

Bibliometric Analysis and Visualization of Academic Emotions among Students

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To Link this Article: <http://dx.doi.org/10.6007/IJARBS/v14-i11/23289> DOI:10.6007/IJARBS/v14-i11/23289

Published Date: 11 November 2024

Abstract

Academic emotions are emotional responses that students experience during the learning process, such as pleasure, anxiety, pride, etc., which can affect their mental health and overall academic achievement. This paper aims to provide a full outline of academic emotions and explore the current hot spots and trends. Bibliometric and VOS viewer were used to conduct quantitative analysis. This study aims to systematically analyze and summarize the current state of research on academic emotions among students, identify key areas of focus and development trends, and provide references for future research through bibliometric analysis. A bibliometric analysis was conducted using the PRISMA framework and VOSviewer to summarize research on academic emotions among students from 2013 to 2023. Scopus was selected for its extensive coverage and renowned capability in analyzing scientific literature. A comprehensive keyword search yielded 295 publications. The results reveal the distribution of publications on students' academic emotions over recent ten years, highlighting the most relevant journals, influential authors, contributing countries, primary research keywords, and key topics. This analysis also offers insights into trends and future directions for research on students' academic emotions. Future research should focus on academic emotions in younger students, particularly in primary school and explore the role of academic emotions across diverse educational and cultural contexts; adopting longitudinal and mixed-methods designs will also help uncover the dynamic and psychological aspects of academic emotions, providing a more comprehensive and credible perspective.

Keywords: Academic Emotions, Students, Bibliometric Analysis, Vosviewer, Scopus

Introduction

Academic emotions refer to emotions directly linked to academic activities such as learning, classroom instruction, and academic performance, including feelings of enjoyment,

pride, boredom, disappointment, and anxiety (Pekrun et al., 2010). It can be categorized into four types: Positive High-Arousal (PHA), including emotions like enjoyment, hope, and pride; Positive Low-Arousal (PLA), such as satisfaction, calmness, and relief; Negative High-Arousal (NHA), including anger, anxiety, and shame; and Negative Low-Arousal (NLA), such as hopelessness, boredom, depression, and fatigue. The impact of academic emotions on learning outcomes is reflected in many ways. Studies have shown that positive emotions and negative emotions have very different effects on the learning process. Studies show that positive emotions, such as enjoyment and pride, significantly enhance students' self-regulation abilities and learning interests, ultimately boosting academic achievement (Carmona–Halty et al., 2019). In contrast, negative emotions, such as boredom and anxiety, adversely weaken students' concentration and motivation, undermining students' academic outcomes (Adesola et al., 2019; Pekrun, 2017; Qu et al., 2022). Additionally, emotional experiences during learning can influence students' behavior, thinking, and attention in the classroom. Positive and activating emotions have been found to impact student performance (Acatrinei, 2024).

This study aims to analyze trends in students' academic emotions-related publications using bibliometric analysis, providing insights for future research. Furthermore, it offers a visualization of current research trends in students' academic emotions. Data were collected from the Scopus database to answer the following research questions:

1. What is the distribution of students' academic emotions-related publications over the past decade?
2. Which journals and authors are most relevant to students' academic emotions research?
3. Which countries have significantly contributed most to students' academic emotions research?
4. What are the primary focus areas of scholars in the past decade regarding students' academic emotions?
5. Based on research from the past decade, what are the trends in students' academic emotions research?

Method

This bibliometric study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) structure (David Moher et al., 2009). Bibliometrics analysis is based on tracking research on a specific topic and revealing research results by analyzing these studies according to various characteristics (Martí-Parreño et al., 2016). The primary objective of this comprehensive analysis is to elucidate and analyze research on student academic emotions over the past decade. This study thoroughly investigates key countries, academic institutions, publications, and contributing authors in this field. Additionally, it identifies significant terms related to this specific area of research and frequently discussed topics and trends within the field.

Scopus is recognized as the largest abstract and citation database, containing literature across a wide range of peer-reviewed subjects (Baas et al., 2020). Due to its extensive coverage and reputation, the Scopus database was carefully chosen as the primary source for this review on 16 August 2024.

This study aimed to retrieve academic articles on students’ academic emotions by establishing a set of inclusion and exclusion criteria (Table 1). First, articles with titles, abstracts, or keywords containing “academic emotions” OR “academic mood” were selected to ensure the research literature is closely related to academic emotions. The scope was further limited to student populations by including terms like “students,” “children,” “graduates,” “pupils,” “school-aged children,” “adolescents,” “teenagers,” “undergraduates,” or “postgraduates,” excluding studies involving teachers and researchers to maintain relevance. To ensure the timeliness of the literature, only articles published between 2013 and 2023 were considered, excluding publications before 2013 and 2024, to obtain research results from the past decade. The focus was on social sciences, psychology, art and humanities, excluding literature from medicine, computer science, and engineering to maintain disciplinary relevance. Only research articles were included to ensure academic rigor, excluding reviews, book chapters, conference papers, and series books. Only journal-published articles were included to ensure the reliability and authority of academic sources, excluding research from series books. Lastly, to guarantee the international comparability and generalizability of the research results, only English-language literature was included, excluding other languages. These stringent inclusion and exclusion criteria ensured a highly relevant and manageable set of academic articles, providing a solid foundation for academic emotions research.

