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Systematic Review of Global Research on Acculturation of International Students (2003-2023)

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ABSTRACT

This paper presents a scientometric review of global articles regarding acculturation of international students (AoIS), published from 2003 to 2023 and indexed in the Web of Science Core Collection (WoSCC), to provide a quantifiable snapshot of the field. Bibliographic information was extracted from WoSCC. Refined data were visualized using CiteSpace. Worldwide publications have been increasing continuously since 2013, with a staged development among relevant disciplines. Limited collaborations have been found among countries, institutions, and posting authors, however a gradual trend toward transnational teamwork has been emerging. Research foci mainly concentrate on macro factors of acculturation. Research gaps have also been revealed, as hotspots in recent pedagogical research field have not been adopted in studies of AoIS.

Keywords: Acculturation, International Students, Cultural Adaption, Acculturative Experience.

INTRODUCTION

Acculturation, or cultural adaption, which appears to be one of the prominent topics of higher education since American anthropologists formed its unified definition (Redfield, Linton, & Herskovits, 1936), refers to the adaption to the

changes of cultural patterns during continuous interaction of individuals or groups with different backgrounds. This definition has laid basis for most subsequent studies. For international students, acculturation could be defined as their gradual acceptance of the pertinent elements of the new culture, without completely discard their own original cultural backgrounds (Sokolskaya & Valentonis, 2020). According to Mclachlan and Justice (2009), cultural adaptation appears to be the primary problem faced by international students in foreign cultures. Similar to other intercultural sojourners, they may experience challenges including acculturative stress, and difficulties with adjustment to the cultural environment of the host countries (Smith & Khawaja, 2011).

As per Organisation for Economic Cooperation and Development (OECD, 2019), international students' mobility has been increasing over the past two decades. In 2020, 6.4 million students worldwide crossed borders for higher-education, i.e. more than twice the number of 2007 (OECD, 2019). These international students accounted for 5% of global bachelor students, 14% of master students and 24% of doctoral students (OECD, 2019). Due to the COVID-19, in 2021 and first half of 2022, students' mobility was affected by the challenges of the pandemic, which on the other hand had accelerated the transition towards technology-assisted distant education when in-person learning was disrupted. Consequently, the number of international students had declined during periods of school closures at various stages of the pandemic. However, as OECD (2022) highlighted, many countries struggled to monitor online higher-education systematically and to provide comparable cultural experiences for their foreign students, who may have also encountered acculturative issues to adapt to the different cultures.

It is acknowledged that the presence of international students is critical for host countries, not only for economically benefits, but also socially and culturally, i.e. fresh outlook, young talent, and unique cultural perspectives, which accelerate the development and diversity of a nation (Hegarty, 2014). Acculturative issues, on the other hand, may profoundly affect their experiences in the host countries, and cause attachment anxiety, neuroticism and other adaptive stress (Wang, Jin, & Zamudio, 2021). Hence, it is not surprising that acculturation of intercultural international students has gained substantial attention globally for higher-education, and that related studies provide insights for further exploration of international students' experiences (Güzel & Glazer, 2019; Ma et al., 2020).

Against this background, however, to date there has been limited systematic review on the development of global research related to the acculturation of international students (AoIS). These reviews identified an array of important factors, such as theoretical frameworks, research methodologies, and research themes concerning international students' cultural adaption (Sharif, 2019). Previous literature review also found that although the international student literatures provided support for some

acculturative aspects, further investigation of related models is scarce to accurately describe the acculturation of international students (Smith & Khawaja, 2011). Additionally, prominent acculturation models portray the host society as an important factor influencing international students' acculturation, which suggests the need for future intervention. Albeit existing interpretations are mostly based on qualitative content analysis, subsequent expansion of research in recent years highlight the necessity for another review. Furthermore, as Choy et al. (2021) maintained, there has been an ongoing need to explore the evolvments of dominant acculturation models applied to international students, as a large proportion of the acculturation studies are related to immigrants and refugees.

On the other hand, scientometrics, or systematic review, has recently been adopted in numerous quantitative studies to probe into the numerical correlations between variables, thus exploring the patterned regularities and causal relationships (Marginson, 2022). Hence, in order to provide a comparatively quantifiable and visualized snapshot of this field, this paper presents the outcome of a scientometric review using the CiteSpace software, of 639 relevant journal articles published in the last two decades from 2003 to 2023 and indexed in the Web of Science Core Collection (WoSCC), to complement the existing literature reviews from a quantitative perspective.

