What do we know about L2 teachers' emotion regulation? A bibliometric analysis of the pertinent literature

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ABSTRACT: Since emotion regulation is a key factor in second language (L2) education, multitudes of studies have been conducted on this emotional factor. Yet, the majority of previous research has focused on the emotion regulation strategies used by L2 learners. In recent years, some scholars have started to explore L2 teachers' emotion regulation from various perspectives, but to the best of our knowledge, no systematic review to date has been carried out in this area. Using CiteSpace software (Version 6.2.R2), the present review study analyzed 26 articles published from 2020 to 2023. The analysis outcomes showed that L2 teachers' emotion regulation is a growing but still nascent research area that attracts interdisciplinary attention from psychologists and linguists around the globe. The results also demonstrated that Iran and China are the most fruitful and fertile lands in this area with Iran having a higher degree of collaboration among institutions and authors. Considering the limitations of previous studies, this study provides some suggestions for future research.

KEYWORDS: emotion regulation; second language (L2) education; L2 teachers; bibliometric analysis

1. Introduction

Emotions are an essential aspect of human life that may influence the personal and interpersonal characteristics of individuals (Seaton and Beaumont, 2015; van Kleef and Lelieveld, 2022). They can also affect one's performance positively or negatively, depending on how they are regulated (Lipnevich et al., 2021; Wood et al., 2022). Therefore, emotion regulation is a crucial skill for enhancing well-being and achieving goals. Emotion regulation emerged as a research domain in the 1990s, building on earlier theoretical and empirical work on psychological defences (Freud, 1964) and stress coping (Lazarus and Folkman, 1984), which suggested that people can actively regulate their emotions instead of falling into the passive victims of them. Emotion regulation is defined as the different processes that people use to control or express their feelings (Gross, 1998).

Previous literature has identified two main outcomes of emotion regulation: reappraisal and suppression (McRae and Gross, 2020). Reappraisal involves changing one's perspective on a situation to alter one's emotional response, which is generally considered an effective and adaptive strategy. It can reduce negative emotions and increase positive emotions, helping people cope with stress and adversity, and improving their performance in challenging tasks. Suppression, on the other hand, refers to inhibiting the outward expression of emotions, which is generally considered a less effective and maladaptive strategy. It can reduce positive emotions and increase negative emotions, increasing physiological arousal

and stress, and interfering with cognitive processes.

Emotions are also pervasive in the context of second language acquisition (L2), which has a profound impact on learners' L2 proficiency and instructors' teaching practices (Derakhshan, Wang, Wang, et al., 2023; Hu and Wang, 2023; Yu et al., 2022; Zhi et al., 2023). Due to the salience of emotions, MacIntyre and Gregersen (2012) introduced positive psychology (PP) to the field of L2. PP focuses on the strengths and well-being of individuals, and it is based on the pillars of positive institutions, characteristics, and emotions. Therefore, emotion regulation has been highlighted as a crucial positive characteristic in the L2 context underpinned by PP (Derakhshan, 2022; Y. Wang et al., 2021). Previous literature on emotion regulation has mainly focused on L2 learners (Derakhshan and Zare, 2023; Solhi et al., 2023; Theiyab Alazemi et al., 2023). However, as the center of learning, L2 teachers are widely recognized to be exposed to various emotions and challenges during their career (YL Wang and Pan, 2023; S Li, 2023), so emotion regulation is also highly required (Benevene et al., 2020; Zhi and Wang, 2023). Fortunately, there has been a growing body of empirical studies on L2 teachers' emotion regulation in recent years (Fan and Wang, 2022; Fathi et al., 2021; Greenier et al., 2021). These studies can provide valuable insights into L2 teachers' emotion regulation.

Despite increasing attention from researchers on this topic, there is a lack of a systematic review that synthesizes and evaluates the existing literature in this area from different perspectives and dimensions. Thus, the purpose of this review study is to fill this gap by providing a comprehensive and critical analysis of the current state of the art on L2 teachers' emotion regulation. It also aims to identify the limitations in the research field and offer implications and suggestions for future research and practice. To achieve this aim, we searched for relevant articles published between 2020 and 2023 in the Web of Science (WoS) Core Collections database, as the first article on this topic appeared in 2020. Then, we applied CiteSpace to conduct a bibliometric analysis, which can reveal the patterns of authors, institutions, countries, and keywords related to various types of publications in this area. Specifically, this study was guided by the following four research questions:

RQ1: What are the global trends in L2 teachers' emotion regulation?

RQ2: What are the research hotspots for L2 teachers' emotion regulation?

RQ3: How about the cooperation among countries, institutions, and authors?

RQ4: What are the limitations of existing studies and future directions?

2. Materials and methods

2.1. Ethics statement

This study did not require any Institutional Review Board approval, as it did not involve any human subjects. This study was based on bibliometric data obtained from the WoS database, a web-based platform for scientific and scholarly research.

2.2. Data sources and collection

All the data were obtained from the WoS Core Collection on 23 August 2023 based on several considerations. First, WoS is a widely recognized and reputable database, known for its comprehensive coverage of scholarly literature. Second, by focusing on one database, we aimed to maintain consistency and reduce the potential for data duplication or redundancy from multiple sources. This allowed us to have a clear and controlled dataset for our research.