Table 1
Inclusion and Exclusion Criteria

Search Queries	Inclusion Criteria	Exclusion Criteria
TITLE-ABS-KEY ("academic emotion*" OR "academic mood") AND ("student*" OR "children" OR "graduate*" OR "pupil*" OR "school-aged children" OR "adolescent*" OR "teenager*" OR "undergraduate*" OR "postgraduate*") AND PUBYEAR > 2012 AND PUBYEAR < 2024 AND (LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ARTS")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j")) AND (students n=675	non-student (eg. teachers , researchers etc.) n=18
	The year of 2013-2023 n=528	>2013 and in 2024 n=47
	Social science, psychology, arts and humanities n=418	Subject areas in medicine, Computer Science, Business, Management and Accounting, Neuroscience, Mathematics, Health Professions, Engineering, Economics, Econometrics and Finance, Agricultural and Biological Sciences, Environmental Science, Biochemistry, Genetics and Molecular Biology, Energy, Pharmacology, Toxicology and Pharmaceutic, Nursing, Earth and Planetary Sciences, Decision Sciences n=110
	Article n=339	Review, book chapter, conference paper Review, Conference paper, Book

LIMIT-TO (LANGUAGE , "English"))		chapter, Note, Erratum, Conference review. n=79
	Journal n=338	Book series n=1
	English language n=304	Other languages n=34

The PRISMA framework (Figure 1) provides an overview of the entire process of systematically screening literature. The figure shows the process of identifying, screening and including studies related to “academic emotions” or “academic mood” from the Scopus database. Initially, 693 records were identified based on the search terms. After an initial screening, 675 records were further examined, while 18 records were excluded due to factors such as non-student samples, studies before 2013 and after 2024, and inclusion of unrelated subject areas (e.g. computer science, medicine). After screening, 304 reports were assessed for eligibility. Nine articles were excluded at this stage due to a lack of DOI. Ultimately, 295 studies were included in the review and formed the basis for the analysis. This process helped to ensure that only relevant and high-quality studies were considered in the final analysis.