Specifically, this paper aims to elicit research areas and foci (i.e. central points of research attention), trends and outcomes, as well as gaps and issues in AoIS over the past two decades, in order to provide a comprehensive understanding of the field.

The following research questions are addressed:

What is the overview of global research related to international students' acculturation?

What are the major contributors and collaborations in the field, including leading countries, high-yielding institutions, and productive authors?

What are the research foci over the past two decades, and the emerging trends in recent years regarding international students' acculturation?

RESEARCH METHOD

Data Collection

The Web of Science Core Collection (WoSCC) is the oldest selective citation index of scholarly publications covering journals, proceedings, books, and data compilations (Birkle et al., 2020). Recognized as one of the world's leading multidisciplinary bibliographic databases (Singh et al., 2021), WoSCC contains a relatively large set of journals specializing in education, of which some are related to international students.

Bibliographic information related to AoIS was extracted from WoSCC, serving as a most appropriate data source for conducting scientometric reviews. Results were then refined to conduct subsequent analysis.

As mentioned earlier, with the aim of collecting pertinent articles related to international students' acculturation over the past twenty years, a time span between January 2003 and April 2023 was set. After several preliminary searches and repeated comparisons, an advanced topic search retrieval strategy was applied, using the search terms including "acculturation" or its synonyms, i.e., "cultural adaption", and "international student" in various combinations with Boolean Operator "AND" and "OR" that explores "TS", i.e., "title", "abstract", "author keywords", and "keywords plus" of every publication in WoSCC.

Hence the search strategy is as follows:

TS= ("acculturation" AND "international student") OR ("cultural adaption" AND "international student").

Search results were then refined for eligibility for the inclusion or exclusion criteria presented in Table 1.

Table 1: Eligibility Criteria.

Inclusion Criteria	Exclusion Criteria
Articles published in a peer-reviewed journal	Publications including conference proceedings, research notes, editors' comments, book chapters, and reviews
Written in English	Written in languages other than English
Full-length articles with empirical findings with actual data	Papers of personal opinions and theoretical argumentations without actual data
Articles centered on both acculturation and international student	Articles centred on only acculturation or only international student

Eventually 639 English articles were obtained as valid records, which were then downloaded for Cite Space analysis, with "Record Content" set as "Full Record" and "File Format" as "Plain Text".

Data Analysis

CiteSpace and Setting

An integrated bibliometric approach was adopted to review and analyse the collected data via mathematical and statistical methods. The data were imported and dynamically visualized using CiteSpace (6.1.R6), which is the econometric software for multivariate analysis that was developed by Prof. Chen's research team (Chen, 2005; Jia & Bava Harji, 2023; Su, Li, & Kang, 2019). Time Span was 2013-2023, with Time Slicing was set to 1 year. Selection criteria under the Top N%

column were set to 50%, and “Static” and “Show Merged Network” were selected for visualization.

In CiteSpace, the relative size of the visualized node (representing publication frequency) and the presence of a red/purple ring (representing betweenness centrality) indicate the node’s magnitude or importance in the domain (Chen, 2006). Similarly, the thickness of the visualized link between two nodes proportionally indicates the strength of the connection (Moral-Munoz et al., 2019). Based on the visualization results, the 639 global articles in terms of authors, institutions, countries, keyword co-occurrence, clusters and bursts were analysed for research frontiers, hotspots, evolvments and trends of acculturative research regarding international students. For detailed analysis, title and abstract screening were also conducted with the selected articles.

Paths of Analysis

To comprehensively analyse global research over the past two decades regarding international students’ acculturative experiences, this paper separated its paths from three aspects based on the functions available in CiteSpace:

- (1) Fundamental analysis of collected data, in order to present an overview of the field in general, comprising the number of annual publications, authors, institutions, and countries.
- (2) Hotspots analysis through mapping the keyword co-occurrence, clusters and time lines, which provided clear demonstrations of the main foci, basic themes, and hotspots development of the field between 2003-2023.
- (3) Frontiers and trends exploration. Research frontiers analysis consisted of the ranking of co-cited core papers or references (Li & Long, 2020), i.e., references that were more frequently cited were indicators as frontiers of the research field. Bursts analysis, on the other hand, was used to identify citation bursts, which is defined as the intensity of the sudden appearance or vanishing of keywords during a certain phase, thus indicates the shift of research direction in the research trend (Zhang et al., 2020). Based on the analysis of the frontiers and bursts, the trending research themes and future research suggestions were then inferred.

