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Bibliometric Exploration of Procrastination and Mental Health: Mapping Research Trends, Intellectual Structure, and Emerging Themes

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Abstract

Procrastination has attracted growing scholarly attention because of its association with psychological distress, emotional regulation, and psychological well-being. Although previous studies have examined procrastination from theoretical, empirical, and review-based perspectives, the intellectual structure and thematic evolution of research specifically connecting procrastination with mental health require further systematic investigation. Addressing this gap, the present study maps the scientific landscape of procrastination and mental health through bibliometric analysis of publications retrieved from the Scopus database. Using Biblioshiny and VOSviewer, the study examines publication trends, influential journals and publications, intellectual foundations, international collaboration, and thematic structures. The findings reveal increasing scholarly attention to the research domain, particularly in recent years. Among the contributing journals, Frontiers in Psychology emerges as the most productive source, with 62 publications and 1,447 citations. The co-citation analysis identifies 31 items organised into four clusters, connected through 301 links with a total link strength of 1,103, reflecting the interconnected intellectual foundations of procrastination research. Furthermore, keyword co-occurrence analysis identifies seven thematic clusters, representing research on psychological interventions and mental health outcomes, academic procrastination and student performance, self-control and behavioural addictions, sleep and bedtime procrastination, neuroimaging, psychological assessment, and motivation, personality, and psychological well-being. Overall, the findings demonstrate the multidisciplinary nature of this research domain and highlight the importance of self-regulation, motivational processes, psychological interventions, and sleep-related behaviour in understanding the broader research landscape. The study provides an organised overview of the field's intellectual development and identifies directions for future theoretical and empirical investigations.

Keywords: Procrastination; mental health; psychological distress; emotional regulation; self-regulation; depression

1 Introduction

Procrastination has attracted considerable attention in psychological research because of its association with self-regulation, emotional experiences, and individual functioning (Mohammadi Bytamar et al., 2020). It is generally understood as the voluntary postponement of intended activities despite the expectation that such delays may result in undesirable consequences (Pychyl & Sirois, 2016). Research has examined procrastination across academic, occupational, and everyday settings, highlighting its connections with motivation, impulsiveness, self-control, and task aversiveness (Steel, 2007; Yan & Zhang, 2022). Beyond its behavioural dimensions, procrastination has also become an important subject in research on mental health (Shalev, 2018). Previous studies have investigated its associations with negative emotional experiences, including guilt, frustration, worry, anxiety,

depression, and psychological distress (Van Eerde, 2000; Steel, 2007; Ferrari & Díaz-Morales, 2014; Peixoto et al., 2021). These relationships may vary across individuals and research contexts, making it important to examine the psychological processes and research perspectives associated with this area.

Existing review studies provide useful foundations for understanding the development of procrastination. Yan and Zhang (2022) examined the broader intellectual and thematic development of procrastination research through bibliometric methods, whereas Nie et al. (2025) synthesised empirical evidence concerning the relationship between procrastination and negative emotions through a systematic review and meta-analysis. While bibliometric analysis maps the development, structure, and research themes of a scholarly field, meta-analysis estimates the strength of relationships across empirical studies (Passas, 2024). Building on these complementary perspectives, the present study adopts a bibliometric approach to examine research specifically connecting procrastination with mental health. It focuses on the publication landscape, influential contributions, intellectual foundations, scholarly collaboration, thematic patterns, and emerging research directions (Mohamad Hanefar et al., 2025).

2 Background of the study

Procrastination is commonly conceptualised as a form of self-regulation failure in which individuals experience difficulties translating their intentions into timely action and maintaining goal-directed behaviour (Steel, 2007; Rozental & Carlbring, 2014). Previous research has explored procrastination in relation to personality characteristics (Kim et al., 2017), motivation (Wu & Fan, 2017), self-efficacy (Graff, 2019), impulsiveness (Ferrari, 1993), and task-related factors (van Hooft, 2025), demonstrating its multidimensional psychological nature. Consequently, procrastination extends beyond a simple time-management problem and involves difficulties in regulating behaviour, sustaining motivation, and responding to task-related demands (Steel, 2007; Yan & Zhang, 2022). Within this broader perspective, mental health has emerged as an important area of investigation. Previous studies have examined procrastination in relation to psychological experiences such as anxiety, depression, stress, and negative emotions (Stead et al., 2010; Ferrari & Díaz-Morales, 2014). The negative effects of procrastination become particularly evident during periods of competing academic demands, such as examination periods (Rice et al., 2012). Studies among university students have also reported associations between higher levels of procrastination and greater experiences of depression, anxiety, stress, interpersonal sensitivity, and poorer overall mental health (Maria-Ioanna & Patra, 2022; Stead et al., 2010; Hu et al., 2026). Repeatedly postponing intended activities may also generate guilt, frustration, worry, and dissatisfaction, particularly when delays interfere with personal, academic, or occupational responsibilities (Sirois et al., 2015). However, these associations should not necessarily be interpreted as unidirectional or causal, as psychological distress may also influence an individual's ability to initiate and complete intended activities (Steel, 2007; Nie et al., 2025).