The data retrieval strategy consisted of the following four parts: (1) Topic = "EFL teachers' emotion regulation" or "FL teachers' emotion regulation" or "L2 teachers' emotion regulation" or "English teachers' emotion regulation" or "foreign language teachers' emotion regulation" or "language teachers' emotion regulation"; (2) Document Type = "article & review article"; (3) Language = English; (4) Publication Year = 2013–2023. The search yielded 127 articles on this topic that were published from 2015 to 2023. Afterward, we excluded articles according to the following criteria: (1) articles were not published on the journals indexed by SSCI, SCI, or A&HCI; (2) articles were irrelevant to L2 teachers' emotion regulation. (This may be due to the limitations of the search algorithm, which retrieved some articles that did not pertain to L2 teachers' emotion regulation, even though we used the keywords specified above.); (3) articles were not written in English. Finally, 26 valid articles published from 2020 to 2023 were retained (see **Figure 1**).

It should be noted that we adopted the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to scrutinize the pertinent literature. PRISMA is a set of evidence-based guidelines that assist researchers in performing and reporting systematic reviews. By following PRISMA, we aimed to enhance the quality and transparency of our research synthesis and minimize the potential for bias and error.
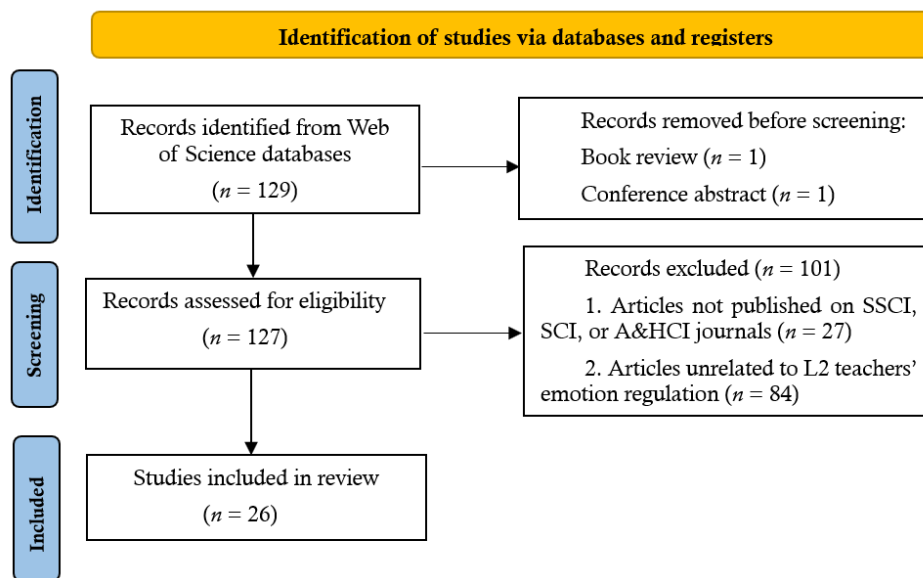

Figure 1. The flowchart of included publications in this study.

2.3. Instrument

Bibliometric analysis is a quantitative approach to analyzing scholarly publications, which can reveal the patterns of authors, institutions, countries, and keywords associated with types of publications in various research areas (Liang et al., 2017). It can also help identify the research trends and knowledge gaps in a research field over time (Wu et al., 2021). CiteSpace is a visualization analysis software that enables researchers to visualize and analyze the structure and dynamics of scientific literature based on co-citation analysis (Chen et al., 2022). It can process various types of citation data and produce interactive maps that reveal the main themes, influential papers, and emerging trends in a research field. CiteSpace also supports progressive knowledge domain visualization, which can assist researchers in conducting literature reviews, identifying research gaps, and discovering new opportunities. Therefore, we used CiteSpace (Version 6.2.R2) to review the literature on L2 teachers' emotion regulation in this

study. CiteSpace has been widely used for conducting review research in various fields, such as education (Chu et al., 2023), linguistics (Peng and Hu, 2022), medicine (Gao et al., 2023), etc., which further justifies its use for this study.

2.4. Data analysis

To conduct a bibliometric analysis of the selected literature using CiteSpace, we followed these steps. First, we imported the 26 articles in full record plain text format into CiteSpace and removed any duplicate records. Second, we extracted keywords from the articles using the default option in CiteSpace. Third, we initially established the period from 2013 to 2023, but we discovered that the first relevant article was published in 2020. Hence, we adjusted the period from 2020 to 2023, and we divided it into four slices, each corresponding to one year. Fourth, we performed a series of analyses on the number of annual publications, journals, countries, institutions, authors, and keywords. It should be noted that in CiteSpace, nodes represent these entities and links indicate collaborative or co-cited relationships. The size of nodes reflected their frequency or count, while different colors represented different years, with darker colors indicating earlier years and lighter colors indicating recent years. Additionally, purple circles contribute to centrality, which indicates the importance of nodes in the field. Nodes with high centrality were often considered as turning points or crucial points in the field.