RESULTS AND DISCUSSIONS

Fundamental Analysis and Overview of Publications

Annual Distribution of Publications

Statistical analysis of the number of publications could provide insights into the evolvments of the domain (Jia & Bava Harji, 2023). Therefore annual publications in WoSCC on AoIS clearly present the trends and changes in academic

attention over past twenty years. Figure 1 illustrates the 639 articles on AoIS published annually from January 2003 to April 2023.

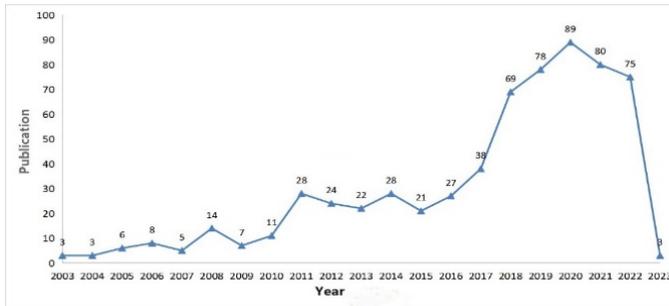


Figure 1: Annual Publication Statistics of AoIS.

As seen in Figure 1, the evolution of the research field of AoIS can be separated into four stages, namely the budding stage, the slow development stage, the rapid development stage, and the slight reduction stage.

In the budding stage (2003–2007), AoIS research was at the initial phase of evolution, with the number of published articles relatively small, i.e., no more than eight each year. In early years of 2003 and 2004, only three articles were published annually. Despite having recognized the pertinent influence of acculturative experiences to international students (Nilsson & Anderson, 2004), an overwhelming majority of these articles were concentrating on international students' experience in a certain country or region, rather than generalization of the topic, or adoption of the scientific methods (Frey & Roysircar, 2006; Zhang & Dixon, 2003).

In the slow development stage (2008–2015), a slow increase, i.e. an average of about 16 articles per year, was evident. A number of empirical articles explored social networks and psychological orientations of international students (Nilsson et al., 2008).

AoIS research began to develop more rapidly in the third stage (2016–2020) as the number of articles increased to 89 in 2020. Research findings on AoIS abounded, and diverse factors such as discrimination (Ramos et al., 2016), social media (Yu, Foroudi, & Gupta, 2019), even diet habits (Alakaam & Willyard, 2020) were examined. However albeit a decreasing trend was witnessed after 2020, which could be due to the pandemic and global lockdowns, the number of published articles was still larger than the first and second phases and even the beginning of the third stage.

Global Authors and Collaborations

The publication status of the authors may reflect the width and depth of a domain (Serenko et al., 2010). Hence the statistical analysis of the most productive authors of AoIS research and a co-occurrence visualization of global authors are presented in Table 2 and Figure 2. In Figure 2, the bigger the font and dot respectively, the more articles published by the author; The links between the authors show the collaborations between them, and the colours of the links represent the year of

collaborations, and the thickness of the links indicate the strength of collaborations.

Table 2: Top 8 Prolific Authors.

Sr. No	Author	Institution	No. of Articles
1	Azadeh Shafaei	School of Business and Law, Edith Cowan University (ECU), Australia	5
2	Nordin Abd Razak	School Of Education, Universiti Sains Malaysia	5
3	Kathrin Jonkmann	FernUniversität in Hagen, Hagen, Germany	3
4	Julia Zimmermann	Faculty of Psychology, FernUniversität in Hagen, Hagen, Germany	3
5	Kate Reid	School of Education, University of Glasgow, Scotland	3
6	Dely Lazarte Elliot	School of Education, University of Glasgow, Scotland	3
7	Baumfield, Vivienne	School of Education, University of Glasgow, Scotland	3
8	Kinga Bierwiazzonek	Department of Psychology, University of Oslo, Norway	3

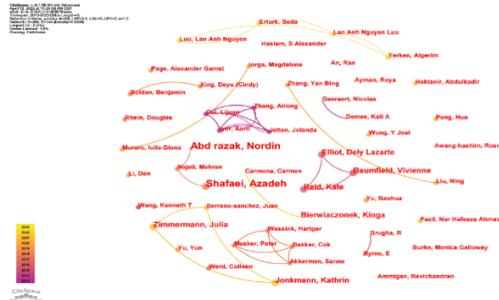


Figure 2: Global Author Co-Occurrence Visualization.

