e-ISSN: 2548–1800
p-ISSN: 1693–2552

The evolution of research on academic procrastination during Covid-19: A visual analysis using VOSviewer and Biblioshiny

Wahidah Fitriani[1], Rahayu Eka Putri[2], Diyana Kamarudin[3],Adam Mudinillah[4]
[12]Universitas Islam Negeri Mahmud Yunus Batusangkar, Indonesia
[3]Universiti Malaysia Pahang, Malaysia
[4]Sekolah Tinggi Agama Islam Pariangan, Indonesia
[1]wahidahfitriani@uinmybatusangkar.ac.id
[2]rahayuekaputri081117@gmail.com
[3]yanakamarudin@ump.edu.my
[4]adammudinillah@staialhikmahpariangan.ac.id

Artikel history

Received	*Revised*	*Accepted*	*Published*
2023-01-03	*2023-01-15*	*2023-02-01*	*2023-02-28*

Keyword :

Academic procrastination, Bibliometric analysis, Biblioshiny. VOSviewer

Abstract

Several students have experienced academic procrastination, particularly in the context of the Covid-19 pandemic. Previous research has been conducted to understand the relationship between academic procrastination and a range of variables, including self-regulated learning, academic stress, and achievement. However, a significant gap exists in terms of analyzing the broader patterns and trends in this field through bibliometric analysis. Therefore, this study aimed to provide a complete picture of academic procrastination and explore hot spots and research trends during Covid-19. The bibliometric VOSviewer and Biblioshiny methods were used to analyze academic procrastination literatures in the Scopus core collection database. The overall characteristics of academic procrastination during this period were summarized by analyzing numbers, published research, countries, institutions, and keywords. A total of 141 articles published in the Scopus database from 2020 to 2022 were analyzed. The result showed the most influential countries were China, Turkey, as well as Indonesia and the United States, which took a prominent lead with 29, 16, and 13 articles published, respectively. Universität Paderborn emerged as the most productive institution, having published 5 articles during covid-19. With the aid of VOSviewer and Biblioshiny tools, this research identified the hotpots of academic procrastination, which were mainly associated with the title analysis, namely self-efficacy, academic motivation, academic achievement, life satisfaction, university students, academic hardiness, psychological wellbeing, followed by self-regulation, anxiety, and internet addiction. Therefore, this research was very useful for scholars and practitioners to comprehensively understand the trend of research on academic procrastination during Covid-19.

How to cite: Fitriani, W., Putri, R.E., Kamarudin, D., Mudinillah, A. (2023). The evolution of research on academic procrastination during Covid-19: A visual analysis using VOSviewer and Biblioshiny. *Insight: Jurnal Ilmiah Psikologi, 25*(1), 70-yy. doi: https://doi.org/10.26486/psikologi.v25i1.3272

INTRODUCTION

The Covid-19 pandemic has brought about significant changes in learning patterns, with the original form of instruction transitioning from face-to-face to online known as distance learning. This transition was primarily prompted by the implementation of social distancing measures, which aimed to minimize physical contact and prevent the spread of the virus. Although distance learning serves as a solution to mitigate the spread of Covid-19, it has created

e-ISSN: 2548–1800
p-ISSN: 1693–2552

several problems for students (Dhawan, 2020; Melgaard et al., 2021). One of the key issues faced by students in the realm of distance learning is the difficulty in comprehending teaching materials, which has hindered their learning progress. Moreover, the shift to online instruction has resulted in a delay in submitting academic assignments (Jørgen Melgaard et al., 2022). This delay is well known as academic procrastination, which is a common and universal problem (Korniseva et al., 2022: Xu et al., 2021).

During the learning process, various problems often arise, which manifest as academic delays and students' inability to complete assignments on time (Abdollahi et al., 2020; Madjid et al., 2021; Magdová et al., 2021). These delays can be attributed to factors such as a monotonous learning system and unclear instruction from educators, leading to students' inclination to procrastinate when working on assigned tasks (Gadosey et al., 2021; Limone et al., 2020). Academic procrastination can arise when students form joint study groups with the intention of completing assignments together, but actually results in further delays. Such behavior is already inherent in students, resulting in lateness and indiscipline (Baranova et al., 2020; Sharma & Alvi, 2021). This can be seen from the attitude of the learner when the deadline for completing an assignment is far off, as some of students think about relaxing first and assume there is still plenty of time. Consequently, this tendency can decrease the quality of the absorption of teaching material and negatively impact the quality of learning objectives and students' performance (Xue et al., 2021).

The definition of the emergence of procrastination is triggered by two factors. First, the psychology of students in the absorption of less effective learning, exacerbated by the monotonous nature of technology-based learning systems in recent years. Second, the spread of the Covid-19 outbreak, which has shifted the process of learning to online systems (Alavudeen et al., 2021; Colvin et al., 2022; Melgaard et al., 2021). This situation has significantly triggered the psychological changes of students who experience awkwardness in using technology, leading to feelings of academic stress (Adom et al., 2020). As a result, students are more prone to delaying their academic task.

Furthermore, this academic delay can be intentional because, in its context, students affected by academic stress deliberately procrastinate their academic tasks (Gómez-Romero et al., 2020). This is promoted by the failure of students to discipline themselves in various aspects of their daily lives, a phenomenon that has become an overall picture in students facing educational challenges (Brenlla et al., 2022). In the context of the violations of this delay, students already know in advance the consequences associated (Barnych et al., 2023; Dami et al., 2020). It has been reported that the unattractiveness of e-learning model has a detrimental

effect on academic procrastination among students (Muarifah et al., 2022), specifically in higher education institutions.

The negative impact of procrastination also affects the quantity and quality of students' behavior, leading to indiscipline in education (Argiropoulou et al., 2022; Ayaz & Gök, 2022). This manifests as a contaminated behavior in the continuity education process. Furthermore, this does not provide an overview of independent behavior and theoretical knowledge as a quality form of progress in the related educational psychology of students (Corrales-Reyes et al., 2022; Darras et al., 2020). Several research acknowledged that the delay negatively impacted the continuity of independent learning strategies and hinders students' academic success (Randjelović et al., 2021; Schmidt, 2020). It has also been found that procrastination is a serious threat to students' academic achievement at a sustainable stage (Litvinova et al., 2020).

The negative impact of procrastination affects the quantity and quality of students' behavior, leading to indiscipline in education (Argiropoulou & Vlachopanou, 2021; Svartdal, Dahl, et al., 2020). It has been reported that the lack of self-discipline and confidence in students' abilities can result in procrastination of learning activities (Gadosey et al., 2021). This is also triggered by a lack of understanding of the material being taught, negligence in time discipline, and the lack of a sense of responsibility, which instill the mindset of postponing assignments (Almalki et al., 2020; Bison et al., 2021). Some extensive research have been conducted on the topic of delays in several aspects related to different points of view (Baranova et al., 2020; Elhai et al., 2021). The research of academic procrastination was already an important research area, even before pandemic, with a specific focus on instrument tools, influencing factors, and treatments. This is because it can help educators and students identify strategies to overcome procrastination as well as improve academic performance and well-being. The pandemic has also increased the importance of this area of research, as many students have struggled with online learning and the challenges of working from home, which can decrease academic performance and increase the likelihood of procrastination.