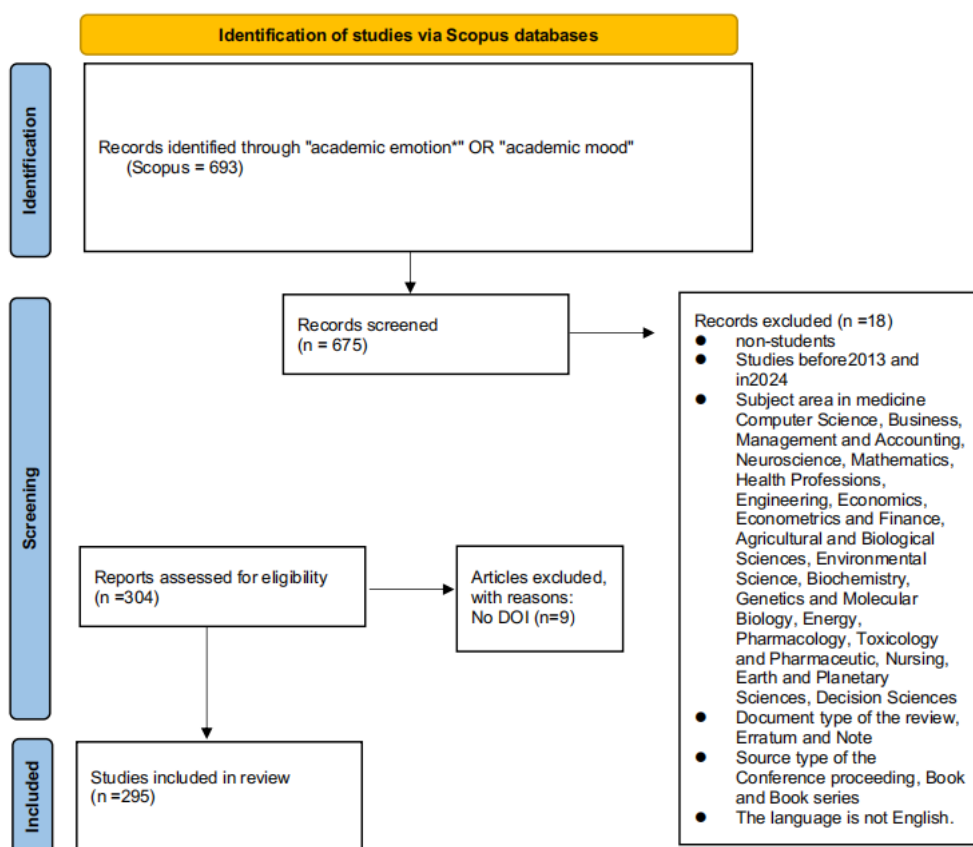


Figure 1 Prisma framework for this review

Result

This section presents the bibliometric research findings on students' academic emotions. Spanning a decade of research data, it offers a multifaceted view into this evolving field. The

content covers key subject areas, publication trends, influential journals and countries, major academic institutions, prolific authors, and main research keywords. The aim of this comprehensive analysis is to illustrate the current state of global research on students' academic emotions over the past ten years, identify the foundational elements propelling this scholarly exploration, and provide an extensive perspective on the study of students' academic emotions.

The Distribution by Years

As shown in Figure 2, from 2013 to 2023, the number of relevant articles on academic emotions showed a continuous growth trend. Despite some fluctuations in 2015, the overall number of publications increased year by year. In particular, since 2016, the number of relevant documents has steadily increased, and in 2022 and 2023 it reached a peak in the past decade, exceeding 66 and 69 respectively. This indicates that academic interest in the study of academic emotions is increasing, and in particular in recent years, related research has received significant attention.

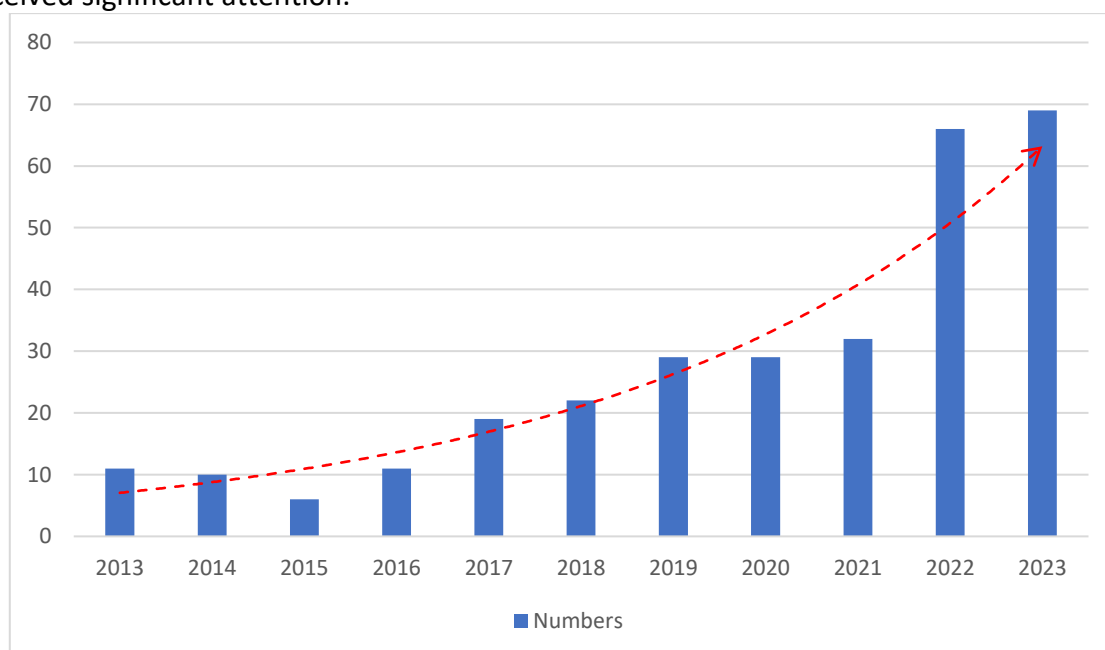


Figure 2. The distribution of students' academic emotions by year

Most Relevant Journals and Authors in Students' Academic Emotions Research

A search of the Scopus database identified the top five of the most relevant journals on this topic. Detailed information about these journals, including total publications (TP), total citations (TC), citation score, most cited article, times cited, is presented in table 2. As shown in Table 2, the most relevant journal in the field of academic emotions research is "Frontiers in Psychology," with a total publication count of 22,447 and a total citation count of 119,948, and a citation score of 5.3. Following this is "Current Psychology," published by Springer Nature, with a total publication count of 4,238, a total citation count of 19,554, and a citation score of 4.6. The most cited article in "Frontiers in Psychology" discusses "Perceived academic control and academic emotions predict undergraduate university student success: Examining effects on dropout intention and achievement" which has been cited 125 times. In "Current Psychology," the most cited article is the interplay among academic resilience, critical thinking, academic emotion regulation, academic self-esteem, and academic demotivation, with 23 citations. Additionally, "Learning and Individual Differences" is another significant

journal in the field, with a total publication count of 327, a total citation count of 2,163, and a citation score of 6.6. The most cited article in this journal is “The mediating roles of academic self-efficacy and academic emotions in the relation between basic psychological needs satisfaction and learning engagement among Chinese adolescent students”, cited 152 times.