As shown in Table 2, the authors with the highest number of publications are Shafaei and Razak (with five collaborated articles), whose research were mainly focused on factors influencing AoIS (Shafaei et al., 2016) and the impact of AoIS (Shafaei, Abd Razak, & Nejati, 2016). In addition, other prolific authors researched on other topics such as international students’ personalities and psychological conditions, as well as some interdisciplinary articles (Serrano-Sánchez, Zimmermann, & Jonkmann, 2021).

The information in Figure 2 shows the academic collaborative relationships among global authors. More nodes and fewer connections can be clearly seen in the figure, indicating that global AoIS authors have not formed a collaborative network. Limited communications and collaborations appear to be established among the authors, which could affect the evolvement of the domain, because cooperation among authors is essential to more global studies and transformation of the field.

Leading Countries of AoIS Studies

The visualization of collaborative network among countries showed the 59 nodes and 110 links connecting them (Figure 3). The leading countries are USA, People’s Republic of China, Australia, South Korea, Canada and England with 203, 88,

55, 40, 32 and 29 publications respectively for each country. It is evident that these countries including the USA which made the biggest contribution to global AoIS research field are developed countries, where the economic and educational environments are more suitable for the enrolment of international students, and the involvement of research system.

On the other hand, as seen by the thickness of the yellow-purple rings, Netherlands (with a centrality of 0.6), Portugal (0.59), Australia (0.57), Scotland (0.57), France (0.54) and England (0.54) have developed most collaborative connections with other countries when publishing articles, with the betweenness centrality taken into consideration. Therefore, it can be deduced that European countries appear to have the most significant influence on global collaborative networks related to AoIS. By contrast, the centrality of the USA (0.11) and China (0.32) are relatively low, indicating that although the two has the highest number of publications, neither have established frequent collaborations with other countries.

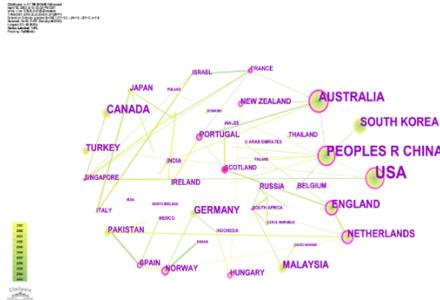


Figure 3: Countries Co-Occurrence Visualization.

Research Institutions of AoIS

The CiteSpace analysis has revealed 258 global institutions, among which six institutions have published more than five relevant articles, have conducted research on AoIS. Most of the institutions are international universities. Hong Kong University of China has published the most number of papers, i.e. eight, followed by Eotvos Lorand University and University North Texas, with each publishing seven articles. However, the mapping of institutions co-occurrence (Figure 4) presented rather limited collaborations among institutions; the darker colour of the link, the earlier year of the collaboration, which also reflects that fewer collaborations have been established in recent years, which could be due to the Covid-19 pandemic. It is also noticed that although some collaboration relationships indeed have been developed, as noted by the absence of a yellow-purple ring of centrality, no institution had played a leading role in

the network.

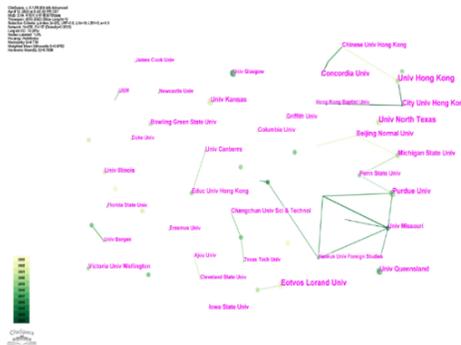


Figure 4: Global Institutions Co-Occurrence.