Stress represents another important dimension in understanding the psychological experiences associated with procrastination (Flett et al., 1995; Eisenbeck et al., 2019). Postponing important activities may create a gap between intended goals and actual progress, potentially increasing pressure as deadlines approach (Gustavson & Miyake, 2017). Tice and Baumeister (1997) observed that although procrastinators may initially experience lower stress, their stress levels and health-related difficulties may increase as deadlines become closer. Other studies have also examined

procrastination in relation to perceived stress and emotional difficulties, suggesting that repeated delays may be accompanied by unfavourable psychological experiences (Flett et al., 1995; Schraw et al., 2007; Lavoie & Pychyl, 2001). These findings highlight stress's relevance as a psychological dimension in research on procrastination and mental health. The Procrastination and Mental Health Model (Figure 1) suggests that procrastination may be associated with adverse health outcomes through increased stress, reduced healthy behaviours, and delayed treatment-seeking. This relationship may also be bidirectional, as existing physical or mental health difficulties can affect motivation and self-regulation, potentially increasing procrastination. This perspective highlights the complex relationship between procrastination and psychological well-being.

Research has also investigated whether procrastination is linked to delays in obtaining professional or health-related help. Postponement has been previously highlighted as a factor in help-seeking for problems such as drug abuse and gambling, demonstrating that delay may extend beyond everyday tasks to judgements about personal well-being (McCoy et al., 2001; Bellringer et al., 2008). Similarly, Sirois et al. (2003) and Sirois (2007) examined procrastination in relation to physical health and health-related behaviours. Their findings highlighted the relevance of stress in understanding the association between procrastination and physical health.

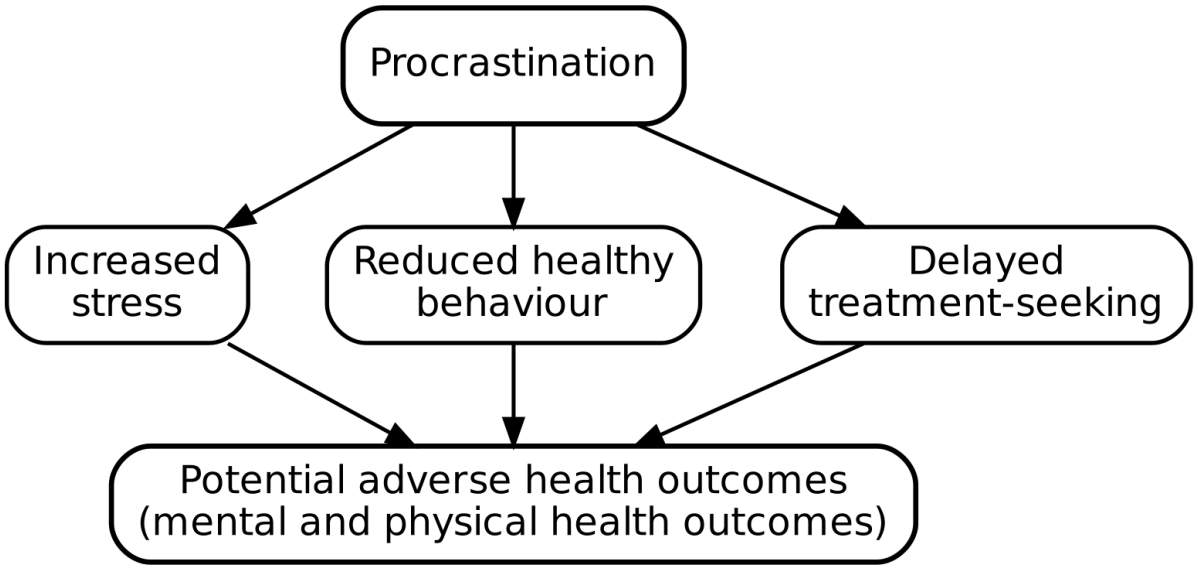


Figure 1. Conceptual representation of procrastination and mental health (source: author).