Several research explored academic procrastination associated with various variables, including self-efficacy (Gün et al., 2020; Liu et al., 2020), achievement emotion (Gadosey et al., 2021), perfectionism (Cho & Lee, 2022), self-regulated learning (Wang et al., 2022; Valenzuela et al., 2020), stress perception (Ma et al., 2022), anxiety (Chen, 2021; Desai et al., 2021; Jia et al., 2021; Lin, 2022; Porras & Ortega, 2021; Roshanisefat et al., 2021; Sternberg et al., 2020; Trassi et al., 2022; Vivar-Bravo et al., 2021; Zhang & Zhang, 2022), depression (Freyhofer et al., 2021), self-esteem (Barutçu Yıldırım & Demir, 2020), and others. These research did not only tend to analyze the model of the relationship between academic procrastination and other variables influencing it, but also examined the treatments carried out to reduce academic

e-ISSN: 2548–1800
p-ISSN: 1693–2552

procrastination behavior. However, there are still limited research on bibliometric analysis and visualization of research trends on this topic during the Covid-19 pandemic. Tao et al. (2021) conducted an analysis and visualization of academic procrastination using the bibliometric tool and the graphic R language, analyzing all articles published from 1938 to January 2021 retrieved from the WoS database. In contrast, this present research analyzed data retrieved from the Scopus database from 2020 to December 2022.

Considering the aforementioned reasons, this research was conducted by mapping the academic procrastination among students, which negatively impacted their psychology, including academic stress and failure (Ramírez-Gil et al., 2022; Opdenakker, 2021), anxiety and academic performance (Porras & Ortega, 2021). Therefore, conducting a bibliometric analysis is necessary to comprehensively understand academic procrastination. Bibliometric research is an R-tool that can be developed with a flow of R statistical and graphic combinations with a logical work system to provide an overview of scientific mapping (Guo et al., 2021). It serves as guideline for future research experts interested in exploring academic procrastination. This research aims to address the following research questions: what are the research trends and evolutionary paths of academic procrastination during Covid-19? Which countries, authors, and institutions contributed the most to this research area? What are the research hotspots? By answering the questions above, this research not only provides a deeper analysis of the literature in the area of academic procrastination during Covid-19, but also broadens the ideas for future research and provides a basis and reference for innovation in this field. Innovation refers to the introduction of new ideas, methods frameworks, or intervention that can advance the understanding and potential solutions related to academic procrastination during the Covid-19 pandemic. This research promotes future research experts to think creatively, propose fresh perspectives, and push the boundaries of existing knowledge in this field. It also suggests the exploration of new angles, proposal of novel theoretical frameworks, design of innovative interventions, or adoption of interdisciplinary approach to enhance an understanding of the topic. In this context, innovation is not limited to technological advancements, but encompasses creative thinking and fresh perspectives that contribute to the advancement of knowledge and potential solutions in the field of academic procrastination.

METHOD

The method used in conducting bibliometric analysis involved evaluating the quantity and developing trends in certain subjects. It is an interesting assessment of published scientific databases as a benchmark for assessing the intended topic. Furthermore, VOSviewer and Biblioshiny tools were used to analyze academic procrastination and develop an overview of

bibliometric analysis mapping (Ejaz et al., 2022; Rizky Jumansyah, 2022). These tools wereselected with the aim of producing a significant mapping of a collection of scientific databases that discuss academic procrastination.

This research was carried out with a systematic preparation of steps. Firstly, the scientific databases from publication indexes in Scopus database were reviewed, with search time ranging from 2020 to December 2022. Secondly, all relevant data were analyzed using Microsoft Office Excel. Thirdly, the data were transferred into RIS data form as an input requirement for mapping. Fourth, they were subsequently subjected to bibliometric analysis according to data classification, co-network-author citations, author collaborations, collaboration between countries, analysis of journal co-citations, and relevant reference data cited (van Eck & Waltman, 2014). The conclusion of this research provides a mapping description that explores academic procrastination. This will help uncover facts related to the impact of academic procrastination on students' psychological aspects.

The analytical data were sourced from the Scopus databases (Tavukcu et al., 2020), which assisted in the research of bibliometric analysis. This database was selected because many of the sources were already accurate and most relevant or well-known for conducting bibliometric analysis. A title search was conducted with a specific syntax to ensure appropriate selection of the database. The Scopus database contained 141 scientific data. Conclusions can be drawn from the findings of the titles that were searched when the database obtained only had a thin comparison in its acquisition (Brenlla et al., 2022). Furthermore, the Scopus database standards were selected for its quality of data coverage. The high level of relevance and filtering of data in the use of the query data method are as follows:

Figure 1. Data Quarry

A bibliometric analysis was carried out on the data obtained through the query method using the graphical language R (version Rx64 4.0.3). This was carried out to analyze the publication of the comprehensive mapping results of academic procrastination. The analysis

e-ISSN: 2548–1800
p-ISSN: 1693–2552

aimed to explain the mapping of the research topics discussed based on the factual data compiled in the form of quality papers, the best authors, and research publications from 2020 to December 2022. All database findings were subsequently inputted into the VOSviewer device by transferring the data into RIS data form (Arruda et al., 2022; Soegoto et al., 2021). VOSviewer and Biblioshiny were selected due to their ability to provide visualization and construction picture in a bibliometric mapping overview.

RESULTS AND DISCUSSION

The results of data analysis from the output of scientific database publications in 2020-2022 assisted the research experts to explain the mapping of students' academic procrastination, which had shown an increase. This conclusion was based on the findings of published scientific databases, which increased from the 2020 publication year until the end of December 2022. The total number of 141 documents were published in Scopus databases. "Document" in this context has the same meaning as "article". The number of articles on academic procrastination slightly increased in 2020 (43), decreased in 2021 (38), and increased in 2022 (60). The number of publication is shown in Table 1.

Table 1. Document by year

Year	Document	%
2022	60	43.6%
2021	38	27%
2020	43	30.5%
Total	141	100%

Undoubtedly, the research focus in 2020 was slightly higher because the publications specifically addressed the conditions of the educational environment which experienced changes in the continuity of the learning process. The analysis was carried out to provide an overview of the emerging problems that had the effect of changing the learning process in the past three years due to Covid-19. The changes in the learning process gave rise to the academic problems, which in turn triggered academic procrastination. The spread of the pandemic had transformed the learning process, with students learning from home. The impact of remote learning had become a major factor contributing to academic procrastination. This was evident from the changes in the behavior of students who often exercise delay in self-discipline toward the assignments given.

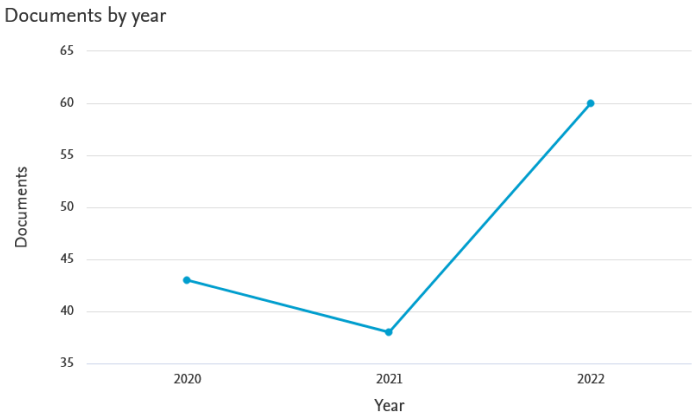


Figure 2. Graphical publications of the 2020-2022 database

Figure 2 shows a slight decrease in the number of publication from 2020 (30.5%) to 2021 (27%) and a sharp increase in 2022 (43.6%). The classification analysis from the Scopus database illustrated that the impact of academic procrastination significantly decreased students' discipline. This was supported by various sources of scientific databases available on Scopus, with focus on research topics related to the negative impact of less efficient learning systems on the learning process. Inefficiency is often triggered by students' lack of understanding of the learning material, leading to an attitude of procrastination by delaying the tasks given. Besides, this encouragement is strengthened when the delivery of learning is less attractive, causing students to feel bored (Barrot et al., 2021).