Hotspot and theme Evolvement Analysis Research Hotspots of AoIS

The keywords of AoIS research are visualized by co-occurrence mapping (Figure 5), and the top ten keywords with the most occurrence frequency as well as the longest existence are: “international student”, “acculturation”, “adjustment”, “adaptation”, “experience”, “stress”, “identity”, “social support” and “attitude”. Hence, they can be assumed as the most fundamental keywords or research domain in the field of AoIS over the past twenty years. Among the ten keywords, “experience” and “attitude” depict comparatively high centrality values of 0.18 and 0.14, which are indicative being the most central themes for the AoIS subject and interdisciplinary studies.

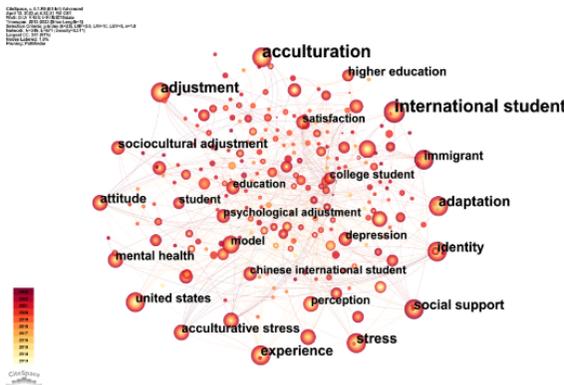


Figure 5: Keywords Co-Occurrence Visualization.

In addition, the occurrence of the main keywords also show the frequent academic correlations among them, such as the impact of changes in sociocultural context on mental health (Fox, Thayer, & Wadhwa, 2017), or the dialectical relationship between social support and acculturative stress and depression (Chae, Park, & Kang, 2014). It is also noticeable that among all the hotspots illustrated in Figure 5, the most concerned destination country of international students is the “United States”, which remains the top host destination for international students. On the other hand, the most frequently studied nationality is “Chinese international student”, with China being the largest pool of international students abroad (Raghuram & Sondhi, 2022).

Table 3: Keywords with Centrality Greater Than 0.1.

Number	Centrality	Keyword	Year Occurrence
1	0.19	academic performance	2013
2	0.19	acculturation strategy	2013
3	0.19	acculturation attitude	2013
4	0.18	experience	2013
5	0.15	psychological adaptation	2016
6	0.15	predictor	2015
7	0.14	attitude	2013
8	0.13	integration	2016
9	0.12	scale	2014
10	0.12	cultural adjustment	2014
11	0.12	acculturation stress	2018
12	0.11	social support	2013
13	0.11	language	2017
14	0.1	depressive symptom	2014
15	0.1	Chinese student	2013
16	0.1	exchange student	2016

As defined in CiteSpace, keywords with centrality greater than 0.1 represent central nodes, which are relatively important and influential in the research domain (Wang & Lu, 2020). Table 3 lists the 16 keywords with centrality more than 0.1, i.e. the top influential keywords that scholars paid close attention to over the last two decades.

As seen in Table 3, studies on “academic performance” of international students as well as their “acculturation strategy” and “acculturation attitude” have been frequently conducted in the field since the very beginning of 2013. The latest study by Sirin and Sin (2023) has revealed the significant positive correlation between international students’ acculturation and their academic performance, as well as Park, Joshanloo, and Utsugi (2023) has reported on the role of acculturation strategies and attitudes as mediators for the psychological and sociocultural adjustment of international students. On the other hand, “psychological” aspects, such as “stress” and “depressive symptom”, have also been influential, as acculturative stress has been recognised as a

distinguishing component related to depression (Driscoll & Torres, 2022).

Research Clusters and Keywords Evolution of AoIS

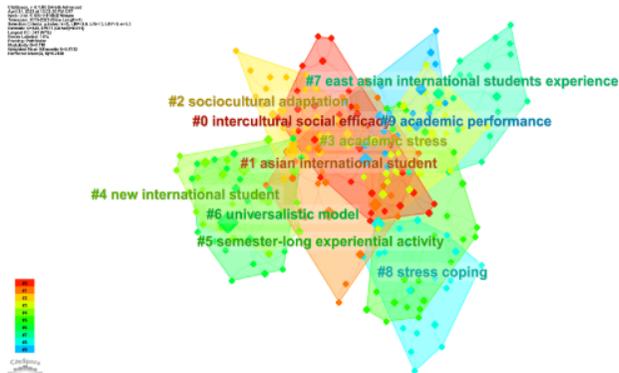


Figure 6: Top Ten Keywords Clusters of AoIS.