These findings do not identify the same mechanism for mental health outcomes but do highlight larger psychological and behavioural implications that may be relevant to the study of procrastination. Procrastination has traditionally been understood as a self-regulatory failure involving the unnecessary postponement of intended activities despite the anticipated negative consequences (Steel, 2007). Beyond its implications for task completion and performance, research has also established its association with psychological distress and diminished well-being (Sirois, 2013; Beutel et al., 2016). For instance, Stead et al. (2010) reported that procrastination and stress were associated with poorer mental health among university students. Similarly, a representative community study by Beutel et al. (2016) identified positive associations between procrastination, perceived stress, depression, anxiety, and fatigue, alongside lower life satisfaction. These findings suggest that procrastination is not merely a behavioural difficulty but also an important factor in understanding individuals' psychological experiences. Furthermore, Sirois (2023) emphasised the

role of contextual conditions in the relationship between procrastination and stress, suggesting that stressful circumstances and difficulties in regulating negative emotions may reinforce procrastinatory tendencies. More recently, Nie et al. (2025), through their systematic review and meta-analysis, provided further evidence of a moderate positive association between procrastination and negative emotional experiences, particularly depression, anxiety, and stress. The variation in these relationships across studies also indicates that the association between procrastination and mental health is complex and warrants examination across different psychological dimensions and research contexts.

From a broader research perspective, bibliometric investigations have contributed to understanding the intellectual and thematic development of procrastination research. Yan and Zhang (2022) conducted a bibliometric analysis of procrastination literature indexed in the Web of Science from 1990 to 2020, identifying major research themes relating to personality characteristics, antecedents, consequences, interventions, bedtime procrastination, and self-control failure associated with social media use. Similarly, Nie et al. (2025), through a systematic review and meta-analysis, synthesised empirical evidence concerning the association between procrastination and negative emotional experiences, particularly depression, anxiety, and stress. Although these studies have advanced understanding of procrastination and its psychological implications, a focused bibliometric examination of the literature connecting procrastination with mental health is still needed. Specifically, the intellectual foundations, thematic relationships, evolution of research themes, and emerging directions concerning depression, anxiety, stress, psychological distress, and mental well-being require systematic investigation. Addressing this gap, the present study employs bibliometric techniques to examine publication and citation patterns, influential contributors, collaboration networks, intellectual foundations, thematic clusters, and emerging research directions in procrastination and mental health research. Through this examination, the study aims to provide an integrated understanding of the evolution of this research domain and identify potential priorities for future research.

3 Rationale of the study

Existing research has examined procrastination from theoretical, empirical, and review-based perspectives. Steel (2007) explained procrastination as a form of self-regulation failure, while Yan and Zhang (2022) explored the broader intellectual and thematic development of procrastination research through bibliometric analysis. More recently, Nie et al. (2025) synthesised empirical evidence concerning the association between procrastination and negative emotions through a systematic review and meta-analysis. Although these studies have contributed significantly to understanding procrastination and its psychological implications, a focused bibliometric examination of the scholarly literature connecting procrastination with mental health remains necessary. The present study is therefore undertaken to provide a systematic understanding of the development and intellectual structure of this research domain. By mapping publication and citation patterns, influential contributions, scholarly collaboration, intellectual foundations, and thematic evolution, the study seeks to identify the major psychological dimensions associated with procrastination and mental health. It also aims to highlight emerging themes and comparatively underexplored areas that may guide future theoretical and empirical investigations. Through this focused bibliometric approach, the study intends to consolidate existing scholarly knowledge and provide a foundation for advancing research at the intersection of procrastination and mental health.

4 Research questions

The following research questions are formulated to address the aims of the study:

RQ1. How has the research on the relationship between procrastination and mental health been published and cited?

RQ2. Which authors, publications, journals, institutions, and countries have made the most significant contributions to this research domain?

RQ3. What are the intellectual foundations and scholarly collaboration structures of research on procrastination and mental health?

RQ4. What are the major thematic clusters and psychological concepts represented in the literature connecting procrastination with mental health?