3. Results

3.1. Annual publication analysis

To answer RQ1, we applied the search strategy and retrieved 26 publications that met the inclusion criteria. **Figure 2** shows the annual distribution of these publications.
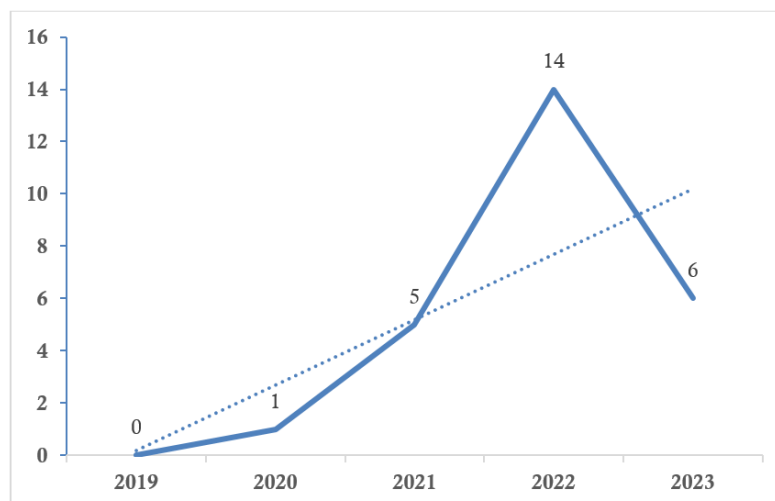

Figure 2. Annual publication trend from 2019 to 2023.

L2 teachers' emotion regulation is an emerging topic in the research on L2 emotional variables, for the first article on this topic was published only in 2020. No previous studies on this topic were found in the literature. Since then, however, there has been a rapid increase in the number of articles on this topic, as shown in **Figure 2**. The figure uses a dotted line to indicate the growth rate of publications on this topic, which reveals an upward trend. This suggests that this topic is attracting more attention and interest from researchers. Nevertheless, this field is still in its infancy, for all the articles were published within a span of four years.

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3.2. Journals analysis

We examined the journals that published articles on L2 teachers' emotion regulation (8 journals in total) to find out the main outlets of knowledge dissemination and make information retrieval easier in this field. This analysis also helps us answer RQ1. **Table 1** displays the journals that published more than one article in this field, along with their publication counts. Frontiers in Psychology ranks first with 15 publications, followed by Current Psychology and System with 3 publications each respectively. The remaining journals have only one publication each. The journal with the highest impact factor is System. Based on the information of the journals, we can infer that psychological journals are the most influential in this field. However, linguistic journals are also showing interest in this topic, which indicates the growth of psycholinguistics.

Table 1. The top journals from 2020 to 2023.

Journal	Count	Impact factor	Area
Frontiers in Psychology	15	3.8 (Q1)	Psychology, Multidisciplinary
Current Psychology	3	2.8 (Q3)	Psychology, Multidisciplinary
System	3	6.0 (Q1)	Linguistics, Education

3.3. Keywords co-occurrence and clustering analysis

Keywords are essential for capturing the core ideas of a study. By examining the keywords, we can synthesize the research topics in a specific field, detect the hotspots, and discover the research directions (Ma et al., 2020). This helps us address RQ2. We selected articles published from 2020 to 2023 with a time slice of one year and used keywords as the node type in CiteSpace. This produced a keyword co-occurrence map, which showed a merged network of 94 nodes and 352 links, as illustrated in **Figure 3**. After excluding the keywords for search, **Table 2** lists the top five keywords that had high frequency in this study: burnout (9), job satisfaction (7), intelligence (6), strategy (5), and self-efficacy (5).
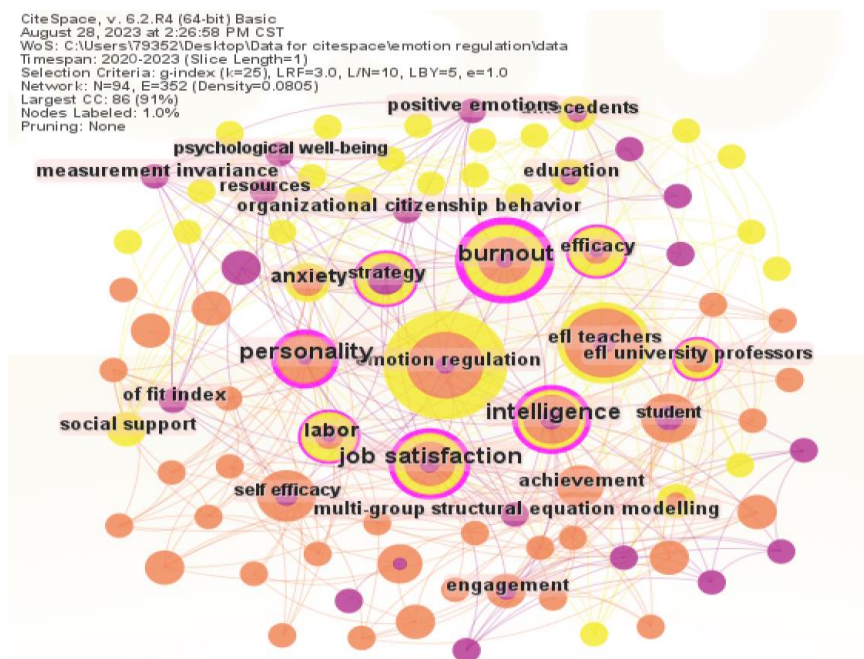

Figure 3. The co-occurrence map of keywords from 2020 to 2023.