Keyword clustering which was conducted via running the clustering function on CiteSpace, classifies keywords with the same characteristics, in order to further examine the knowledge structure of various hotspots (Guo et al., 2022). Detected keywords of previous section were thus clustered using LLR algorithm and were set to obtain the top ten clusters of this research field. Mapping result is illustrated in Figure 6. The module value modularity $Q = 0.718 > 0.3$ indicates that the clusters structure is significant, while the mean profile value mean $S = 0.8756 > 0.5$ confirms that the cluster is reliable (Zheng et al., 2023). The clustering labels were marked in the descending order of #0 (intercultural social efficacy), #1 (Asian international student), #2 (smart city), #3 (sociocultural adaption), #4 (new international student), #5 (semester-long experiential activity), #6 (universalistic model), #7 (East Asian international students experience), #8 (stress coping), and #9 (academic performance). Each of the ten clusters has a silhouette degree greater than 0.7, which explains the considerable degree of closeness between clusters (Li et al., 2023).

The clustering and the high-frequency keywords mentioned earlier are integrated, and the following four major categories are generalized:

- (1) Theoretical studies and construction (Cluster #0, Cluster #6). The high-frequency keywords in these clusters included “empirical analysis”, “social efficacy”, “social support” and “cross-cultural adaptation”, etc., which involved theoretical and methodological aspects of the research.

- (2) Objects of research (Cluster #1, Cluster #4, Cluster #7). It is obvious that Asian students, especially East Asian students were mostly concentrated on. The high-frequency keywords of the clusters such as “Chinese international student” and “Hong Kong” also validate that Chinese international students have been mostly chosen as representatives of East Asian international students. Meanwhile, “new international students” were the most acculturation-sensible objects of the field, as they may be easily affected and adapt to different orientations through the cross-social contacts (Aladegbaiye, de Jong, & Beldad, 2023).
- (3) Experiential issues and strategies exploration (Cluster #2, Cluster #5, Cluster #9). The frequently occurred keywords included “academic experience”, “academic performance”, “program”, “social media” and “examination”, etc. These clusters were based on the analysis of international students’ acculturative experiences in the hosting societies (Li et al., 2017), and the relationship between their acculturative issues and their academic accomplishments (Lee, 2016).
- (4) Psychological modelling and stress assessment (Cluster #3, Cluster #8) with frequent keywords such as “stress”, “psychological”, “communication” and “depression”. These clusters also corresponded to the keywords co-occurrence analysis emphasised earlier. The psychological studies provided interdisciplinary information of AoIS. For instance, studies have found that international students’ psychological well-being was affected by the length of stay, language proficiency, willingness for seeking help and depression (Li & Long, 2020). In addition, stress coping strategies were examined by numerous researchers, as Bai (2016) suggested that strong personality as well as social support is of great importance for reducing acculturative stress and promoting adjustment.

Based on the keywords clustering, the time zone mapping of the keywords (Figure 7) was established to present the evolvement of the keywords chronologically. It can be concluded from Figure 7 that most of the fundamental and central keywords of the clusters emerged in 2013. With the continuous global research, themes have gradually shifted from the studies of basic concepts in the first stage, to some macro terms and the formulation of clusters in the second stage, to micro concepts development and case exploration in the third stage, forming a clear macro–micro evolvement trend. In recent years, the articles appear to concentrate research on “social media” or “women” of AoIS. However, compared with the first stage, the following research have not explored wider into other interdisciplinary domains other than psychology. The microanalysis of the third stage does not correspond to the global crisis caused by COVID-19; less publications and unchanged topics have been

witnessed. The lack of design of appropriate coping strategies in this online learning era is obvious, thus, in the next stage of research, scholars should timely adapt the research targets, “overturn” the fundamental structures formed previously, accelerate the adoption of new technologies, and consider the current situation encountering international students.