Table 2
Top 5 journals in academic emotions among students

	Journals	TP*(2020-2023)	TC*(2020-2023)	Cite Score (2023)	Most Cited articles	Times Cited
1	Frontiers In Psychology	22447	119948	5.3	Perceived academic control and academic emotions predict undergraduate university student success: Examining effects on dropout intention and achievement	125
2	Current Psychology	4238	19554	4.6	To be a language learner or not to be? The interplay among academic resilience, critical thinking, academic emotion regulation, academic self-esteem, and academic demotivation	23
3	Learning And Individual Differences	327	2163	6.6	The mediating roles of academic self-efficacy and academic emotions in the relation between basic psychological needs satisfaction and learning engagement among Chinese adolescent students	152
4	Asia Pacific Education Researcher	232	1776	7.7	Beyond Math Anxiety: Positive Emotions Predict Mathematics Achievement, Self-Regulation, and Self-Efficacy	71
5	Frontiers In Education	2789	7992	2.9	The Effect of Emotions on Self-Regulated-Learning (SRL) and Story Comprehension in Emerging Readers	9

TP= total publications, TC= total citation

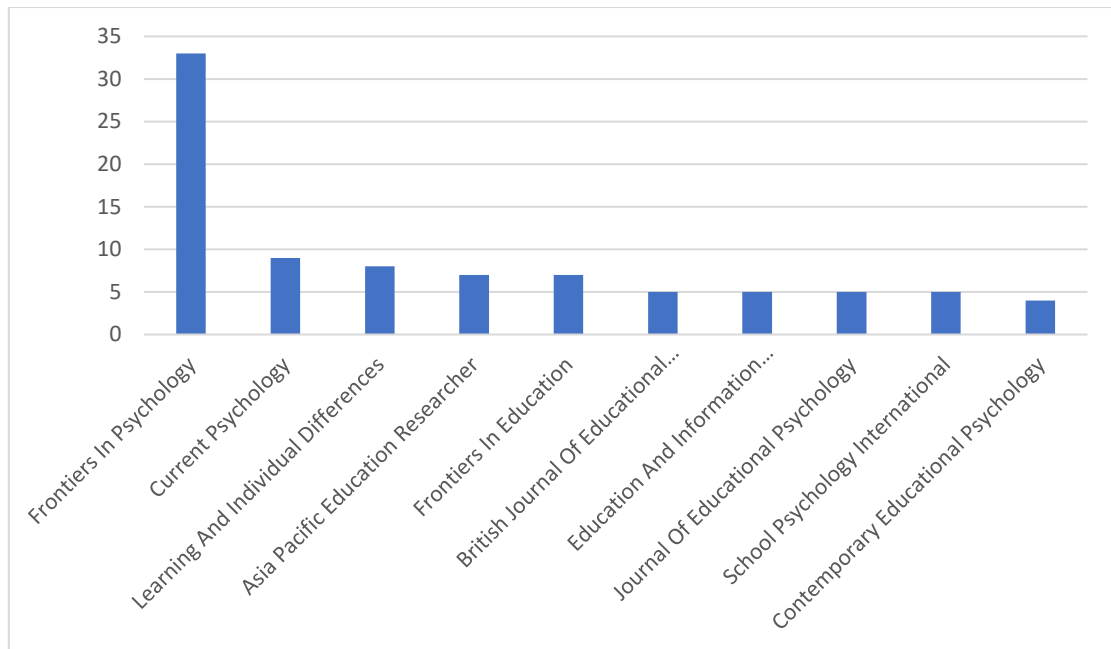


Figure 3 Documents by source

Figure 3 displays the top ten journals contributing to academic emotions research. “Frontiers in Psychology” leads significantly, publishing 33 papers, far surpassing the second-ranked “Current Psychology”, which published 9 papers, and the third-ranked “Learning and Individual Differences”, with 8 papers. The substantial gap between the top-ranked journal and the others suggests a concentration of academic emotions research within a few key journals, indicating that this field may lack diversity and still be a niche area within academic research on student emotions.

