking skills are more resilient in the face of academic challenges and life stressors (AlOtaibi et al., 2023; Ku et al., 2013). The ability to analyse situations, consider multiple perspectives, and make informed decisions contributes to a sense of control and efficacy, buffering against the stresses of university life (Staib, 2003). Critical thinking difficulties, on the other hand, may be associated with increased stress, anxiety, and feelings of overwhelm. Students who struggle with information analysis or problem-solving may face increased academic pressures, potentially affecting their mental health. Recognizing this bidirectional relationship opens the door to understanding and meeting the holistic needs of university students.

The prevalence of mental health issues among university students has increased significantly in recent years. While university life is full of opportunities, it also comes with its own set of stressors. Academic pressures, social transitions, financial concerns, and the search for identity

all contribute to a complex landscape that can have an impact on mental health outcomes. Students equipped with strong critical thinking skills may approach challenges with a problem-solving mindset, seeking support when needed and effectively managing stressors. Conversely, difficulties in critical thinking may contribute to a heightened vulnerability to mental health issues. Recognising the symbiotic relationship between critical thinking and mental health opens avenues for targeted support and intervention. Educational institutions can integrate strategies that nurture critical thinking skills within curricula, providing students with tools to navigate academic challenges and bolster their mental resilience.

Numerous scholarly investigations have examined the correlation between the state of mental health among university students and their critical thinking abilities. For example, a meta-analysis was performed to investigate the correlation between cognitive-behavioural variables and the mental health status of university students, and it was found that an individual difference in mental health was significantly associated with disposition and critical thinking ability (Irie et al., 2019). Further research revealed a significant correlation between the state of mental health among medical students and their critical thinking abilities (Akhavan Rezayat et al., 2017). Furthermore, AlOtaibi et al. (2023) demonstrated that motivational methods for online learning encouraged students to engage in critical thinking and cognitive processing strategies in psychiatry and mental health care courses.

Conversely, a negative correlation between critical thinking and mental health among medical students was documented by Gorji et al. (2018). It is important to note, however, that the relationship between critical thinking and mental health is complex and can be influenced by a variety of factors. For example, one study found a link between job stress, thinking style, and symptoms of post-traumatic stress disorder in mental health nurses, implying a link between thinking style and individual mental health (Liu et al., 2022).

Additionally, the cultivation of critical thinking abilities has been prioritised across numerous academic environments. Papathanasiou et al., (2014) assert that critical thinking is a crucial aptitude for nursing students, as they underscore the significance of impartiality, tenacity, and ethical judgement. Moreover, the development of critical thinking skills throughout the information-seeking process was examined in Haghparast et al. (2014), suggesting a correlation between the two. In addition, the study conducted by (Suryani et al., 2021) examined the effects of different instructional approaches on the development of critical thinking abilities among students, highlighting the significance of pedagogical methods in this regard. Consequently, it is indisputable that critical thinking abilities are indispensable for assisting students in enhancing their mental health.

Nevertheless, there is a dearth of research investigating the potential correlation between the aptitude for critical thinking and the mental well-being of university students. Contrary findings, several studies have documented either a negative correlation or a positive association between critical thinking abilities and mental health status. Supporting the mental health of university students requires additional research into the mechanisms at play and potential interventions that could be of assistance, as it is indisputable that critical thinking abilities are indispensable in this regard. Consequently, the primary objective of this study is to address this knowledge gap through an investigation into the potential impact and correlation between critical thinking skills and mental health outcomes within this demographic.

Specifically, the study is to answer the following research questions.

- i. What is the level of critical thinking skills among university students in Selangor?
- ii. What is the level of mental health status among university students in Selangor?
- iii. Is there any significant relationship between critical thinking skills and mental health status among students in Selangor?

This study has far-reaching implications for the various stakeholders involved in university students' academic journeys, including educators, mental health professionals, parents, and government agencies. The study's findings can help students gain self-awareness and empower themselves. Students can better manage their academic and personal well-being when they have a firm grasp of the connection between critical thinking abilities and mental health. By understanding the relationship between cognitive abilities and mental health, students can take charge of their own well-being by learning to cope with stress, improve their critical thinking skills, and reach out for help when they need it.