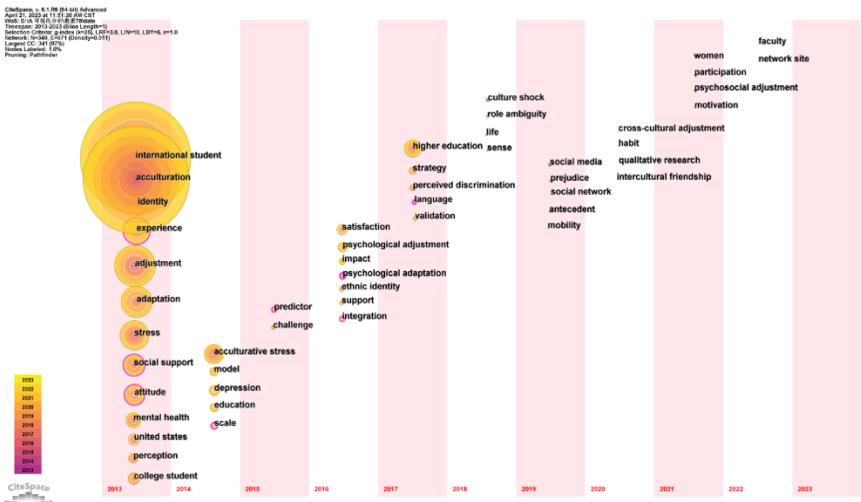


Figure 7: Keywords Time Zone Evolution of Aois.

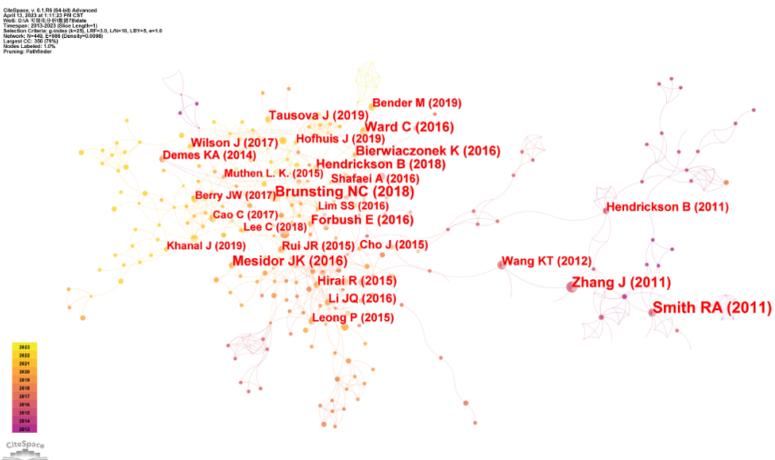


Figure 8: Frequently Cited Articles of AoIS.

According to Figure 8, the top ten cited articles are summarized in Table 4.

Frontiers Analysis and Trends Exploration

The research frontiers are defined as the most cited articles as active indicators for popular themes in the domain development, and the mapping of the frequently cited articles over the last two decades is presented in Figure 8.

Table 4: Top 10 Cited Articles of AoIS.

No.	Article	Author(s)	Year
1	<i>A review of the acculturation experiences of international students</i>	Smith RA, Khawaja NG	2011
2	<i>Predictors of undergraduate international student psychosocial adjustment to US universities: A systematic review from 2009-2018</i>	Brunsting NC, Zachry C Takeuchi R	2018
3	<i>Acculturation and psychosocial adjustment of Chinese international students: Examining mediation and moderation effects</i>	Zhang J, Goodson P	2011
4	<i>Advancing acculturation theory and research: the acculturation process in its ecological context</i>	Ward C, Greeraert N	2016
5	<i>Factors that contribute to the adjustment of international students.</i>	Mesidor JK, Sly KF	2016
6	<i>Social media use and adaptation among Chinese students beginning to study in the United States</i>	Forbush E, Foucault-Welles B	2016
7	<i>Psychological and sociocultural adjustment of first-year international students: Trajectories and predictors.</i>	Hirai R, Frazier P, Syed M	2015
8	<i>An analysis of friendship networks, social connectedness, homesickness, and satisfaction levels of international students.</i>	Hendrickson B Rosen D, Aune R K.	2011
9	<i>The role of perceived cultural distance, personal growth initiative, language proficiencies, and tridimensional acculturation orientations for psychological adjustment among international students.</i>	Taušová, J, Bender, M Dimitrova, R van de Vijver, F	2019
10	<i>Acculturation, internet use, and psychological well-being among Chinese international students</i>	Li JQ, Liu X, Wei T, Lan W	2013

Burst detection was also conducted to identify the emerging or upcoming research frontier. Figure 9 lists the top 25 bursting keywords detected, in terms of strength, and the start and end years.