Table 3

The Top 5 Most Productive Authors in the Field of Academic Emotions Research

	Name	TP	TC	H-index	Most cited article	Times cited	Affiliation
1	Goetz, T.	144	16389	60	Boredom and academic achievement: Testing a model of reciprocal causation	267	Universität Wien
2	Hirvonen, R.	45	849	19	The dynamics of motivation, emotion, and task performance in simulated achievement situations	27	Itä-Suomen yliopisto
3	Kiuru, N.	137	3976	36	The dynamics of motivation, emotion, and task performance in simulated achievement situations	27	University of Jyväskylä
4	Nett, U.E.	25	1242	14	Characteristics of teaching and students' emotions in the classroom: Investigating differences across domains	129	Universität Augsburg
5	Pyhältö, K.	142	3580	32	From anxiety to enthusiasm: emotional patterns among student teachers	29	Stellenbosch University

TP= total publications, TC= total citation

On the other hand, another aspect of question 2 investigates the most prolific authors. Table 3 details the total number of publications (TP), total citations (TC), h-index, the most cited article and the number of citations for each author, as well as the academic institution to which they belong. These data reveal the level of recognition their research has received within the academic community. Table 3 lists the details of the top 5 prolific authors in the field of academic emotions research. These authors have made significant contributions to academic emotions research. The most prolific author is "Goetz, T.", with a total of 144 publications, an h-index of 60 and a total of 16,389 citations. The author is affiliated with the Universität Wien. This is followed by "Pyhältö, K.", with a total of 142 publications, an h-index of 32 and 3,580 citations. The author is affiliated with Stellenbosch University. These two authors are well ahead of the rest. The third most cited author is "Kiuru, N." with a total of 137 publications, an h-index of 36 and 3976 citations, from the University of Jyväskylä.

Most Productive Countries in Students' Academic Emotions Research

According to Figure 3, China and the United States are far ahead in terms of the number of publications in the most productive countries for research on students' academic

emotions. China has the highest number of relevant publications, with about 76, while the United States has 60. Finland is in third place, with about 25 publications. Germany, Canada and Iran follow closely behind. Spain, Hong Kong, Switzerland and the United Kingdom also contributed a small number of research results in this field. This figure shows the main contributors to research on students' academic emotions worldwide, in particular the significant contributions of China and the United States.

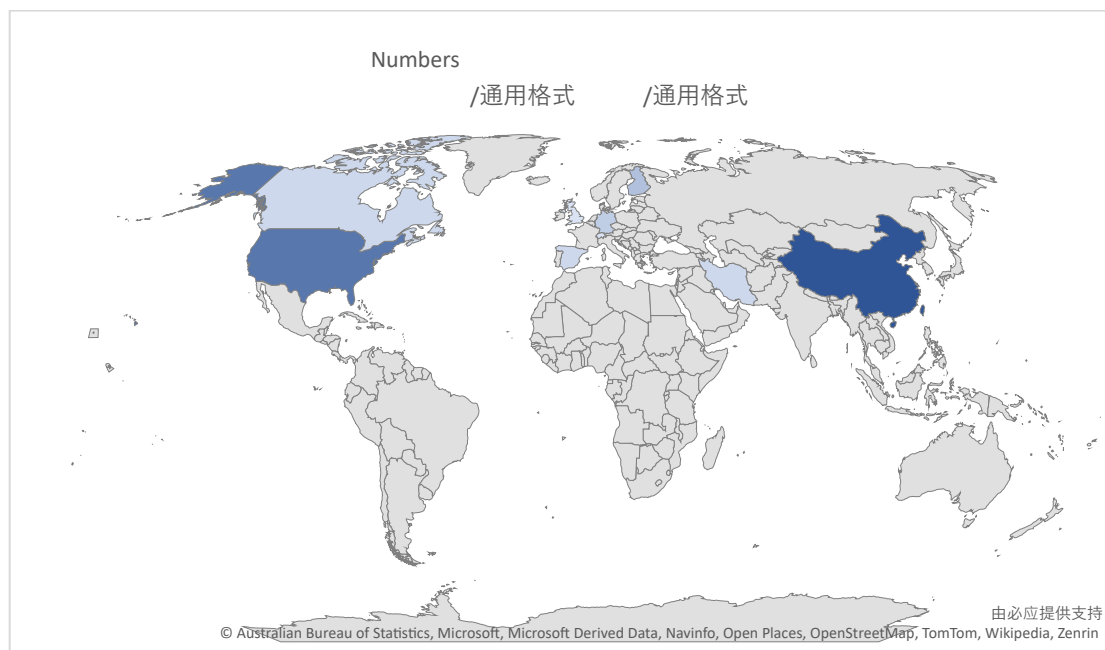


Figure 3 A map based on the most productive countries in students' academic emotions research



Figure 4. A map based on the relationship of co-authorship with countries

Figure 4 reveals the collaboration of global research on academic emotions, with the United States and China as the central hubs of collaboration. China (OC=30), the United States (OC=29), and Germany (OC=21) have established close ties with many countries, including Finland. This fully demonstrates their importance in promoting cross-continental research collaboration and has made significant contributions to the development of this research field.