Academic institutions and teachers can both learn from each other about what works to help students develop their critical thinking skills. The study's results can be used to help teachers improve their students' mental health and academic performance. Mental health professionals are very important when it comes to helping students who are having problems. This study gives them a better understanding of the things that affect mental health, which lets them target their efforts. If mental health professionals know more about the link between critical thinking and mental health, they can make counselling and support programmes for university students that are more effective.

Parents, as key stakeholders in the education of their children, can benefit from the study's outcomes. Awareness of the link between critical thinking and mental health enables parents to provide informed guidance and support to their university-going children. Governments and policymakers play a pivotal role in shaping the educational landscape. This study provides evidence to inform policy decisions related to mental health support in educational institutions. Policymakers can use these findings to advocate for and implement comprehensive mental health programmes within the education system, fostering an environment that prioritizes the well-being of students alongside academic success.

2. Methods

Participants

The method used is very important in the quest to figure out the complicated link between college students' critical thinking skills and mental health. One-stage cluster random sampling stands out as a smart and effective method that has benefits in both real life and rigorous research. Clusters are made up of students from different academic years, and 132 third-year students were used in the study.

Measures

Two key measures will be used in this research. Firstly, a set of questionnaires to measure critical thinking skills developed by (Sarigoz, 2012) was used in the study. The survey consists of five-point Likert as (1) *never*, (2) *rarely*, (3) *sometimes*, (4) *often*, (5) *always* and consists of 21 questions with reliability score of 0.91. A reliability score of 0.91 is considered high and suggests a very strong level of consistency or dependability in the measurements obtained from a particular instrument or test (Taber, 2018).

Secondly, mental health status was evaluated using established scales, the Depression Anxiety Stress Scale-21 (DASS-21) is a short form of the original DASS-42, a self-report scale designed to measure the negative emotional states of depression, anxiety, and stress. The DASS-21 consists of three subscales, each containing 7 items, which assess different aspects of these emotional states (Henry & Crawford, 2005). It consists of four-point Likert scale as (1) *Did not apply to me at all*, (2) *Applied to me to some degree, or some of the time*, (3) *Applied to me to a considerable degree or a good part of time*, (4) *Applied to me very much or most of the time*. A strong degree of consistency or dependability in the measurements derived from the instrument is further supported by the Cronbach alpha value of 0.98.

Procedure

Voluntary participation of the participants was sought in the study, with measures taken to ensure confidentiality and informed consent. A cross-sectional design was utilised to gather data pertaining to the mental health status and critical thinking abilities of the participants within a singular period. The survey was conducted using a Microsoft form, which was disseminated to the students prior to the start of the new academic term. The survey also encompassed the collection of demographic information, including gender and academic programme.

Data Analysis

To answer the first and the second research question, descriptive analyses were used to measure students' level of critical thinking skills and their mental health status. Descriptive analysis is used to provide a snapshot of the current situation as well as to uncover new facts and research meaning. It is summarised using descriptive statistics, which provide a complete picture of what is going on at any given time. (Cooksey, 2020).

Correlation analysis was conducted to determine the association between critical thinking skills and mental health status, which is the third research question. It is used to assess the relationships between and among two or more variables and to allow testing of expected relationships between and among variables and the making of predictions (Prematunga, 2012)

3. Results and Discussion

The demographic information of the participants is shown in Table 1. Most of the participants were female students (132 females and 29 males). The participants' academic programmes were also gathered. Most participants (35.6%) are enrolled in the Teaching English as a Second Language programme, followed by the Teaching Arabic as a Second Language programme (28%) and the Islamic Education and Guidance and Counselling programmes (22% and 14.4%, respectively).

Table 1: Demographic Information

		Frequency	Percent
Gender (N=132)	Male	29	22.0
	Female	103	78.0
Academic Programme	GUIDE	19	14.4
	ISED	29	22.0
	TEASL	47	35.6
	TAASL	37	28.0

Level of critical thinking skills among university students

Table 2 shows the level of critical thinking skills among students in Selangor. Data shows that the participants have a high level of critical thinking skills ($M=3.82$, $SD=0.48$).