Institutional analysis and the research of the educational movement's contribution have collaborated with psychological institutions to analyze academic procrastination. The consequences of procrastination as a result of Covid-19 have been considered. The online learning system requires students to independently master learning and complete assignments, with educators conveying these demands through a gadget or cellphone-based communication networks. As a result, the presence of such demands significantly influences students' behavior. Students experience a saturation of understanding the material and eventually develop the urge to procrastinate, ultimately leading to negligence in self-discipline. This case highlights the significant influence of procrastination on the psychological state of students (García-Ros et al., 2022: Cahyaratri et al., 2022; Peixoto et al., 2021). This is evident from the visualized scientific databases published in many of the journals listed in table 2. In addition, the results showed that Frontiers in Psychology was an index of scientific data published in the form of document at the highest level.

e-ISSN: 2548–1800
p-ISSN: 1693–2552

Table 2. Top 10 Most Relevant Sources

Sources	*Articles*
Frontiers in Psychology	11
Current Psychology	8
ACM International Conference Proceeding Series	5
International Journal of Environmental Research and Public Health	4
Psychology Research and Behavior Management	3
Behavioral Sciences	2
British Journal of Guidance and Counselling	2
Canadian Journal of Education	2
Computers and Education	2
European Journal of Psychology	2

Table 2 summarizes these results, displaying the top 10 most relevant sources. Frontiers in Psychology ranked first with an article database of 11 document, followed by Current Psychology, with 8 published articles. The ACM International Conference Proceeding Series ranked third, with 5 published articles, while the International Journal of Environmental Research ranked fourth, with 4 published documents. The Journal of Psychology Research and Behavior Management ranked fifth, followed by Behavioral Sciences, British Journal of Guidance and Counselling, Canadian Journal of Education, Computers and Education, as well as European Journal of Psychology. All of the aforementioned journals published 2 documents during Covid-19 pandemic.

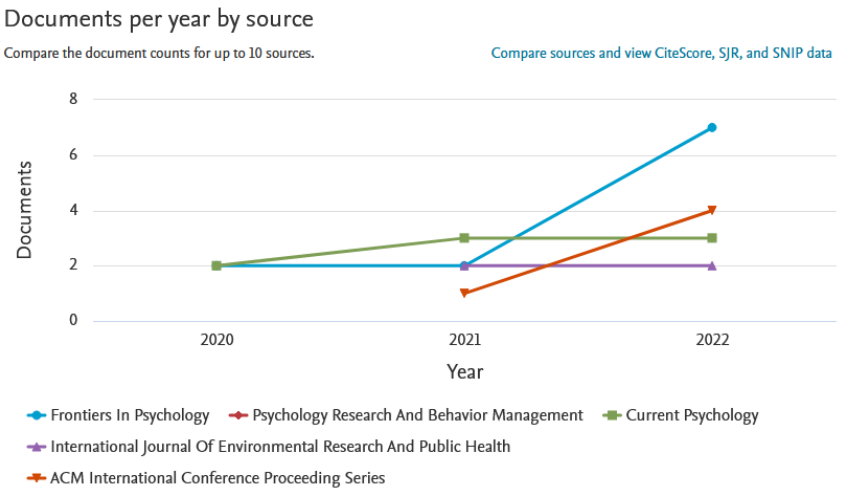


Figure 3. Document per Year by Source

Following the analysis of the Scopus data, a plot description of the results was obtained from the visualization of the authors. Figure 4 shows that the most prolific author in writing papers

about academic procrastination are Friest, S. Grunschel, C, Klingsieck, K.B., Scheunemann, A., and Schnettler, T, all of whom published 4 articles. This is followed by Bäulke, L., Dresel M., Hen M., Koppenborg, M. and Vilalba-Condori, K.O, who published as many as 3 articles. The results of their prolific publication on academic procrastination contributed and collaborated with research that addressed this topic. Moreover, the authors accurately contributed and collaborated on writings relevant to their works in order to produce the highest number of publication.

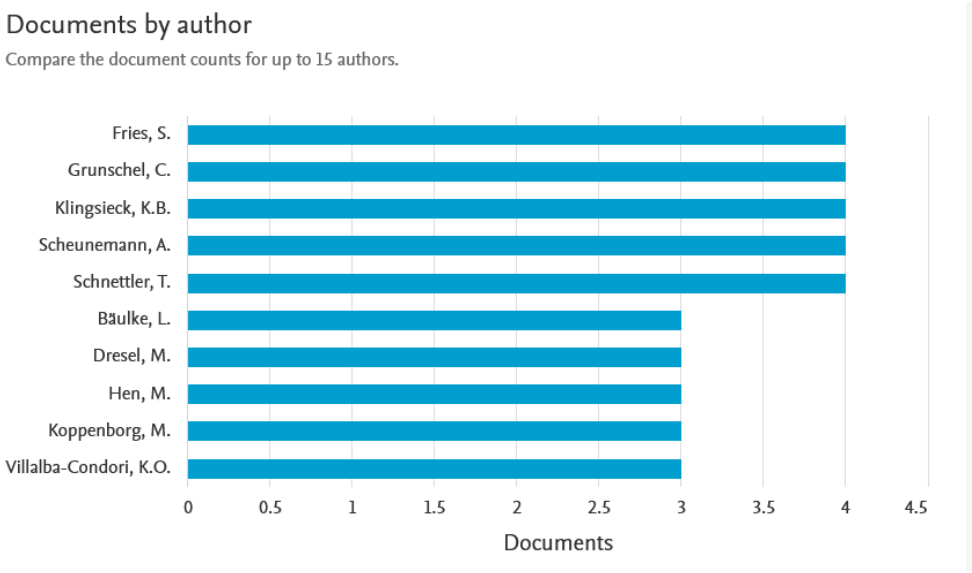


Figure 4. Document by authors

The analysis of documents by country or territory in Table 3 shows that China is the most influential country studying academic procrastination during Covid-19 pandemic, having published 29 articles. This was followed by Turkey with 16 published documents. Indonesia and the United States held the same position, as they both published 13 articles.

Table 3. Document by Country or Territory

Country/Territory	Articles
China	29
Turkey	16
Indonesia	13
United States	13
Peru	9
Spain	9
Germany	8
Iran	6
Israel	6
Canada	5

e-ISSN: 2548–1800
p-ISSN: 1693–2552

Figure 5 shows more details related to the description of the most productive countries that published articles on academic procrastination.

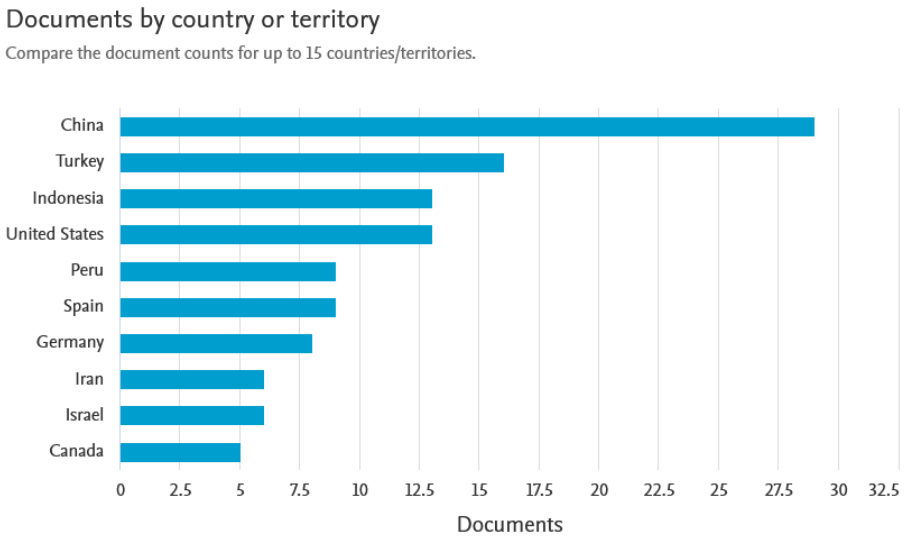


Figure 5. Document by country or territory

Institutional research in national contributions, with cooperation between countries aims to address comprehensive writing and realize accurately visualized data, as well as map findings obtained. Country visualization in research contributions published to international institutions already input as many as 10 of the highest countries. The discussion in Figure 5 shows the publication distribution across regions and countries. China held the most significant area of publication, ranking first, with 29 published articles, followed by Turkey, with 16 published articles. Indonesia dan the United States ranked third with 13 published articles, Peru and Spain ranked fourth, with 9 published articles, while Germany ranked fifth, with 8 published articles. Both Iran and Israel were in the sixth position, with 6 published articles, while Canada ranked seventh, with 5 published articles.