Table 2. The top five keywords and centrality from 2020 to 2023.

Ranking	Keywords	Frequency	Centrality
1	Burnout	9	0.42
2	Job satisfaction	7	0.38
3	Intelligence	6	0.33
4	Strategy	5	0.13
5	Self-efficacy	5	0.08

We used CiteSpace to cluster the keywords in the cited literature and name the clusters based on the nominal terms extracted by the logarithmic likelihood algorithm (LLR). As a result, our clusters with the following names were obtained: #0 burnout, #1 relationality, #2 affective strategies, and #3 English as a foreign language (see **Figure 4**). A notable finding of our analysis is the absence of any records with citations or frequency bursts. This may indicate that the data set we used is insufficient to capture any significant changes in this research topic. As we mentioned earlier, the research on L2 teachers' emotion regulation is still in its infancy and the relevant articles are scarce.
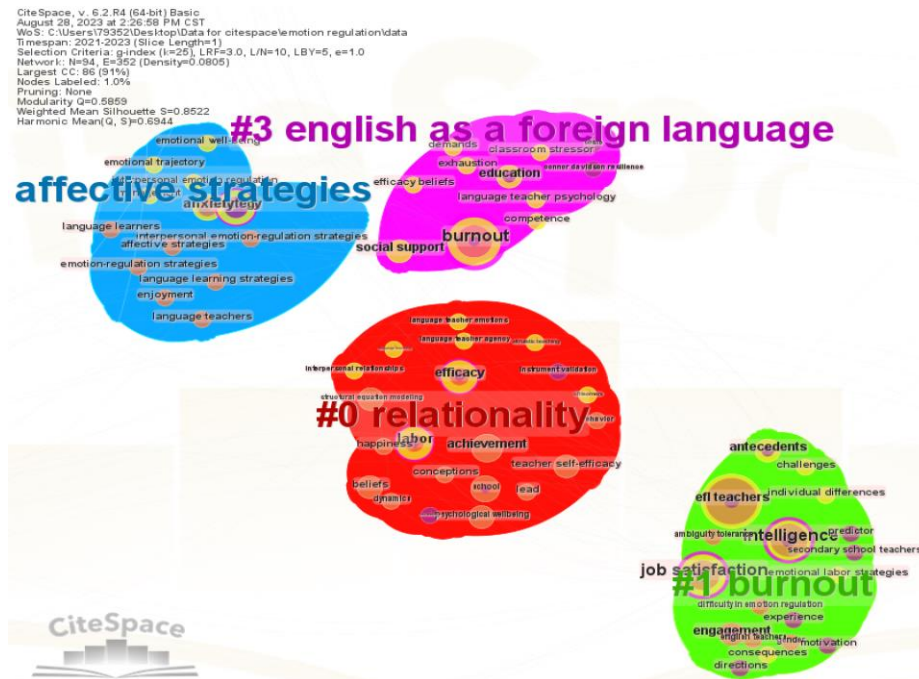

Figure 4. The clustering map of keywords from 2020 to 2023.

3.4. Countries analysis

To answer RQ3, we investigated the relationships between articles on L2 teachers' emotion regulation published in different countries from 2020 to 2023. We split this period into four 1-year periods and examined the articles published in each period. We then created a country-specific distribution map based on the results of our analysis, which is shown in **Figure 5**. It consists of a merged network of 15 nodes and 19 links. The map consists of nodes and lines, where each node represents a country and each line indicates a relationship between two countries. The size of the nodes corresponds to the number of publications from each country, with larger nodes implying higher publication productivity. **Table 3** lists the top five most productive countries in the field of L2 teachers' emotion regulation. As can be seen from the table, Iran and China have the highest publication productivity (13), which is also the only

country with more than 10 articles. They are followed by England, Thailand, and Scotland. These results suggest that Iran and China are the leading countries in this field.

Figure 5. Co-occurrence map of countries from 2020 to 2023.

Table 3. The top five countries and their centrality from 2020 to 2023.

Ranking	Countries	Frequency	Centrality
1	Iran	13	0.16
2	China	13	0.16
3	England	3	0.11
4	Thailand	2	0.00
5	Scotland	2	0.00

3.5. Institutions analysis

To address RQ3, we explored the collaborative relationships between institutions and identified the influential institutions in the field of L2 teachers' emotion regulation. **Table 4** lists the top five most productive institutions in this area of study, ranked by the number of publications. University of Kurdistan, Iran has the highest number of publications (5), followed by Islamic Azad University (Iran), Ahvaz Jundishapur University of Medical Sciences (Iran), University of Aberdeen (UK), and Henan University (China) (2). The majority of the top five institutions are located in Iran, which demonstrates that Iran is a fertile and fruitful land in the field.

Table 4. The top five institutions and centrality from 2020 to 2023.