Table 2: Critical thinking skills

Items	Mean	Std. Deviation
When I encounter a matter, I consider it with prejudice without thinking.	3.94	.906
When I encounter a matter, I realise whether the subject is from first hand or second hand.	3.77	.846
I deduce regarding the explained matter and I can evaluate the reasons of these deductions.	4.16	.564
I can understand pale in the matter and obscurities from explanations regarding the matter.	3.95	.734
I can detect the problems in a matter, explain and define them.	3.86	.817
When I encounter a problem, I can solve it, and make deductions.	4.01	.704
While a matter is explained, I can analyse it by thinking the data regarding that matter.	3.84	.836
By means of my thoughts regarding a matter, I can improve hypothesis regarding the matter	3.87	.814
I can pass an accurate judgement on the matter, and I can come to a conclusion with my thoughts	3.77	.799
When I read a matter, I can understand the main idea and intention of the writer.	3.76	.883
By means of my thoughts, I can make comments and can judge the matters.	4.06	.615
When I encounter a matter, I can Express my thoughts regarding matter and I can defend my opinion	3.69	.917
I can explain my thoughts regarding a matter convincingly and logically.	3.84	.801
By means of explanations regarding a matter, I can predict the ideas unexplained.	3.45	.868
From the explanations regarding a matter, I can find the contradiction between reason and result	3.73	.790
While a matter is explained, I can concentrate on the matter together with my thoughts.	3.85	.805
By means of explanations regarding a matter, I can establish striking connections regarding the matter.	3.88	.801
When I encounter a matter, I can think critically, reasoning and analytically.	3.81	.783
When I encounter a matter, I can visualise it and can feel as the main character of the matter.	3.81	.901
When I encounter a matter, I can be more elaborative thanks to my thoughts.	3.98	.704
When I encounter a matter or an action, my thoughts do not misguide me.	3.20	1.009
Total Mean	3.8236	.48293

This finding runs counter to the findings of Hyytinen et al. (2018), who proposed that prospective students for universities should have critical thinking skills that are at least moderate. Research conducted by other researchers, on the other hand, suggests that there is a substantial disparity between the critical thinking abilities of students and the outcomes that are anticipated for graduate students. (Aouaf et al., 2023). It has also been observed that the level of critical thinking among students attending universities is low and does not meet the expectations that have been set (Rabbo, 2019). This variation in critical thinking skills among university students is supported further by a study that found that incoming students have a wide range of critical thinking skills. This diversity in critical thinking skills is expected to continue. (van der Zanden et al., 2020). Because of this, it is possible to assert that the findings contributed new information to the existing body of knowledge.

Level of mental health status among university students

Table 3 below shows the level of mental health status among university students.

Table 3: Mental Health Status

Items	Mean	Std. Deviation
I found it hard to wind down	2.06	.535
I was aware of dryness of my mouth	1.97	.837
I couldn't seem to experience any positive feeling at all	1.64	.594
I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	1.44	.657
I found it difficult to work up the initiative to do things	2.13	.681
I tended to over-react to situations	1.98	.815
I experienced trembling (eg, in the hands)	1.92	.782
I felt that I was using a lot of nervous energy	2.15	.815
I was worried about situations in which I might panic and make a fool of myself	2.29	1.088
I felt that I had nothing to look forward to	1.61	.798
I found myself getting agitated	2.12	.856
I found it difficult to relax	1.86	.700
I felt down-hearted and blue	1.95	.628
I was intolerant of anything that kept me from getting on with what I was doing	1.91	.805
I felt I was close to panic	1.71	.705
I was unable to become enthusiastic about anything	1.80	.814
I felt I wasn't worth much as a person	1.71	.921
I felt that I was rather touchy	2.37	.785
I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	1.62	.715
I felt scared without any good reason	1.70	.826
I felt that life was meaningless	1.40	.708
Total Mean	1.8737	.48587