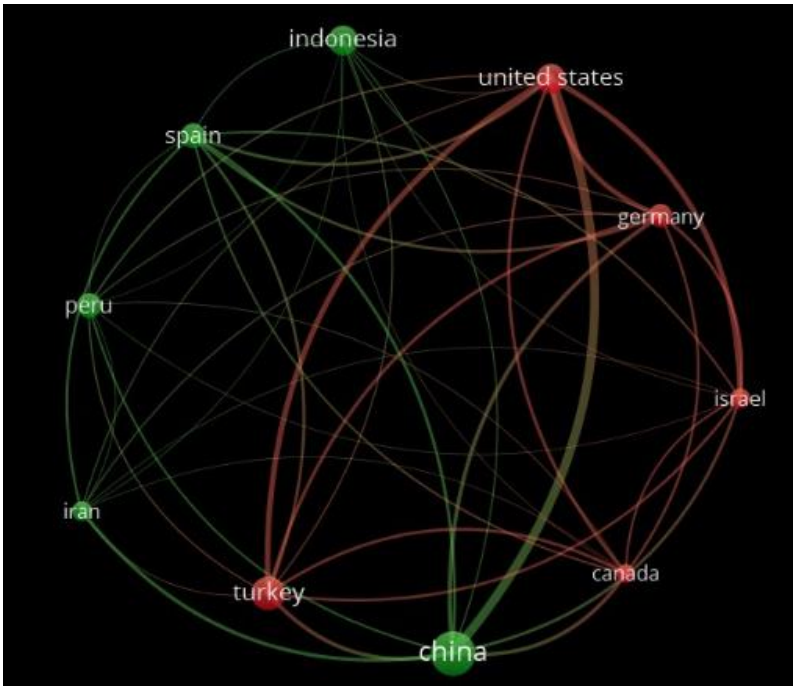


Figure 6. Description of document by country and its collaboration

Based on the explanation in Figure 5, VOSviewer was used to obtain a more comprehensive description related to the document by country. Figure 6 shows the contribution of institutional research collaborating to conduct visualized research with accurate analytical findings. The databased used for this mapping overview was derived from publications spanning from 2020 to 2022, with the expectation of obtaining comprehensive mapping results. The mapping overview results were inputted into the VOSviewer software to provide an overview of how the publication areas sourced from Scopus can be effectively mapped. This enables the research experts to observe the mapping network. The results showed that China was the first publication area to focus on academic procrastination. This network is experiencing expansion as illustrated by the green network which is closely collaborating with the United States. China is also collaborating with Turkey, Germany, Canada, Indonesia, and Spain. Turkey ranked second in the publication of data. The region also collaborated with other regional areas, such as the United States, Canada, Israel, Germany, and China, to support the publication of research data on academic procrastination. The collaboration among authors from these various areas provided more accurate publication data. Figure 5 clearly illustrates that the major research areas are China, Turkey, the United States, and Indonesia. While numerous countries engaged in area collaborations, this is in accordance with the previous objective to enhance the accuracy and comprehensiveness of publications.

e-ISSN: 2548–1800
p-ISSN: 1693–2552

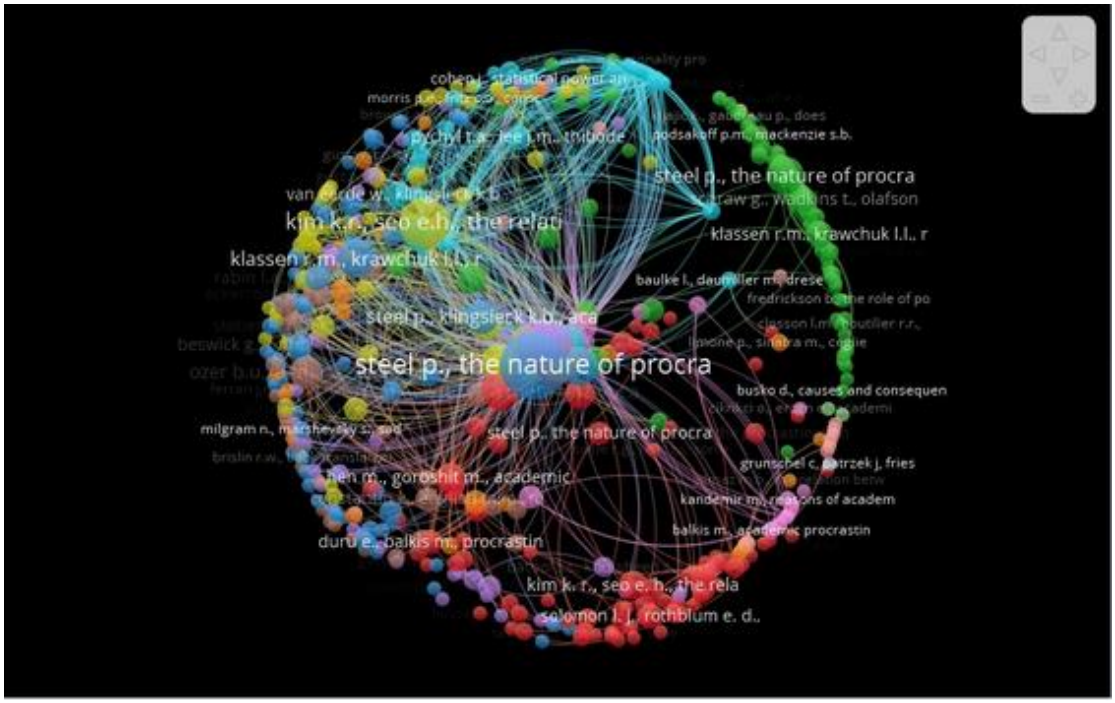


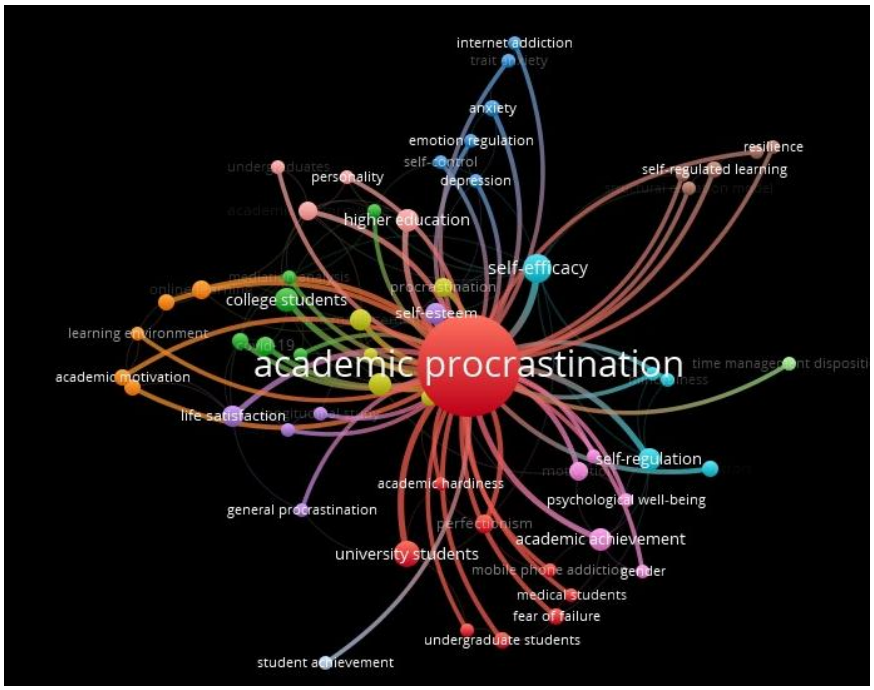
Figure 7. Description of the most cited author