Ranking	Institutions	Frequency	Centrality
1	University of Kurdistan	5	0.03
2	Islamic Azad University	2	0.01
3	Ahvaz Jundishapur University of Medical Sciences	2	0.00
4	University of Aberdeen	2	0.00
5	Henan University	2	0.00

3.6. Authors analysis

To address RQ3, we examined the co-authorship patterns in the field of L2 teachers' emotion regulation. We selected articles published between 2020 and 2023 and set a time slice of 1 year in CiteSpace. **Table 5** presents the authors who are closely collaborated and most productive: Heydarnejad, Taherech from the Department of English Language at the University of Gonabad has the highest number of publications (6), followed by Fathi, Jalil from the Department of English and Linguistics at University of Kurdistan (4), Derakhshan, Ali from the Department of English Language and Literature at Golestan University (3), Jury, Mickael from the Department of Languages, Linguistics, Music, and Visual Culture at Aberdeen University (2), and Azizi, Zeinab from the Department of Teaching English and Linguistics at University of Ayatollah Ozma Borujerdi (2).

Table 5. The top five authors and centrality from 2020 to 2023.

Ranking	Authors	Frequency	Centrality
1	Heydarnejad, Taherech	6	0.10
2	Fathi, Jalil	4	0.04
3	Derakshan, Ali	3	0.01
4	Greenier, Vincent	2	0.00
5	Azizi, Zeinab	2	0.00

4. Discussion

4.1. Global trends on L2 teachers' emotion regulation

Using CiteSpace, we conducted a comprehensive analysis of the publications, journals, countries, institutions, authors, and keywords related to L2 teachers' emotion regulation. The first article that mentioned this topic was "Language teachers' interpersonal learner-directed emotion-regulation strategies" by Bielak and Mystkowska-Wiertelak (2020). They employed a novel instrument (MYE) and interviews to investigate how 9 L2 teachers in Poland influenced the emotional states of 64 L2 learners. The results revealed that the teachers applied various strategies, such as feedback, praise, and scaffolding, to enhance positive emotions and reduce negative emotions.

However, this study concentrated on the strategies that L2 teachers utilized to regulate their students' emotions, rather than their own emotions. Therefore, the first study that explicitly investigated L2 teachers' emotion regulation was "Emotion regulation and psychological well-being in teacher work engagement: A case of British and Iranian English language teachers" by Greenier et al. (2021). The authors adopted a mixed-methods approach, combining quantitative data from surveys and qualitative data from interviews, to explore how British and Iranian English language teachers coped with their emotions and how this influenced their well-being and work engagement. They found that emotion regulation and psychological well-being were both positively correlated with work engagement. They also revealed some cross-cultural differences in the use and effectiveness of emotion regulation strategies.

From 2021 onwards, the number of studies on L2 teachers' emotion regulation increased rapidly. In 2022, there were 15 relevant articles, which was three times as many as the previous year. These analyses suggest that the study of L2 teachers' emotion regulation has evolved from the previous focus on L2 students' emotion regulation. However, the research on L2 teachers' emotion regulation is still in its infancy and has a rising trend, which provides abundant opportunities for further investigations by researchers.

We used the impact factor and the quartile ranking based on the Journal Citation Reports to evaluate the quality and importance of the journals that published articles on L2 teachers' emotion regulation (see **Table 1**). The impact factor is the average number of times articles published in a certain journal are cited by other articles, while the quartile ranking divides journals into four groups according to their impact factor in each category. Our results indicate that among the journals that published articles on L2 teachers' emotion regulation, Frontiers in Psychology, Current Psychology, and System are the most influential ones. Frontiers in Psychology with its impact factor of 3.8 and System with its impact factor of 6.0 are JCR Q1 journals, respectively, which suggests that they are among the highest-ranked journals in their categories, and this topic is well recognized by prestigious journals. Moreover, Frontiers in Psychology is a psychological-oriented journal, while System is a linguistic-oriented journal. This indicates that L2 teachers' emotion regulation, as a subfield of psycholinguistics, is a worthwhile topic that attracts the attention of both psychologists and linguists worldwide.

4.2. Research hotspots for L2 teachers' emotion regulation

Keywords represent the main argument of a document and reflect its core content. By analyzing keywords, we can identify the research hotspots of teachers' emotion regulation and determine the appropriate research direction. According to the analysis of keyword co-occurrence and clustering (see **Table 2**, **Figures 3** and **4**), the research hotspots of L2 teachers' emotion regulation can be classified into the following three aspects.

4.2.1. Emotion regulation and positive constructs

The ability to self-regulate emotions is considered a positive characteristic of PP. Therefore, researchers have explored the relationship between L2 teachers' emotion regulation and various positive constructs that are relevant to their professional development. One of these constructs is well-being, which is defined as an individual teacher's evaluation of his or her satisfaction in classroom contexts. Several studies have examined how L2 teachers' self-regulation and well-being jointly influence their work engagement (Greenier et al., 2021; Pan et al., 2023), teaching enjoyment (Azari et al., 2022), and professional success (Fan and Wang, 2022). Moreover, some studies have confirmed the positive predictive role of L2 teachers' self-regulation on their well-being (X Shen et al., 2022; Xiao and Tian, 2023).

Another construct that has received attention from researchers is work engagement, which is described as a positive, fulfilling, and work-related state of mind. It has been established that L2 teachers' emotion regulation can significantly and positively predict their work engagement (Deng et al., 2022; Namaziandost, Heydarnejad, Rahmani Doqaruni, et al., 2023; Xie, 2021). Furthermore, researchers have also investigated the connections between L2 teachers' emotion regulation and other psychological factors. For instance, Namaziandost, Heydarnejad, Rezai (2023) found that reflective teaching has a positive and significant effect on emotion regulation and immunity, and emotion regulation has a positive and significant effect on immunity. These exploratory studies indicate that L2 teachers' emotion regulation is a crucial skill that can enhance their positive psychological outcomes and professional development.