Primary Research Keywords in Students' Academic Emotions

The co-occurrence map of all keywords visually represents the most frequently appearing terms in academic emotions research, highlighting the key themes and focal areas in the field. The analysis shows that commonly occurring keywords include "academic emotions" (OC=153, TLS=265), "academic achievement" (OC=16, TLS=101), and "motivation" (OC=15, TLS=78), indicating essential psychological factors influencing academic emotions. Additionally, terms like "students" (OC=30, TLS=194) and "adolescents" (OC=28, TLS=191)

underscore the importance of various educational levels within the research.

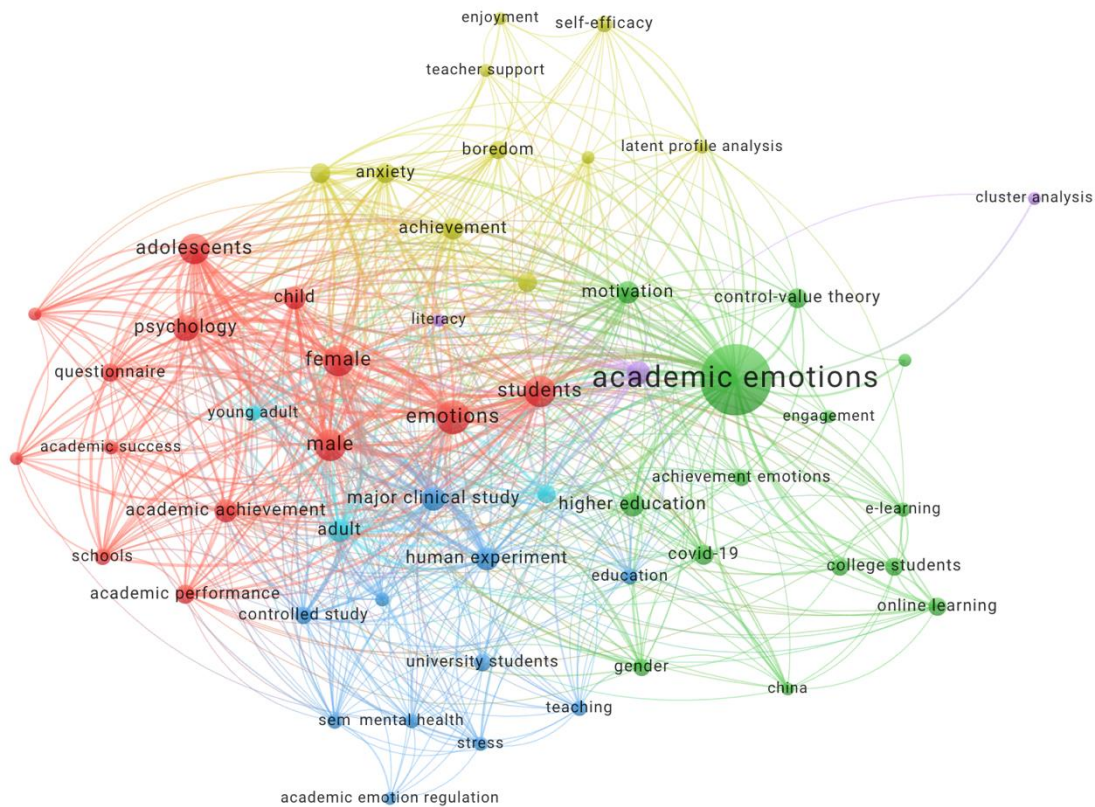


Figure 5. A map based on the relationship of co-occurrence with all keywords in students' academic emotions