The VOSviewer mapping description in Figure 7 shows that Steel P. is the most cited author (Steel, P. 2007). Steel, P. had collaborated with various other authors in publishing documents, including Klingsieck in 2016 (Steel, P. & Klingsieck, 2016), and Svartdal in 2020 (Svartdal, Klingsieck, et al., 2020). In the collection of scientific databases for the analysis of academic procrastination, several authors related their writing network with Steel, P. and Klingsieck, a network larger than the circle of its users. Therefore, it can be concluded that the collection of scientific databases in writing is highly accurate and can serve as a guide in reference research material for other scientific writing. Besides Steel., P. and Klingsieck, other authors, such as Klassen, G., Krawchuck, L. L., and Rajani, S. (Klassen et al., 2008) contributed extensively, as many of their writings served as references in subsequent research. Klassen documents, which were used for further analytical research, were published in 2009 (Klassen et al., 2009). Several other authors had also collaborated on writing documents, one of which was with Ang. R.P., et al. on the publication in 2010 (Klassen et al., 2010). However, there were limited collaboration network links with other authors, likely because most authors focused on the topic of academic procrastination, drawing references from Svartdal, Klingisieck et al.'s publication in 2020 (Svartdal, Klingsieck, et al., 2020).

Table 4. Sources Local Impact

Element	h_index	g_index	m_index	TC	MP	PY_start
Frontiers in Psychology	8	11	2.000	140	28	2020
Current Psychology	5	10	1.250	103	12	2020
International Journal of Environmental and Public Health	4	5	1.333	30	7	2021
Computers and Education	3	3	0.750	72	3	2020
Journal of American College Health	3	3	0.750	21	3	2020
Social Psychology of Education	3	4	1.000	34	4	2021
Behavioral Sciences	2	3	0.500	22	3	2020
Bordon Revista De Pedagogia	2	3	0.500	12	3	2020
British Journal of Guidance and Counselling	2	2	0.500	15	2	2020
Computers in Human Behavior	2	2	0.500	41	2	2020
Showing 1 to 10 0f 156 entries		Previous	1 2 3	4 5	……..	16 Next

The mapping results showed that the most significant publications were journals from China, the United States, and Germany. China ranked third for publications on the quality of international journals with an H-index of 8, the United States with 5, and Germany with 4. Moreover, it recorded a g-index of 11, while the United States had 10, and Germany 5 publications. The results of area publications provided an overview of interrelated mapping. There was a strong relationship between the area citation network and the level of publication annually. This showed there are still few collaborations among authors studying the topic of academic procrastination, specifically in the publication areas indexed in the top ten international journals.



e-ISSN: 2548–1800
p-ISSN: 1693–2552

Figure 8. Keywords Co-Occurance

The next step of analysis was to examine the results of the citation mapping of keywords related to the topic of academic procrastination. The visualization results showed that the most dominant keywords during the title analysis of the topic, academic procrastination, were self-efficacy (Yeoh et al., 2022; Liu et al., 2020; Uma et al., 2020), academic motivation (Bison et al., 2021), academic achievement (Kljajic et al., 2022), life satisfaction (Özer & Saçkes, 2011), college students, university student, academic hardiness (Jia et al., 2021; Abdollahi et al., 2020), psychological wellbeing (Peixoto et al., 2021), undergraduate students, followed by self regulation (Pelikan et al., 2021; de la Fuente et al., 2021), anxiety (Barutçu Yıldırım & Demir, 2020; Porras & Ortega, 2021), and internet addiction (Lin, 2022; Ramírez-Gil et al., 2022). Some of these keywords were the dominant terms according to analytical research. The results of the mapping and biblioshiny tables, as summarized above, revealed how networks from the bibliometric analysis can be mapped to conduct bibliographic analysis on the topic of academic procrastination. Fact analysis can reveal how the impact of academic procrastination affects students' performance in evaluating academic progress in 2020-2022. This research was carried out in-depth to evaluate the mapping of the traced scientific databases. This was also aimed at discussing and analyzing the extent to which the effects of procrastination were received with the existence of learning-based cases. The results showed that the publication of scientific or databases from the beginning of 2020 to December 2022, had extensively discussed the effects of academic procrastination. The mapping was performed using the VOSviewer tool, with index data obtained from the Scopus data set, and graphical mapping visualization from all published authors. Several authors had made a comprehensive and collaborative contribution in their selected year of publication, focusing on the analysis of procrastination and its impact on the academic quality of students. In general, these research experts and writers analyzed the effects of learning on academics during the COVID-19 pandemic. The review of data searches also provided evidence that research experts predominantly examined the impact of learning during the COVID-19 period, resulting in academic procrastination among students. The identified effect of procrastination was the habit of delaying tasks, which stemmed from lack of a sense of discipline and responsibility (Unda-López et al., 2022; Hong et al., 2021).

Based on the correlation and association obtained in the mapping description and reference analysis traced, it was evident that the level of academic procrastination greatly influenced the decline in academic achievement. Academic procrastination serves as a trigger factor due to changes in the learning process from face to face to online, and the lack of students' life satisfaction. This can also be attributed to the understanding of the subject due to academic hardiness, as seen from the previous research. Implementing efforts to improve

students' performance and provide an overview of behaviour patterns in the sense of responsibility, can help maintain their subjective wellbeing and academic achievement.

CONCLUSION

This research analyzed research on academic procrastination using visual review tools. A total of 141 publication retrieved from Scopus database during Covid-19 were analyzed. The results showed an increasing number of publications related to academic procrastination in 2020. However, this productivity slightly decreased in 2021 and then increased in 2022. China emerged as the most influential and prominent country to publish document in this area. In terms of affiliations, Universität Paderborn was the most productive academic institutions in publishing the document. The analysis of the authors showed that only a few scholars from different countries and affiliations collaborated in writing and publishing their articles. Therefore, international affiliations and countries need to enhance communication and cooperation with each other. During the Covid-19 period, Frontiers in psychology journal attracted significant attention that contributed to the rise publication. The hot spots of academic procrastination were identified using VOSviewer and associated with keywords, such as self-efficacy, academic motivation, academic achievement, life satisfaction, college studentsuniversity students, academic hardiness, psychological wellbeing, undergraduate students, followed by self-regulation, anxiety, and internet addiction.

It is noteworthy that the data in this research were limited to document collected from the Scopus database. Therefore, future research should utilize data from other international databases. In addition, a small number of investigation team was involved, resulting in few collaborators and links. Future research experts could work with more collaborators from different affiliations and countries.

ACKNOWLEDGMENT

The authors are grateful to the reviewers and editor team of Insight: Jurnal Ilmiah Psikologi for their contribution to the publication of this article, as well as the writers whose articles were analyzed. May the findings of this research inspire future researchers.