5 Methodology

5.1 Research methodology

The present study adopts a bibliometric research approach to investigate the evolution, intellectual foundations, social structure, and emerging trends in the literature on procrastination and mental health. Bibliometric analysis combines performance analysis with science-mapping techniques to evaluate research productivity, citation impact, collaboration patterns, and conceptual relationships within a defined research domain (Donthu et al., 2021; Zupic & Čater, 2015).

The analysis is structured around two complementary components: performance analysis and science mapping. Performance analysis examines publication and citation patterns to identify influential authors, journals, documents, institutions, and countries. Science mapping investigates collaboration networks, intellectual relationships, and thematic structures through techniques such as co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence analysis. The selection of these techniques is guided by the research objectives and the availability and completeness of the exported bibliographic data (Donthu et al., 2021).

5.2 Data source and search strategy

Bibliographic records were retrieved from the Scopus database using a structured search strategy designed to identify scholarly publications examining procrastination in relation to mental health. The search was conducted within the TITLE-ABS-KEY fields, which cover publication titles, abstracts, and author keywords. The search strategy combined terms related to procrastination, including "procrastinat*" and "self-regulation failure", with mental health-related terms such as "mental health", "mental well-being", "psychological distress", "emotional distress", "psychological strain", "mental health problem*", "depress*", "anxi*", "stress", and "burnout". To ensure the relevance and consistency of the retrieved literature, the search was restricted to publications published between 2001 and 2025, English-language journal articles, and documents available at the final publication stage. The selected period provides complete calendar years for the bibliometric analysis. For transparency and reproducibility, the search date, the initial number of records retrieved, and the number of records retained after applying the database filters and subsequent screening procedures were documented. These figures were obtained from the actual Scopus search results and data-cleaning records. The search strategy was refined by examining a sample of publication titles and

abstracts to assess its relevance and determine whether previously identified relevant studies were retrieved.

5.3 Inclusion and exclusion criteria

The inclusion and exclusion criteria were established to ensure consistency and relevance in the selection of bibliographic records.

5.3.1 Inclusion criteria

- Publications indexed in Scopus for the publication period considered.
- Journal articles published in the final stage in English.
- Studies addressing procrastination in relation to mental health, psychological distress, depression, anxiety, stress, burnout, or another outcome explicitly covered by the final search strategy.
- Records with adequate bibliographic information for the intended analysis.

5.3.2 Exclusion criteria

- Publications outside the selected period or not meeting the specified language, document-type, source-type, or publication-stage filters.
- Records unrelated to the association between procrastination and mental-health effects.
- Duplicate records, where identified.
- Records lacking sufficient information for the relevant analysis, where the missing information cannot be recovered.

The titles and abstracts of the retrieved records were examined against the scope of the study. Where relevance could not be established using the available metadata, further assessment was undertaken where necessary. Duplicate records and publications that did not satisfy the eligibility criteria were excluded. The number of records excluded at each screening stage was documented, and the final bibliographic corpus was established after completing the screening and data-cleaning procedures.

5.4 Data cleaning and preparation

The retrieved bibliographic records were exported from Scopus in CSV format, including the available information on publication details, citation data, abstracts, author keywords, indexed keywords, institutional affiliations, and cited references.

The exported data were imported into RStudio and processed using the Bibliometrix package and its graphical interface, Biblioshiny. VOSviewer was also employed to construct and visualise selected bibliometric networks.

Data preparation involved identifying and removing duplicate records, checking missing bibliographic information, and standardising variations in author names, institutional affiliations, and keywords. Records that appeared similar but could not be confidently classified through automated duplicate detection were manually examined. A thesaurus file was used, where appropriate, to harmonise keyword variants and spelling differences representing the same concept. However, conceptually distinct keywords were retained separately rather than being combined merely because of their thematic association.

The original Scopus export was preserved as a backup to maintain the integrity of the retrieved data. The number of records before and after data cleaning was documented. These procedures were undertaken to minimise preventable inaccuracies in publication counts, citation indicators, and bibliometric network structures.

5.5 Data analysis

The bibliometric analysis was conducted using performance analysis and science-mapping techniques to examine the development and intellectual structure of research on procrastination and mental health.

Performance analysis was undertaken to assess annual scientific production and identify the contributions of authors, journals, institutions, and countries. Citation-based indicators were also examined to identify influential publications and contributors within the research domain. Depending on data availability, the analysis included total publications, total citations, average citations per publication, annual citation patterns, and h-index and g-index indicators.