The calculated mean of 1.87, accompanied by a standard deviation of 0.48, indicates that the mental health status of university students is classified as moderate. While this may not pose a tangible threat, it raises concerns regarding the need for increased focus on mental health concerns among students. The results are consistent with those of several prior studies that examined the prevalence of mental health disorders, including anxiety, depression, and stress, among university students and reported on their mental health status.(Gogoi et al., 2022; Islam et al., 2022; Kamarulzaman et al., 2023; Prowse et al., 2021). These studies have consistently demonstrated that university students are a susceptible population to mental illnesses, as evidenced by the prevalence of reported high levels of stress, anxiety, and depression. These problems have been exacerbated by the COVID-19 pandemic, according to available evidence; the pandemic has likely caused students to experience greater levels of psychological distress and academic burnout.(Gogoi et al., 2022; Kamarulzaman et al., 2023; Prowse et al., 2021). Consequently, now is an opportune moment to assist students in enhancing their mental well-being.

Relationship between critical thinking skills and mental health status among university students

The relationship between students' mental health and critical thinking skills is displayed in Table 4. According to the data, there appears to be a significant negative correlation ($r=-.257$, $p=.003$, $p<.001$) between the two variables. This suggests that the participants' mental health problems decrease in tandem with their increased critical thinking skills.

Table 4: Correlation

		Critical Thinking	Mental health
Critical Thinking	Pearson Correlation	1	-.257**
	Sig. (2-tailed)		.003
	N	132	132
Mental health	Pearson Correlation	-.257**	1
	Sig. (2-tailed)	.003	
	N	132	132

***. Correlation is significant at the 0.01 level (2-tailed).*

The findings are consistent with those of Gorji et al. (2018), who observed comparable results, namely that the direct path coefficient between mental health and critical thinking was negative and statistically significant. This suggests that critical thinking can provide an explanation for mental health. Alternatively stated, higher mental health questionnaire scores indicate poorer mental health. As a result, individuals who possess developed critical thinking abilities experience enhanced mental well-being. Conversely, an alternative investigation posits that the possession of critical thinking abilities—including but not limited to situation analysis, the contemplation of multiple viewpoints, and the capacity to arrive at well-informed judgments—provides a buffer against the pressures inherent in collegiate existence. (Staib, 2003). On the other hand, challenges with critical thinking may be linked to heightened levels of stress, anxiety, and a sense of being inundated. Elevated academic demands may have an adverse impact on the mental well-being of students who encounter difficulties in information analysis or problem-solving. A door is opened to comprehending and satisfying the comprehensive requirements of university students when this bidirectional relationship is acknowledged.

4. Conclusion

This study investigates the correlation between mental health and critical thinking abilities among university students, providing significant perspectives on their scholastic and emotional environments. The findings reveal a notable variation in critical thinking proficiency, emphasizing the importance of addressing this diversity to meet educational expectations. Concurrently, the study highlights a moderate level of mental health concerns among students, indicating the need for increased attention to mental well-being in academic settings. The negative correlation between critical thinking skills and mental health status underscores the interconnectedness of cognitive and emotional dimensions. Stakeholders, comprising educators, mental health professionals, parents, and policymakers, are encouraged to work together in creating an atmosphere that cultivates cognitive and emotional resilience, given that students who possess strong critical thinking skills demonstrate improved mental health. This study emphasises the need for a holistic approach to student development, acknowledging that the interplay between mental health and critical thinking is crucial in moulding the coming generations of university students who will be influential figures and innovative thinkers.

Acknowledgement.

This research was supported by the Hassan Langgulung (Education) Research Grant, Kulliyah of Education, International Islamic University Malaysia [HRG23-022-0022].