REFERENCES

Abdollahi, A., Farab, M.N., Panahipour, S., & Allen, K. A. (2020). Academic Hardiness as a Moderator between Evaluative Concerns Perfectionism and Academic Procrastination in Students. *Journal of Genetic Psychology, 181*(5), 365–374. https://doi.org/10.1080/00221325.2020.1783194

Adom, D., Essel, H. B., & Chukwuere, J. (2020). The state of academic stress in the higher

institutions of Ghana: The way forward. *Universal Journal of Educational Research*, *8*(2), 321–331. https://doi.org/10.13189/ujer.2020.080201

Alavudeen, S. S., Easwaran, V., Mir, J. I., Shahrani, S. M., Aseeri, A. A., Khan, N. A., Almodeer, A. M., & Asiri, A. A. (2021). The influence of COVID-19 related psychological and demographic variables on the effectiveness of e-learning among health care students in the southern region of Saudi Arabia. *Saudi Pharmaceutical Journal*, *29*(7), 775–780. https://doi.org/10.1016/j.jsps.2021.05.009

Almalki, K., Alharbi, O., Al-Ahmadi, W., & Aljohani, M. (2020). Anti-procrastination online tool for graduate students based on the pomodoro technique. In Z. P., I. A., & I. A. (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 12206 LNCS* (pp. 133–144). Springer. https://doi.org/10.1007/978-3-030-50506-6_10

Argiropoulou, M.-I., & Vlachopanou, P. (2021). Studying Vs Internet Use 0–1: the Mediating Role of Academic Procrastination between Flow and Problematic Internet Use among Greek University Students. *Journal of Technology in Behavioral Science*, *6*(1), 159–165. https://doi.org/10.1007/s41347-020-00173-4

Argiropoulou, M.-I., Vlachopanou, P., & Kazén, M. (2022). Psychometric properties of the short version of the volitional components inventory in a Greek and a German sample. *Hellenic Journal of Psychology*, *19*(3), 184–205. https://doi.org/10.26262/hjp.v19i3.8210

Arruda, H., Silva, E. R., Lessa, M., Proença Jr., D., & Bartholo, R. (2022). VOSviewer and Bibliometrix. *Journal of the Medical Library Association*, *110*(3), 392–395. https://doi.org/10.5195/jmla.2022.1434

Ayaz, M., & Gök, B. (2022). The effect of e-portfolio application on reflective thinking and learning motivation of primary school teacher candidates. *Current Psychology*, 1–17. https://doi.org/10.1007/s12144-022-04135-2

Baranova, T., Almazova, N., Tabolina, A., Kunina, O., & Yudina, I. (2020). The Study on Psychological Constitutions of Comprehensive University Students with Different Levels of Academic Procrastination. In *Lecture Notes in Networks and Systems* (Vol. 131, pp. 760–769). Springer. https://doi.org/10.1007/978-3-030-47415-7_81

Barnych, M., Petrenko, S., Nechaienko, T., Kovsh, O., & Saminina, H. (2023). The Development of New Thinking as a Consequence of the Influence of Screen Culture. *Studies in Media and Communication*, *10*(3), 55. https://doi.org/10.11114/smc.v10i3.5834

Barrot, J. S., Llenares, I. I., & del Rosario, L. S. (2021). Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Education and Information Technologies*, *26*(6), 7321–7338. https://doi.org/10.1007/s10639-021-10589-x

Barutçu Yıldırım, F., & Demir, A. (2020). Self-Handicapping Among University Students: The Role of Procrastination, Test Anxiety, Self-Esteem, and Self-Compassion. *Psychological Reports*, *123*(3), 825–843. https://doi.org/10.1177/0033294118825099

Bison, I., Civilleri, A., & Fraccaroli, F. (2021). Delay in university studies: The role of irrational procrastination and study skills. *Giornale Italiano Di Psicologia*, *48*(1), 273–284. https://doi.org/10.1421/101242

Brenlla, M. E., Da Lama, R. G. F., Marengo, I. R., & Cricq, E. S. (2022). Future Time Perspective, Procrastination and Academic Motivation in Argentinian College Students during the Pandemic. *Psychological Thought*, *15*(1), 215–241. https://doi.org/10.37708/psyct.v15i1.640

Cahyaratri, M. T., Saktini, F., Asikin, H. G., & Sumekar, T. A. (2022). the Relationship of Academic Procrastination With Stress, Anxiety, and Depression During the Covid-19 Pandemic in Students of the Medical Study Program, Faculty of Medicine, Undip. *Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro)*, *11*(3), 149–153. https://doi.org/10.14710/dmj.v11i3.33244

Chen, Z. (2021). Information Statistical Analysis on the Effect of Anxiety Level on College Procrastinators and Non-procrastinators on Academic Grades. *Proceedings - 2021 2nd International Conference on Information Science and Education, ICISE-IE 2021*, 574–577. https://doi.org/10.1109/ICISE-IE53922.2021.00137

Cho, M., & Lee, Y.-S. (2022). The effects of medical students' self-oriented perfectionism on academic procrastination: the mediating effect of fear of failure. *Korean Journal of Medical Education*, *34*(2), 121–129. https://doi.org/10.3946/kjme.2022.224

Colvin, M. K., Forchelli, G. A., Reese, K. L., Capawana, M. R., Beery, C. S., Murphy, J., Doyle, A. E., O'Keefe, S. M., & Braaten, E. B. (2022). Neuropsychology consultation to identify learning disorders in children and adolescents: a proposal based on lessons learned during the COVID-19 pandemic. *Child Neuropsychology*, *28*(5), 671–688. https://doi.org/10.1080/09297049.2021.2005010

Corrales-Reyes, I. E., García-Raga, M., Villegas-Maestre, J. D., Valdés-Gamboa, L., Vitón-Castillo, A. A., Tusell-Hormigó, D., & Mejia, C. R. (2022). Factors associated to academic procrastination in dental students from seven Cuban universities. *Revista Cubana de Medicina Militar*, *51*(2). https://www.scopus.com/inward/record.uri?eid=2-s2.0-85138405075&partnerID=40&md5=1611b4c8577cabfc56b0f19b2689900b

Dami, Z. A., Tameon, S. M., & Saudale, J. (2020). The predictive role of academic hope in academic procrastination among students: A mixed methods study. *Pedagogika*, *137*(1), 208–229. https://doi.org/10.15823/p.2020.137.12

Darras, K. E., Spouge, R. J., de Bruin, A. B. H., Sedlic, A., Hague, C., & Forster, B. B. (2020). Undergraduate Radiology Education During the COVID-19 Pandemic: A Review of Teaching and Learning Strategies. *Canadian Association of Radiologists Journal*, *72*(2), 194–200. https://doi.org/10.1177/0846537120944821

de la Fuente, J., Sander, P., Garzón-Umerenkova, A., Vera-Martínez, M. M., Fadda, S., & Gaetha, M. L. (2021). Self-Regulation and Regulatory Teaching as Determinants of Academic Behavioral Confidence and Procrastination in Undergraduate Students. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.602904

Desai, M., Pandit, U., Nerurkar, A., Verma, C., & Gandhi, S. (2021). Test anxiety and procrastination in physiotherapy students. *Journal of Education and Health Promotion*, *10*(1). https://doi.org/10.4103/jehp.jehp_851_20

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Ejaz, H., Zeeshan, H. M., Ahmad, F., Bukhari, S. N. A., Anwar, N., Alanazi, A., Sadiq, A.,

Junaid, K., Atif, M., Abosalif, K. O. A., Iqbal, A., Hamza, M. A., & Younas, S. (2022). Bibliometric Analysis of Publications on the Omicron Variant from 2020 to 2022 in the Scopus Database Using R and VOSviewer. *International Journal of Environmental Research and Public Health*, *19*(19), 12407. https://doi.org/10.3390/ijerph191912407

Elhai, J. D., Sapci, O., Yang, H., Amialchuk, A., Rozgonjuk, D., & Montag, C. (2021). Objectively-measured and self-reported smartphone use in relation to surface learning, procrastination, academic productivity, and psychopathology symptoms in college students. *Human Behavior and Emerging Technologies*, *3*(5), 912–921. https://doi.org/10.1002/hbe2.254