Science-mapping techniques were employed to examine the intellectual, social, and conceptual structures of the research domain. Co-authorship analysis was used to investigate collaboration patterns among authors, institutions, and countries. Co-citation analysis examined publications and authors that were frequently cited together, thereby helping to identify the intellectual foundations of the field. Bibliographic coupling was used to explore relationships between publications sharing common references, while keyword co-occurrence analysis identified prominent concepts and thematic clusters.

Thematic mapping and thematic evolution analysis were also used, where supported by the available data, to examine the development and positioning of research themes across the selected publication period (Donthu et al., 2021; Zupic & Čater, 2015).

Bibliometric calculations, performance indicators, and thematic analyses were conducted using Bibliometrix and Biblioshiny in RStudio. VOSviewer was used to construct and visualise selected co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence networks. The relevant network thresholds, counting methods, normalisation settings, and clustering parameters were documented to support methodological transparency and reproducibility. The interpretation of the findings was based on the observed bibliometric results rather than predetermined assumptions.

6 Results and discussion

6.1 Performance analysis

6.1.1 Publication trend analysis

Figure 2 shows the annual scientific production. The increase became particularly pronounced after 2020, with annual publications rising substantially in 2021 and 2022 and exceeding 100 in 2023. The graph further indicates continued growth in 2024 and 2025, with publication activity continuing through 2025. Overall, the chronological pattern suggests that procrastination and mental health have become increasingly prominent areas of scholarly investigation. This growth highlights the expanding academic attention devoted to understanding the psychological and emotional dimensions associated with procrastination. The observed publication trend provides an overview of the development of this research domain over time.

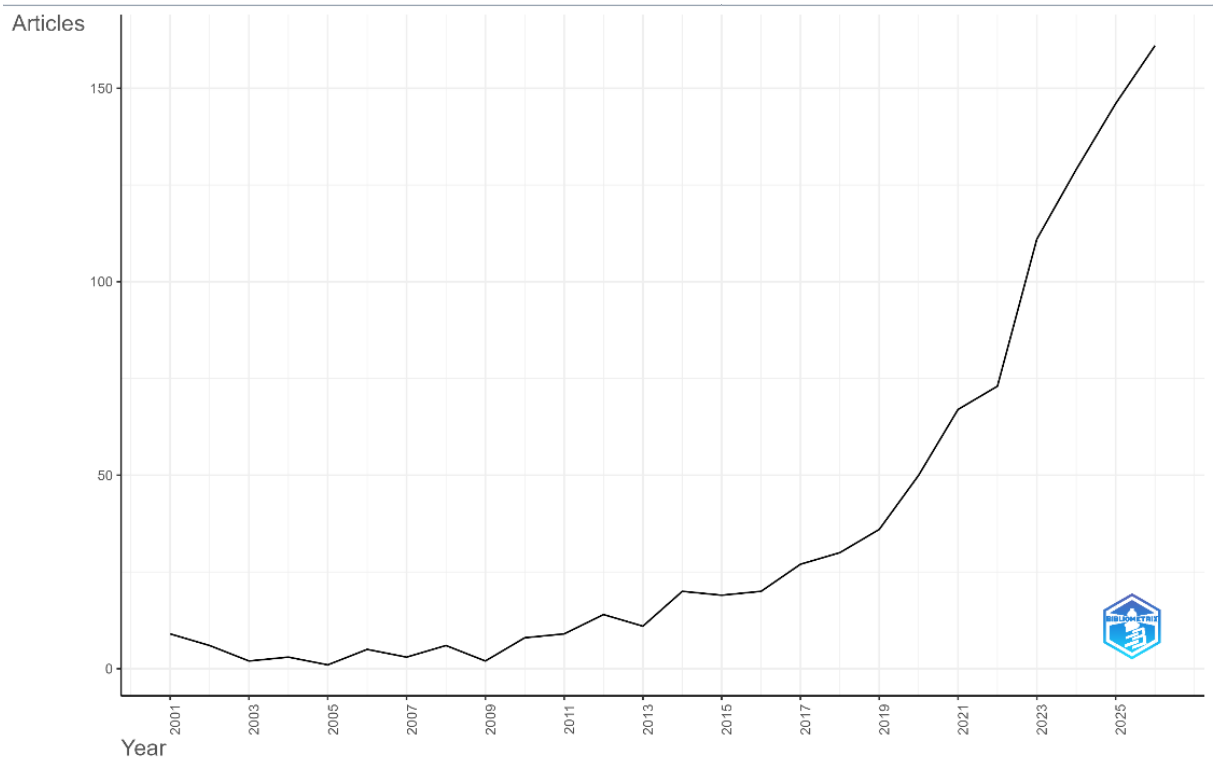


Figure 2. Annual scientific production (source: RStudio and Biblioshiny).