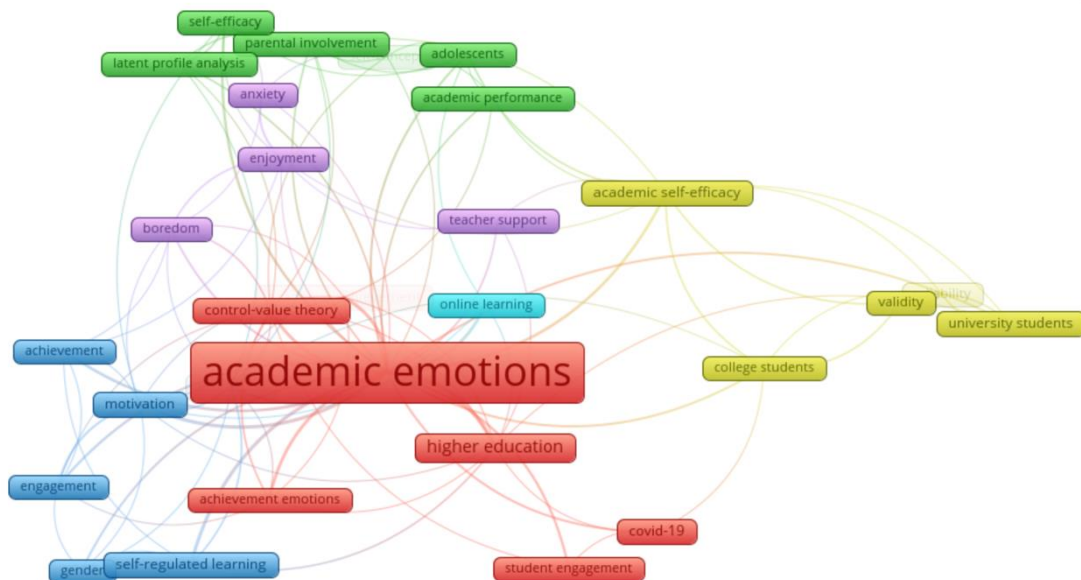


Figure 6. A map based on the relationship of co-occurrence with author keywords

The co-occurrence of author keywords is essential for identifying central themes and trends within a specific research field, as it reveals the primary areas of focus among

researchers. The author keyword co-occurrence map (Figure 6) illustrates key research areas in the field of academic emotions. The term “academic emotions” (OC=151, TLS=106) occupies a central position, reflecting its dominant role in the research. Other important terms include “higher education” (OC=17, TLS=21), indicating a focus on emotional experiences among students in higher education, and “motivation” (OC=10, TLS=20), showing the link between academic emotions and student motivation. Additionally, “control-value theory” (OC=12, TLS=19) and “academic self-efficacy” (OC=11, TLS=17) are also prominent, suggesting that control-value theory is widely accepted by scholars, providing an essential theoretical framework for the study of students’ academic emotions.

Discussion

This study conducts a bibliometric analysis of 295 publications on “students’ academic emotions.” As shown in Figure 2, the number of publications on academic emotions has steadily increased over the past decade, with a notable surge in 2022 and 2023. This rise may be attributed to the impact of COVID-19, as studies suggest that the sudden onset of the pandemic and the shift from in-person to remote learning heightened anxiety levels among students. The isolation, technological barriers, and uncertainties associated with online learning, particularly for those with lower adaptability, may have led to an increase in negative academic emotions (Wu et al., 2022). Additionally, there has been a growing scholarly focus on the effects of students’ academic emotions and emotional regulation strategies on their mental health (Pandey et al., 2022).

However, despite the continuous growth in publications on students’ academic emotions over the past ten years, the actual number of studies remains limited. This scarcity reflects the complexity of researching academic emotions, which involve a dynamic interplay of various emotional states that are difficult to fully capture through a single approach. Moreover, although self-report measures of academic emotions are expanding, tools for measuring academic emotions in research remain relatively limited (Pekrun & Linnenbrink-Garcia, 2014; Pekrun, 2020).

According to the co-occurrence map of all keywords and author keywords in the field of students’ academic emotions, the main research focuses over the past decade have been on motivation, control-value theory (CVT), self-efficacy, academic achievement, and self-regulated learning. First, academic emotions are closely linked to motivation. Research shows that positive academic emotions can enhance students’ motivation for a particular subject, making them more proactive, diligent, and engaged in the learning process. Conversely, students with negative academic emotions often have lower motivation and are more likely to give up when faced with challenging tasks (Wang et al., 2024). Second, the control-value theory (CVT) has been widely recognized for providing a comprehensive framework for understanding academic emotions by connecting emotions and motivation with individuals’ appraisals of control and value. According to CVT, as proposed by R. Pekrun and colleagues, academic emotions are determined by students’ sense of control over a task and their value assessment of it (Pekrun & Stephens, 2009). Specifically, students who feel they can control their learning and find value in the task are more likely to experience positive emotions such as enjoyment and pride, which, in turn, enhances their engagement and academic performance. Research also indicates that positive academic emotions positively mediate the relationship between control-value appraisals and student engagement, whereas negative