Freyhofer, S., Ziegler, N., de Jong, E. M., & Schippers, M. C. (2021). Depression and Anxiety in Times of COVID-19: How Coping Strategies and Loneliness Relate to Mental Health Outcomes and Academic Performance. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.682684

Gadosey, C. K., Schnettler, T., Scheunemann, A., Fries, S., & Grunschel, C. (2021). The intraindividual co-occurrence of anxiety and hope in procrastination episodes during exam preparations: An experience sampling study. *Learning and Individual Differences*, *88*. https://doi.org/10.1016/j.lindif.2021.102013

García-Ros, R., Pérez-González, F., Tomás, J. M., Sancho, P., Plouffe, N., Dionne, F., Côté, G., Qu, R., Ding, N., Li, H., Song, X., Cong, Z., Cai, R., Zhu, Y., Wen, D., Uma, E., Lee, C., Shapiai, S., Binti Mat Nor, A., … Fries, S. (2022). Correlates and Consequences of Behavioral Procrastination: The Effects of Academic Procrastination, Self-Consciousness, Self-Esteem and Self-Handicapping. *Frontiers in Psychology*, *9*(1), 1–7. https://doi.org/10.1177/07342829221079948

Gómez-Romero, M. J., Tomás-Sábado, J., Montes-Hidalgo, J., Brando-Garrido, C., Cladellas, R., & Limonero, J. T. (2020). Academic procrastination and risk of suicidal behavior in university students: The role of emotional regulation. *Ansiedad y Estres*, *26*(2–3), 112–119. https://doi.org/10.1016/j.anyes.2020.06.002

Gün, F., Turabik, T., & Atanur Baskan, G. (2020). The relationship between academic self-efficacy and academic procrastination tendency: A study on teacher candidates. *Hacettepe Egitim Dergisi*, *35*(4), 815–826. https://doi.org/10.16986/HUJE.2019051688

Guo, Y. M., Huang, Z. L., Guo, J., Guo, X. R., Li, H., Liu, M. Y., Ezzeddine, S., & Nkeli, M. J. (2021). A bibliometric analysis and visualization of blockchain. *Future Generation Computer Systems*, *116*, 316–332. https://doi.org/10.1016/j.future.2020.10.023

Hong, J.-C., Lee, Y.-F., & Ye, J.-H. (2021). Procrastination predicts online self-regulated learning and online learning ineffectiveness during the coronavirus lockdown. *Personality and Individual Differences*, *174*, 110673. https://doi.org/10.1016/j.paid.2021.110673

Jia, J., Wang, L.-L., Xu, J.-B., Lin, X.-H., Zhang, B., & Jiang, Q. (2021). Self-Handicapping in Chinese Medical Students During the COVID-19 Pandemic: The Role of Academic Anxiety, Procrastination and Hardiness. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.741821

Klassen, R. M., Ang, R. P., Chong, W. H., Krawchuk, L. L., Huan, V. S., Wong, I. Y. F., & Yeo, L. S. (2009). A cross-cultural study of adolescent procrastination. *Journal of Research on Adolescence*, *19*(4), 799–811. https://doi.org/10.1111/j.1532-7795.2009.00620.x

Klassen, R. M., Ang, R. P., Chong, W. H., Krawchuk, L. L., Huan, V. S., Wong, I. Y., & Yeo, L. S. (2010). Academic procrastination in two settings: Motivation correlates, behavioral patterns, and negative impact of procrastination in Canada and Singapore. *Applied Psychology*, *59*(3), 361–379. https://doi.org/10.1111/j.1464-0597.2009.00394.x

Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*, *33*(4), 915–931. https://doi.org/10.1016/j.cedpsych.2007.07.001

Kljajic, K., Schellenberg, B. J. I., & Gaudreau, P. (2022). Why Do Students Procrastinate More in Some Courses Than in Others and What Happens Next? Expanding the Multilevel Perspective on Procrastination. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.786249

Korniseva, A., Guseva, S., Dombrovskis, V., & Capulis, S. (2022). Predictors of Student Procrastination in Latvian Higher Education Institutions during Distance Learning. *International Journal of Learning in Higher Education*, *29*(1), 171–183. https://doi.org/10.18848/2327-7955/CGP/v29i01/171-183

Limone, P., Sinatra, M., Ceglie, F., & Monacis, L. (2020). Examining procrastination among university students through the lens of the self-regulated learning model. *Behavioral Sciences*, *10*(12). https://doi.org/10.3390/bs10120184

Lin, Y. (2022). Relationship between Trait Anxiety and Academic Procrastination: The Mediating Role of Internet Addiction. *ACM International Conference Proceeding Series*, 139–143. https://doi.org/10.1145/3535756.3535779

Litvinova, A., Kokurin, A., Ekimova, V., Koteneva, A., & Pozdnyakov, V. (2020). Procrastination as a threat to the psychological security of the educational environment. *Behavioral Sciences*, *10*(1). https://doi.org/10.3390/bs10010001

Liu, G., Cheng, G., Hu, J., Pan, Y., & Zhao, S. (2020). Academic Self-Efficacy and Postgraduate Procrastination: A Moderated Mediation Model. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.01752

Ma, Y., Yang, X. M., Hong, L., & Tang, R. J. (2022). The Influence of Stress Perception on Academic Procrastination in Postgraduate Students: The Role of Self-Efficacy for Self-Regulated Learning and Self-Control. *International Journal of Digital Multimedia Broadcasting*, *2022*. https://doi.org/10.1155/2022/6722805

Madjid, A., Sutoyo, D. A., & Shodiq, S. F. (2021). Academic procrastination among students: The influence of social support and resilience mediated by religious character. *Cakrawala Pendidikan*, *40*(1), 56–69. https://doi.org/10.21831/cp.v40i1.34641

Magdová, M., Fuchsová, K., & Berinšterová, M. (2021). Procrastination of university students in the context of academic motivation and self-control. *Ceskoslovenska Psychologie*, *65*(4), 389–402. https://doi.org/10.51561/cspsych.65.4.389

Melgaard, Jø., Monir, R., Lasrado, L. A., & Fagerstrøm, A. (2021). Academic Procrastination and Online Learning during the COVID-19 Pandemic. In M. R., R. R., C.-C. M.M., D. D., & P. E. (Eds.), *Procedia Computer Science* (Vol. 196, pp. 117–124). Elsevier B.V. https://doi.org/10.1016/j.procs.2021.11.080

Melgaard, Jørgen, Monir, R., Lasrado, L., & Fagerstrøm, A. (2022). Academic Procrastination

and Online Learning During the COVID-19 Pandemic. *Procedia Computer Science*, *196*, 117–124. https://doi.org/10.1016/j.procs.2021.11.080

Muarifah, A., Rofiah, N. H., Mujidin, M., Mohamad, Z. S., & Oktaviani, F. (2022). Students' academic procrastination during the COVID-19 pandemic: How does adversity quotient mediate parental social support? *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.961820

Opdenakker, M.-C. (2021). Need-Supportive and Need-Thwarting Teacher Behavior: Their Importance to Boys' and Girls' Academic Engagement and Procrastination Behavior. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.628064

Özer, B. U., & Saçkes, M. (2011). Effects of academic procrastination on college students' life satisfaction. *Procedia - Social and Behavioral Sciences*, *12*, 512–519. https://doi.org/10.1016/j.sbspro.2011.02.063

Peixoto, E. M., Pallini, A. C., Vallerand, R. J., Rahimi, S., & Silva, M. V. (2021). The role of passion for studies on academic procrastination and mental health during the COVID-19 pandemic. *Social Psychology of Education*, *24*(3), 877–893. https://doi.org/10.1007/s11218-021-09636-9