References

- Akhavan Rezayat, A., Niroumand, S., Shieh-zadeh, E., Saghebi, A., Rahimzadeh Oskooie, R., & Dadgarmoghaddam, M. (2017). Assessment of life skills of medical students in Mashhad, Iran, in 2015. *Electronic Physician*, 9(10), 5536–5540. <https://doi.org/10.19082/5536>
- AlOtaibi, N. G., Alshowkan, A., Kamel, N., El-Ashry, A. M., AlSaleh, N. S., & Abd Elhay, E. S. (2023). Assessing perceptions about critical thinking, motivation learning strategies in online psychiatric and mental health nursing education among Egyptian and Saudi undergraduate nursing students. *BMC Nursing*, 22(1). <https://doi.org/10.1186/s12912-023-01264-2>
- Alsaleh, N. J. (2020). Teaching Critical Thinking Skills: Literature Review. In *TOJET: The Turkish Online Journal of Educational Technology* (Vol. 19, Issue 1).
- Aouaf, S., Azzouzi, L., & Housni, H. (2023). Perceived barriers to critical thinking development: the student's view. *International Journal of Linguistics, Literature and Translation*, 6(2), 63–69. <https://doi.org/10.32996/ijllt.2023.6.2.10>
- Colley, B. M., Bilics, A. R., & Lerch, C. M. (2012). Reflection: A key component to thinking critically. *The Canadian Journal for the Scholarship of Teaching and Learning*, 3(1). <https://doi.org/10.5206/cjsotl-rcacea.2012.1.2>
- Cooksey, R. W. (2020). Descriptive statistics for summarising data. In *Illustrating Statistical Procedures: Finding Meaning in Quantitative Data* (pp. 61–139). Springer Singapore. https://doi.org/10.1007/978-981-15-2537-7_5
- Elder, L., & Paul, B. R. (2011). Critical thinking: competency standards essential for the cultivation of intellectual skills, part 3. *Journal of Development Education*, 35(2), 38–39.
- Fitriani, H., Samsuri, T., Rachmadiarti, F., & Raharjo, R. (2022). Characteristics of evaluation-process biology learning tools based on conceptual problem-based learning models to train critical thinking skills. *Jurnal Penelitian Pendidikan IPA*, 8(1), 269–276. <https://doi.org/10.29303/jppipa.v8i1.1168>
- Gogoi, M., Webb, A., Pareek, M., Bayliss, C. D., & Gies, L. (2022). University students' mental health and well-being during the covid-19 pandemic: findings from the UniCoVac qualitative study. *International Journal of Environmental Research and Public Health*, 19(15). <https://doi.org/10.3390/ijerph19159322>
- Gorji, A. M. H., Shafizad, M., Soleimani, A., Darabinia, M., & Goudarzian, A. H. (2018). Path analysis of self-efficacy, critical thinking skills and emotional intelligence for mental health of medical students. *Iranian Journal of Psychiatry and Behavioral Sciences*, 12(4). <https://doi.org/10.5812/ijpbs.59487>
- Haghparast, M., Nasaruddin, F. H., & Abdullah, N. (2014). Cultivating critical thinking through e-learning environment and tools: A review. *Procedia - Social and Behavioral Sciences*, 129, 527–535. <https://doi.org/10.1016/j.sbspro.2014.03.710>
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *The British Journal of Clinical Psychology*, 44(Pt 2), 227–239. <https://doi.org/10.1348/014466505X29657>
- Hyytinen, H., Toom, A., & Postareff, L. (2018). Unraveling the complex relationship in critical thinking, approaches to learning and self-efficacy beliefs among first-year educational