4.2.2. Emotion regulation and negative constructs

Emotion regulation, as a positive characteristic, can shield individuals from negative constructs, especially burnout, and other adverse emotions such as boredom and anxiety, which are prevalent among L2 teachers. Burnout is a psychological syndrome that results from prolonged exposure to chronic interpersonal stressors in the teaching profession. Bing et al. (2022) discovered that L2 teachers' emotion

regulation negatively influenced teacher burnout indirectly through the mediation of teacher self-efficacy. That is, teachers who employed more effective emotion regulation strategies were likely to have lower levels of burnout. G Shen (2022) also examined the role of emotion regulation strategies in alleviating burnout and negative emotions including anxiety and anxiety among L2 teachers in a conceptual study. The author contended that EFL teachers often encountered emotional damage in their profession and that they were required to regulate their emotions when dealing with a diverse class environment.

Another antecedent or cause of burnout is occupational stress, which has also been examined by researchers. Yoosefi et al. (2022) revealed that difficulty in emotion regulation, which involves the problems of controlling or managing one's emotions, had negative direct effects on occupational stress in L2 teachers or indirect effects through marital conflicts. These studies verified that emotion regulation is a vital skill for L2 teachers to cope with the emotional challenges and stressors of their profession and to avoid or diminish the negative consequences of burnout, boredom, and anxiety. These studies imply that targeting emotion regulation through psychological therapies could be effective in reducing those negative emotions or syndromes in L2 teachers.

4.2.3. Emotion regulation and teaching contexts

Researchers have also explored the types, uses, and effectiveness of L2 teachers' different emotion regulation strategies in various language teaching contexts. One line of research has focused on identifying the types of emotion regulation strategies that L2 teachers use and how they are related to their emotional experiences and teaching outcomes. For example, Thumvichit (2023) investigated the emotion regulation strategies that L2 teachers use in response to classroom stressors and found four distinct types of emotion-regulation strategies: adaptive, expressive, suppressive, and avoidant. Morris and King (2023) focused on a specific type of emotion regulation, namely, L2 teachers' instrumental emotion regulation, the deliberate and conscious use of emotion regulation strategies to achieve specific goals or outcomes in teaching. He identified six types of emotion regulation strategies including reappraisal, suppression, humor, venting, distraction, and social support.

Another line of research has examined how L2 teachers regulate their emotions through social interactions and relationships with others in their teaching contexts. For example, Gkonou and Miller (2023) discovered six themes that illustrate how language teachers regulate their emotions through, with, and for others: (1) seeking emotional support from colleagues and friends; (2) sharing positive emotions with students and colleagues; (3) managing negative emotions by avoiding or confronting difficult people; (4) adapting to the emotional norms and expectations of the workplace; (5) expressing emotions authentically or strategically; and (6) developing emotional awareness and empathy. Both lines of research have also discussed the benefits and costs of using different emotion regulation strategies for L2 teachers' well-being and professional development.

4.3. Collaboration among countries, institutions, and authors

The map of national cooperation relationships (see **Figure 5** and **Table 3**) shows that Iran and China have the most prominent nodes, followed by England, Thailand, and Scotland. These five countries had a total frequency of 33, which accounted for 76.7% of the total frequency (43) of all countries. This suggests that these countries have established a strong collaboration network and have significantly contributed to the research field of L2 teachers' emotion regulation. The quantity and quality of studies by Iranian and Chinese scholars surpassed those of other countries.

From the perspective of collaboration between institutions, as shown in **Table 4**, scientific research

institutions have studied L2 teachers' emotion regulation from different aspects, forming a cooperation network centered on the University of Kurdistan (Iran), Islamic Azad University (Iran), Ahvaz Jundishapur University of Medical Sciences (Iran), University of Aberdeen (UK), and Henan University (China). These five institutions had a total frequency of 13, accounting for 27.1% of the total frequency (48) of all institutions. The frequency (5) of the University of Kurdistan (Iran) is higher than that of other institutions (2, respectively), accounting for 38.5% of the frequency of the above institutions. Its research focuses on the L2 teachers' emotion regulation's associations with their occupational burnout, self-efficacy and well-being, and work engagement (Bing et al., 2022; Greenier et al., 2021; X. Shen et al, 2022; Yoosefi et al., 2022).

Table 5 shows the cooperation network of researchers who have investigated L2 teachers' emotion regulation from various perspectives. The network is centered on five researchers: Heydarnejad, Taherech; Fathi, Jalil; Derakshan, Ali; Greenier, Vincent; and Azizi, Zeinab. These researchers have co-authored 17 papers, which constitute 32.7% of the total number of papers (52) in this field. Among them, Heydarnejad, Taherech has the highest frequency of co-authorship (5), followed by Fathi, Jalil; Derakshan, Ali; Greenier, Vincent; and Azizi, Zeinab (4, 3, 2, and 2, respectively). Heydarnejad, and Taherech's frequency accounts for 31.3% of the total frequency of the five researchers. Her research interests align with those of the University of Kurdistan, which focuses on the interplay between L2 teachers' self-regulation, self-efficacy, and work engagement (Deng et al., 2022; Namaziandost, Heydarnejad, Rahmani Doqaruni, et al., 2023). She also explores how other factors such as reflective teaching, immunity, and grit interact with L2 teachers' emotion regulation (Namaziandost, Heydarnejad, Rezai, 2023; Zheng et al., 2022).