Pelikan, E. R., Lüftenegger, M., Holzer, J., Korlat, S., Spiel, C., & Schober, B. (2021). Learning during COVID-19: the role of self-regulated learning, motivation, and procrastination for perceived competence. *Zeitschrift Für Erziehungswissenschaft*, *24*(2), 393–418. https://doi.org/10.1007/s11618-021-01002-x

Porras, M. M., & Ortega, F. H. (2021). Procrastination, test anxiety and academic performance on university students. *Interdisciplinaria*, *38*(2), 243–258. https://doi.org/10.16888/INTERD.2021.38.2.16

Ramírez-Gil, E., Reyes-Castillo, G., Rojas-Solís, J. L., & Fragoso-Luzuriaga, R. (2022). Academic Stress, Procrastination, and Internet Uses Among College Students During thecovid-19 Pandemic. *Revista Ciencias de La Salud*, *20*(3). https://doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.11664

Randjelović, D., Vujičić, M., & Nikolić, G. (2021). Relationships between personality traits, negative affectivity and procrastination in high school students. *Vojnosanitetski Pregled*, *78*(9), 928–934. https://doi.org/10.2298/VSP191014141R

Rizky Jumansyah, A. A. R. (2022). VOSviewer Application Analysis: Computational Physical Chemistry Case Study. *Moroccan Journal of Chemistry*, *Vol. 10*, Mor.-J. Chem. 10 N°1 (2022) 091-101 Pages. https://doi.org/10.48317/IMIST.PRSM/MORJCHEM-V10I1.31756

Roshanisefat, S., Azizi, S. M., & Khatony, A. (2021). Investigating the Relationship of Test Anxiety and Time Management with Academic Procrastination in Students of Health Professions. *Education Research International*, *2021*. https://doi.org/10.1155/2021/1378774

Schmidt, L. (2020). The Objectives of Stakeholder Involvement in Transdisciplinary Research. A Conceptual Framework for a Reflective and Reflexive Practise. *Ecological Economics*, *176*(Query date: 2023-03-09 11:08:50). https://doi.org/10.1016/j.ecolecon.2020.106751

Sharma, A., & Alvi, I. (2021). Evaluating pre and post COVID 19 learning: An empirical study

of learners' perception in higher education. *Education and Information Technologies*, *26*(6), 7015–7032. https://doi.org/10.1007/s10639-021-10521-3

Soegoto, H., Soegoto, E. S., Luckyardi, S., & Rafdhi, A. A. (2021). A Bibliometric Analysis of Management Bioenergy Research Using Vosviewer Application. *Indonesian Journal of Science and Technology*, *7*(1), 89–104. https://doi.org/10.17509/ijost.v7i1.43328

Steel, P, & Klingsieck, K. B. (2016). Academic Procrastination: Psychological Antecedents Revisited. *Australian Psychologist*, *51*(1), 36–46. https://doi.org/10.1111/ap.12173

Steel, Piers. (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. Psychol Bull 133: 65-94. *Psychological Bulletin*, *133*, 65–94. https://doi.org/10.1037/0033-2909.133.1.65

Sternberg, N., Luria, R., Chandhok, S., Vickers, B., Kross, E., & Sheppes, G. (2020). When facebook and finals collide - procrastinatory social media usage predicts enhanced anxiety . *Computers in Human Behavior*, *109*. https://doi.org/10.1016/j.chb.2020.106358

Svartdal, F., Dahl, T. I., Gamst-Klaussen, T., Koppenborg, M., & Klingsieck, K. B. (2020). How Study Environments Foster Academic Procrastination: Overview and Recommendations. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.540910

Svartdal, F., Klingsieck, K. B., Steel, P., & Gamst-Klaussen, T. (2020). Measuring implemental delay in procrastination: Separating onset and sustained goal striving. *Personality and Individual Differences*, *156*. https://doi.org/10.1016/j.paid.2019.109762

Tao, X., Hanif, H., Ahmed, H. H., & Ebrahim, N. A. (2021). Bibliometric Analysis and Visualization of Academic Procrastination. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.722332

Tavukcu, T., Kalimullin, A. M., Litvinov, A. V, Shindryaeva, N. N., Abraukhova, V., & Abdikeev, N. M. (2020). Analysis of Articles on Education and Instructional Technologies (Scopus). *International Journal of Emerging Technologies in Learning (IJET)*, *15*(23), 108. https://doi.org/10.3991/ijet.v15i23.18803

Trassi, A. P., Leonard, S. J., Rodrigues, L. D., Rodas, J. A., & Santos, F. H. (2022). Mediating factors of statistics anxiety in university students: a systematic review and meta-analysis. *Annals of the New York Academy of Sciences*, *1512*(1), 76–97. https://doi.org/10.1111/nyas.14746

Uma, E., Lee, C., Shapiai, S., Binti Mat Nor, A., Soe, H., & Varghese, E. (2020). Academic procrastination and self-efficacy among a group of dental undergraduate students in Malaysia. *Journal of Education and Health Promotion*, *9*(1). https://doi.org/10.4103/jehp.jehp_195_20

Unda-López, A., Osejo-Taco, G., Vinueza-Cabezas, A., Paz, C., & Hidalgo-Andrade, P. (2022). Procrastination during the COVID-19 Pandemic: A Scoping Review. *Behavioral Sciences*, *12*(2). https://doi.org/10.3390/bs12020038

Valenzuela, R., Codina, N., Castillo, I., & Pestana, J. V. (2020). Young University Students' Academic Self-Regulation Profiles and Their Associated Procrastination: Autonomous Functioning Requires Self-Regulated Operations. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00354

van Eck, N. J., & Waltman, L. (2014). *Visualizing Bibliometric Networks BT - Measuring Scholarly Impact: Methods and Practice* (Y. Ding, R. Rousseau, & D. Wolfram (eds.); pp. 285–320). Springer International Publishing. https://doi.org/10.1007/978-3-319-10377-8_13

Vivar-Bravo, J., La Madrid Rojas, F. I., Fuster-Guillén, D., Álvarez Silva, V. A., & Ocaña-Fernández, Y. (2021). Academic Procrastination and Anxiety in University Students of Initial Education of Apurimac. *Health Education and Health Promotion*, *9*(5), 455–459. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85127416167&partnerID=40&md5=83688e8ecfe3995c19f811a805b91395

Wang, C.-H., Salisbury-Glennon, J. D., Dai, Y., Lee, S., & Dong, J. (2022). Empowering College Students to Decrease Digital Distraction Through the Use of Self-Regulated Learning Strategies. *Contemporary Educational Technology*, *14*(4). https://doi.org/10.30935/cedtech/12456

Xu, H. M., Qu, J.-H., Ma, X., & Ling, Y.-T. (2021). Prediction and visualization of academic procrastination in online learning. *ACM International Conference Proceeding Series*, 133–139. https://doi.org/10.1145/3474995.3475017

Xue, X., Wang, Y., Li, H., Gao, J., & Si, J. (2021). The association between mathematical attitudes, academic procrastination and mathematical achievement among primary school students: the moderating effect of mathematical metacognition. *Current Psychology*. https://doi.org/10.1007/s12144-021-02133-4

Yeoh, H. C., Hong, S. P. L., & Prihadi, K. D. (2022). Efficacy, expectancy, or the sense of mattering? Academic procrastination in online study. *International Journal of Evaluation and Research in Education*, *11*(3), 1311–1317. https://doi.org/10.11591/ijere.v11i3.22964

Zarrin, A.S., Gracia, E., & Paixão, M. P. (2020). Prediction of academic procrastination by fear of failure and self-regulation. *Educational Sciences: Theory and Practice*, *20*(3), 34–43. https://doi.org/10.12738/jestp.2020.3.003

Zhang, C., & Zhang, W. (2022). The Impact of Academic Procrastination on Second Language Writing: The Mediating Role of L2 Writing Anxiety. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.851120