- science students. *Learning and Individual Differences*, 67, 132–142. <https://doi.org/10.1016/J.LINDIF.2018.08.004>
- Irie, T., Yokomitsu, K., & Sakano, Y. (2019). Relationship between cognitive behavioral variables and mental health status among university students: A meta-analysis. *PLoS ONE*, 14(9). <https://doi.org/10.1371/journal.pone.0223310>
- Islam, S., Akter, R., Sikder, T., & Griffiths, M. D. (2022). Prevalence and factors associated with depression and anxiety among first-year university students in Bangladesh: A cross-sectional study. *International Journal of Mental Health and Addiction*, 20(3), 1289–1302. <https://doi.org/10.1007/s11469-020-00242-y>
- Kamarulzaman, W. (2017). *The promotion of critical thinking skills in the KSSR classrooms: A case study of selected primary school teachers*. <https://www.scribd.com/document/511284913/THE-PROMOTION-OF-CRITICAL-THINKING-SKILLS-IN-THE-KSSR-CLASSROOMS-A-CASE-STUDY-OF-SELECTED-PRIMARY-SCHOOL-TEACHERS>
- Kamarulzaman, W., Shafie, N., & Kamarul Zaman, W. (2023). Mental health status and academic performance among undergraduate university students during post COVID-19. *Asian Journal of Research in Education and Social Sciences*. <https://doi.org/10.55057/ajress.2023.5.1.7>
- Ku, K. Y. L., Ho, I. T., Hau, K. T., & Lai, E. C. M. (2013). Integrating direct and inquiry-based instruction in the teaching of critical thinking: an intervention study. *Instructional Science*, 1–19. <https://doi.org/10.1007/s11251-013-9279-0>
- Liu, W., Sun, L., Yin, X., Zhao, H., Zhu, G., Lian, B., & Sun, H. (2022). Relationship between job stress, thinking style and symptoms of post-traumatic stress disorder in mental health nurses. *Front. Public Health*. <https://doi.org/10.3389/fpubh.2022.979138>
- Noone, C., Bunting, B., & Hogan, M. J. (2016). Does mindfulness enhance critical thinking? Evidence for the mediating effects of executive functioning in the relationship between mindfulness and critical thinking. *Frontiers in Psychology*, 6(JAN). <https://doi.org/10.3389/FPSYG.2015.02043/FULL>
- Papathanasiou, I. V., Kleisaris, C. F., Fradelos, E. C., Kakou, K., & Kourkouta, L. (2014). Critical thinking: The development of an essential skill for nursing students. *Acta Informatica Medica*, 22(4), 283–286. <https://doi.org/10.5455/aim.2014.22.283-286>
- Prematunga, R. K. (2012). Correlational analysis. *Australian Critical Care*, 25(3), 195–199. <https://doi.org/10.1016/J.AUCC.2012.02.003>
- Prowse, R., Sherratt, F., Abizaid, A., Gabrys, R. L., Hellemans, K. G. C., Patterson, Z. R., & McQuaid, R. J. (2021). Coping With the COVID-19 Pandemic: Examining Gender Differences in Stress and Mental Health Among University Students. *Frontiers in Psychiatry*, 12. <https://doi.org/10.3389/fpsy.2021.650759>
- Rabbo, Dr. J. . A. (2019). The impact of using the first and third parts of the CORT program on the development of critical thinking for talented students in Tafila governorate. *Journal of Studies in Education*, 9(3), 72. <https://doi.org/10.5296/jse.v9i3.15020>
- Sarigoz, O. (2012). Assessment of the high school students' critical thinking skills. *Procedia - Social and Behavioral Sciences*, 46, 5315–5319. <https://doi.org/10.1016/j.sbspro.2012.06.430>
- Smith, J. (2023). *Looking after your mental health at university*. PROSPECT. <https://www.prospects.ac.uk/applying-for-university/university-life/looking-after-your-mental-health-at-university>
- Staib, S. (2003). Teaching and measuring critical thinking. *The Journal of Nursing Education*, 42(11), 498–508.

- Suryani, Y., Nurfadilah, E., Setiawan, I., & Suhartini, C. (2021, March 8). The effect of round table cooperative learning model and learning motivation on students' critical thinking skills. *UNISSET*. <https://doi.org/10.4108/eai.12-12-2020.2304979>
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- University students more at risk of depression than non-students – study*. (2023). The Guardian. <https://www.theguardian.com/education/2023/sep/29/university-students-more-at-risk-of-depression-than-non-students-study>
- van der Zanden, P. J. A. C., Denessen, E., Cillessen, A. H. N., & Meijer, P. C. (2020). Fostering critical thinking skills in secondary education to prepare students for university: teacher perceptions and practices. *Research in Post-Compulsory Education*, 25(4), 394–419. <https://doi.org/10.1080/13596748.2020.1846313>