A notable finding is that China and Iran had the same significant contributions to the research field of L2 teachers' emotion regulation, but the collaboration among Chinese institutions and authors was much weaker than that of Iran. In addition, the quantitative approach using structural equation modeling was the most popular method to research L2 teachers' emotion regulation at both institutional and individual levels. Besides, college teachers were selected as participants in the majority of the studies. In summary, Iran and China were the most fruitful and fertile countries in this research topic, but Iran demonstrated a higher degree of cooperation in terms of institutions and authors. Iran's great contributions to this topic might be ascribed to its linguistic tradition that favors applied linguistics over formal or theoretical linguistics.

4.4. Limitations of the existing studies and directions for future research

Through the review, we identified several limitations of the existing studies on L2 teachers' emotion regulation, which pertain to participants, methods, topics, and theoretical bases. Based on these limitations, we provided suggestions for future research.

4.4.1. Limitations in participants

The existing literature on L2 teachers' emotion regulation is limited by the lack of diversity in the participants. Most of the studies we reviewed focused on Iranian and Chinese L2 teachers, college L2 teachers, and in-service L2 teachers, without considering the potential differences among L2 teachers with different genders, cultures, and teaching grade levels. Therefore, more research is needed to explore the emotion regulation of L2 teachers from various backgrounds and contexts. Comparative studies would be especially useful to examine the following factors:

Culture: L2 teachers from different cultures may have different ways of understanding and expressing emotions, which may influence their choice of emotion regulation strategies. A meta-

analysis by H. Wang et al. (2023) showed that antecedent-focused strategies (such as reappraisal and situation selection) were more effective for teachers in Western cultures, while response-focused strategies (such as suppression and venting) were more effective for teachers in Eastern cultures.

Teaching grade level: L2 teachers of different grade levels (kindergarten, primary, secondary, or college) may also have different emotion regulation strategies, due to the different characteristics and demands of their students. According to H. Wang et al. (2023), kindergarten teachers tended to use more antecedent-focused strategies than teachers of other grade levels, while teachers of secondary or postsecondary levels reported using more response-focused strategies than teachers of kindergarten or primary levels.

Teaching experience: Pre-service and in-service L2 teachers may differ in their emotional experiences and emotion regulation strategies, due to their different roles and contexts. Pre-service teachers have a dual identity as both teachers and students during their teaching practice, which may affect their emotional states and behaviors as novice teachers. For instance, Xie and Jiang (2021) found that in-service teachers experienced more negative emotions than positive ones, while Ji et al., (2022) revealed that pre-service teachers experienced more positive emotions than negative emotions overall.

Gender: L2 teachers with different genders may also have different emotion regulation strategies, due to the possible gender differences in emotion regulation. Previous studies indicated that women used more emotion regulation strategies than men and were more flexible in the implementation of those strategies (Delhom et al., 2021; Goubet and Chrysikou, 2019; Sanchis-Sanchis et al., 2020). However, these findings have not been verified among L2 teachers, who may have different emotional experiences and challenges than the general population.

4.4.2. Limitations in methods

Most of the studies we reviewed used a cross-sectional design and a quantitative analysis based on structural equation modeling. However, these methods have two main limitations for the research on L2 teachers' emotion regulation. First, they cannot establish the causal relationships between teachers' emotion regulation and the related factors over time, as they only measure the teachers' emotional states and behaviors at a certain point. Second, they cannot offer a deeper and richer understanding of the meanings, experiences, and perspectives of the L2 teachers regarding their emotion regulation, as they depend on predefined scales and categories that may not reflect the complexity and diversity of the teachers' emotional phenomena. Therefore, future studies should adopt longitudinal designs and qualitative methods to overcome these limitations. Mixed-methods studies are also recommended, as they can provide a more comprehensive and holistic understanding of the teachers' emotional phenomena.

Furthermore, there are also alternative methods that transcend the qualitative-quantitative dichotomy and allow researchers to examine the interactions and changes of the teachers' emotional variables over time and across contexts. A. Derakhshan, Y. Wang, F. Ghiasvand (2023) suggested that the Complex Dynamic Systems Theory (CDST) approaches are suitable for studying teachers' emotional variables throughout the language education process. These approaches can capture the complexity and dynamism of these variables. The CDST approaches include a wide range of innovative research methods. We listed three commonly used ones:

Social network analysis (SNA): SNA can be used to study the structure and dynamics of social relationships among individuals, groups, or organizations (Hirschi, 2010). SNA can help to understand how social ties influence various psychological phenomena, such as attitudes, behaviors, emotions,

cognition, and well-being. SNA can also help to identify the roles, positions, and patterns of individuals or groups within a network, and how they affect or are affected by the network properties.

Latent growth curve modeling (LGCM): LGCM can be used to study the change and variation of psychological variables over time (Burant, 2016). It is a type of structural equation modeling that can estimate the growth trajectories of individuals or groups based on repeated measurements of the same variable at different time points. LGCM can help to understand how psychological variables develop, what factors influence their development, and how they relate to other variables or outcomes.