From the analysis of the research frontiers and burst detection, it is evident that review papers were most cited in the field, however the existing review articles are relatively out-dated, as theoretical studies as well as case studies regarding Chinese students has attracted attention in the academic community. As per the burst detection, since 2013, a large number of emergent

words have been witnessed, including keywords such as “attitude”, “academic performance”, “personality” and “United State” which have been discussed earlier. However, it is worth noticing that the global researchers have paid greater attention to new hotspots in recent 3 years, including “social media”, “women” and “graduate students”. This indicates that the topics represented by these keywords have emerged to be more active in AoIS field in recent years, which emphasised the updated focus on the use of latest global technologies, gender differences of international students, and different duration of the intercultural contacts. This suggests direction for future research.

Top 25 Keywords with the Strongest Citation Bursts

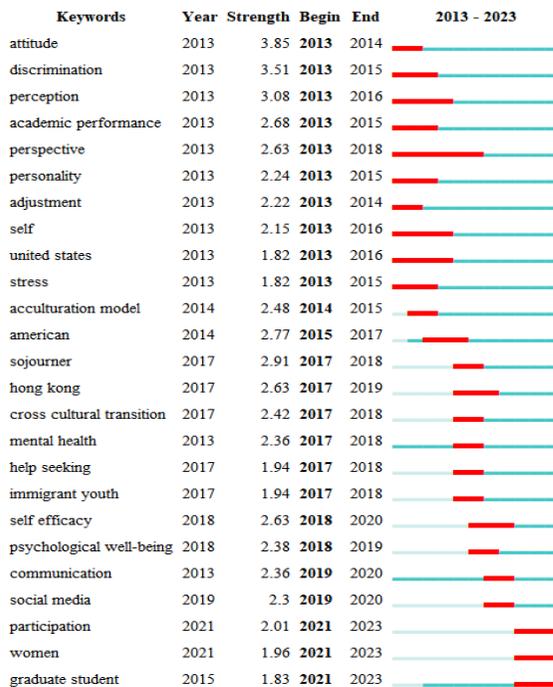


Figure 9: Top 25 keywords with the Strongest Bursts of AoIS.

CONCLUSIONS AND LIMITATIONS

Based on articles reviewed (from 2003 to April 2023) from the WOSCC database, this paper focused on the systematically visual analysis of global authors, institutions,

countries, publications, keywords, and involvement of AoIS in the past twenty years.

The results show that the annual number of publications worldwide has been increasing continuously since 2013, with a staged development, confirming the growing research interest in AoIS among relevant disciplines worldwide. However, albeit from the aspects of countries, institutions, and authors, it was found that limited comprehensive collaborative systems have been established, and fewer collaborative contacts among posting researchers have been especially obvious, a gradual trend toward transnational teamwork has been emerging, particularly among European countries.

Visualizations of highly cited keywords and frontier papers revealed that the research focus of AoIS was mainly influenced by macro factors such as international students' personal attitudes or experiences, with Chinese international students as the most frequent research objects, and the USA as the leading host country. Clusters of keywords were mainly interdisciplinary, especially between pedagogical practices and psychological research.

Although the influence of COVID-19 has reduced recent publications, several new trends have been explored as seen in the burst detections. In terms of latest articles, emerging directions involved aspects including technology-assisted support such as "social media", gender research and other detailed foci of AoIS. However, a gap has been also revealed, i.e. hotspots among recent pedagogical research field such as big data, virtual reality and online education have not been adopted in studies of AoIS.

Therefore, it is suggested to conduct research practices of AoIS in interdisciplinary domains other than psychology; and technology-assisted coping strategies are strongly recommended for future research and policies, in order to conform to the trend of the times, and explore new acculturative concepts and models in this online-learning era.

Several limitations are acknowledged in this paper. Firstly, the limited amount of articles analysed, as only English articles from WOSCC database were reviewed, and articles written in other languages or indexed in other databases were excluded. The depth and comprehensiveness of this review may be insufficient. Secondly, only systematic review of relevant literature was conducted, which excluded empirical evidence of the conclude findings. In addition, limited clusters and leading references were analysed, i.e. only the top ten clusters and frontiers were generated in CiteSpace. Thus, more intensive reading and more in-depth analysis on this basis is recommended for subsequent future reviews.

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