emotions act as negative mediators in this relationship (Xu et al., 2023). Although CVT is a powerful framework, broader individual differences and cultural factors that may influence control-value appraisals and emotions must be considered (Tze et al., 2021). Third, there is a complex interplay between academic emotions and self-efficacy. Studies have found that self-efficacy significantly predicts both academic achievement and emotional experiences, with high self-efficacy students more likely to succeed academically and maintain positive emotions (Putwain et al., 2013). Fourth, academic emotions have a significant correlation with academic achievement. Positive academic emotions, such as enjoyment, are positively associated with achievement, while negative emotions like anxiety and boredom are negatively associated (Lei & Cui, 2016; Zhang, 2024). Lastly, academic emotions significantly impact students' self-regulation. Positive emotions are positively related to self-regulation, often promoting the use of self-regulation strategies, while negative academic emotions are associated with passive external regulation, which can hinder effective self-regulation and, consequently, academic achievement (Asikainen et al., 2018; Pekrun et al., 2010). Further research has shown that enjoyment positively correlates with the use of self-regulation strategies, whereas anger and shame are negatively correlated, and anxiety has a dual relationship with self-regulation (Shen et al., 2023).

Over the past decade, research on students' academic emotions has increasingly focused on adolescents, yet there remains a lack of sufficient studies addressing younger age groups, particularly primary school students. Primary school children are in a crucial phase for developing emotional awareness and self-regulation skills. Focusing on their academic emotions can help them learn to identify, understand, and effectively manage their emotions—abilities that are essential for their future learning, daily life, and interpersonal relationships (Schutz et al., 2019). Recognizing and addressing negative academic emotions early on can enhance students' mental well-being and academic resilience.

In terms of research methodology, a significant portion of existing studies relies on cross-sectional designs, which capture data at a single point in time. This limitation restricts the understanding of the dynamic nature of students' academic emotions and how they may evolve. Additionally, there is a lack of integration between quantitative and qualitative research approaches. Solely quantitative studies may overlook the deeper psychological factors underlying academic emotions, while purely qualitative research may lack broad statistical support. Therefore, future research should use mixed methods to provide a more comprehensive explanation of students' academic emotions, enhancing the credibility of the findings.

Moreover, there are complex relationships between academic emotions, motivation, and academic achievement, which are influenced by cultural and educational contexts (Radišić et al., 2024). As education becomes increasingly globalized, cross-cultural research on academic emotions is gaining importance, especially within diverse classroom settings where the role of academic emotions should be more thoroughly examined. While Control-Value Theory offers a robust framework for understanding academic emotions, it is essential to account for broader individual differences and cultural factors that may impact control-value appraisals and emotional experiences (Tze et al., 2021).

Conclusion

This study conducted a bibliometric and visualization analysis of 295 articles from the Scopus database focusing on students' academic emotions, uncovering the current state and research trends in this field. The analysis reveals a steady increase in academic emotions research over the past decade, with a significant rise in publications in 2022 and 2023, likely influenced by the COVID-19 pandemic. As the lasting effects of the pandemic continue to unfold, researchers have shown an increased interest in examining students' academic emotions during and after the pandemic. This study identifies the most influential journals, countries, and researchers, with China, the United States, and Finland making the largest contributions, and "Frontiers in Psychology" emerging as a prominent publication platform. Keyword analysis highlights core themes such as motivation, control-value theory, self-efficacy, academic achievement, and self-regulated learning.

In summary, these findings clarify the landscape of academic emotions research, emphasizing its importance and relevance. The study provides insights into areas requiring further exploration, particularly the need to strengthen research on younger age groups, especially primary school students. Future research should thus focus more on academic emotions in younger students to understand the development of these emotions over time. Additionally, a cross-cultural perspective should be applied to explore academic emotions across different educational and cultural contexts. Longitudinal designs and mixed methods will further aid in uncovering the dynamic nature and deeper psychological factors of students' academic emotions, offering a more comprehensive and reliable research outlook. These insights serve as a valuable reference for educators and researchers, guiding future studies and deepening our understanding of how academic emotions impact students' learning experiences and overall development.

Limitation

This study has some limitations. First, the data was gathered exclusively from the Scopus database, excluding other sources like Web of Science, JSTOR, and Sage, which may have left out some relevant research. Second, the keywords used in the search might not cover all studies on the topic, potentially overlooking research with different terminology. Additionally, by focusing on the past ten years, this study does not include earlier findings, which may limit the understanding of long-term trends in academic emotions research. Furthermore, only English-language publications were analyzed, which could mean missing insights from studies published in other languages and thus affecting a fully global perspective. Lastly, this study primarily highlights trends and patterns in academic emotions research without deeply examining the underlying causative relationships. Future studies might address these limitations by using multiple databases, broadening the range of keywords and time periods, and employing a variety of methods to perform a more systematic literature review.

In conclusion, bibliometric and visualization analysis provides an informative overview of the research field of academic emotions among students, helping to quickly identify key research themes, trends, and areas of focus. These methods also reveal researcher collaboration networks and the influence of various studies, offering valuable insights for further research and practical applications in understanding and supporting students' academic emotions.

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