Q methodology: Q methodology can be used to study people's subjectivity, that is, their viewpoint on an issue (Lundberg et al., 2020). It involves asking participants to rank and sort a series of statements. The statements are drawn from a comprehensive collection of all the possible views on the issue, called the concourse. The data from the Q sorts are then analyzed using factor analysis, which identifies the common patterns or factors These factors are interpreted as the shared viewpoints or subjectivities of the participants.

4.4.3. Limitations in topics

As mentioned above, the existing literature on L2 teachers' emotion regulation explores various topics, such as how emotion regulation interacts with other psychological constructs, and how the teaching context affects emotion regulation. However, to the best of our knowledge, two major gaps warrant further research.

One of the most notable gaps is the lack of empirical evidence on how L2 teachers' emotion regulation affects learner outcomes. According to the emotion contagion theory (Hatfield, et al., 1993), teachers' emotion regulation may have an impact on learners' emotions, as emotional expressions and behaviors tend to be unconsciously mimicked and synchronized among social partners. Furthermore, the control-value theory (Pekrun and Perry, 2014) proposes that learners' emotions can influence their learning and achievement through cognitive and motivational mechanisms. Therefore, it is plausible to assume that L2 teachers' emotion regulation can indirectly affect various learner outcomes by shaping learners' emotional experiences in class. For example, some studies have found that learners' emotions are related to their engagement (F. Wang and Ye, 2021), willingness to communicate (C. Li et al., 2022), and motivation (Dewaele and Meftah, 2023).

Another area that deserves more attention from researchers is the development and evaluation of emotion regulation training programs for L2 teachers (Bølstad et al., 2023). This involves designing and assessing interventions that aim to enhance the emotional competencies and well-being of L2 teachers in different contexts (LeBlanc et al., 2020). Emotion regulation training programs may consist of various elements, such as: (1) providing teachers with strategies and techniques to regulate their emotions in different situations, such as coping with stress, frustration, anger, anxiety, or boredom; (2) encouraging teachers to practice and apply emotion regulation skills in their daily teaching activities and reflect on their effects and outcomes; (3) offering teachers feedback and support to monitor and evaluate their progress and challenges in emotion regulation.

4.4.4. Limitations in theoretical basis

The theoretical underpinnings of the studies we reviewed are mainly based on positive psychology, which provides a framework for understanding L2 teachers' emotion regulation (Seligman and Csikszentmihalyi, 2000). However, this perspective may not capture the complexity and diversity of the emotional experiences of teaching, which can also be informed by organizational psychology. This field offers various theories that can explain how L2 teachers regulate their emotions concerning their work

environment. For instance, the conservation of resources (COR) theory (Hobfoll and Shirom, 2001) and the job demands-resources (JD-R) model (Taris and Schaufeli, 2016) are two prominent theories that can shed light on the role of emotion regulation in L2 teachers' well-being and performance.

The COR theory posits that individuals cope with stress and trauma by protecting and building their resources, which are anything that they value or need, such as personal, social, and structural resources. Emotion regulation is one of the personal resources that can help individuals manage their emotions in stressful situations. However, emotion regulation can also have different effects on the COR process, depending on the strategy used and the context. On the other hand, emotion regulation can be a source of resource gain when individuals use effective or adaptive strategies, such as reappraisal, which can increase positive affect, optimism, and self-efficacy. These outcomes can enhance the availability of other resources, such as creativity, problem-solving, and social relationships.

The JD-R model is a theoretical framework that describes how different aspects of the work environment affect employees' well-being and performance. The model distinguishes between job demands and job resources. The model proposes that job demands and job resources have different effects on employee well-being, depending on the level of engagement and burnout. The role of emotion regulation in the JD-R model is to mediate the relationships between job characteristics and employee well-being. Emotion regulation can act as either a personal resource or a personal demand, depending on the strategy used and the context. Therefore, emotion regulation can either buffer or amplify the effects of job characteristics on employee well-being. The choice of emotion regulation strategy can have significant implications for employees' health, motivation, and performance.

5. Conclusions

This study employed CiteSpace software to conduct a bibliometric analysis of the research literature on L2 teachers' emotion regulation in the past five years. The analysis revealed the following findings: (1) The research on L2 teachers' emotion regulation has been increasing but is still in its infancy, and it is an interdisciplinary topic that attracts global attention from both psychology and linguistics scholars. (2) Iran and China were the most productive countries in this research topic, but Iran showed a higher level of collaboration among institutions and authors. (3) The main research themes in this topic encompassed three aspects: emotion regulation and positive constructs, emotion regulation and negative constructs, and emotion regulation and teaching contexts.

This study has some inevitable limitations that warrant discussion. Firstly, we only searched the Web of Science database for relevant documents, which might have overlooked some important sources from other databases, such as Scopus, Google Scholar, or CNKI. Secondly, we relied on a single scientometric tool for data analysis, which might have constrained the scope and depth of our findings. Thirdly, we only included English-language studies in our review, which might have excluded some valuable research in other languages. Therefore, future studies may benefit from using a broader and more diverse database and applying different analytical tools to further investigate the topic.

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