6.1.2 Citation structure

Figure 3 illustrates that the average citations per year show considerable fluctuations across the study period, indicating variations in the citation impact of publications over time. The graph records its highest citation peak in 2002, followed by a sharp decline in 2003. Further fluctuations are visible during the subsequent years, with additional peaks around 2007, 2010, 2014, and 2016. From 2017 onwards, average citations generally remained at a moderate level, although the pattern varied across individual years. A gradual decline is visible in the most recent years, particularly in the latter years of the study period. This pattern should be viewed with caution since current works have had less opportunity to accrue citations than older publications. Overall, the annual citation profile reflects the differences in scholarly attention obtained by the research on procrastination and mental health. The annual citation profile supports the annual publication trend by showing the changing citation impact of this research domain.

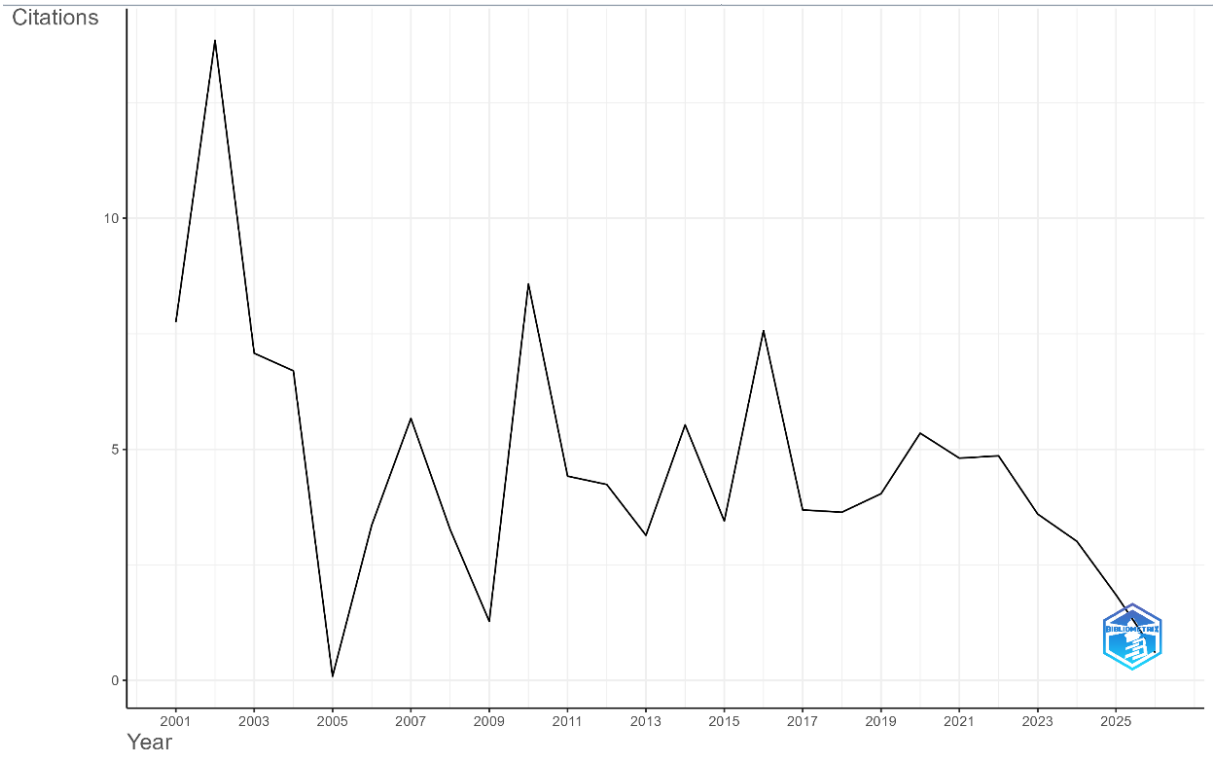


Figure 3. Average citations per year (source: RStudio and Biblioshiny).

6.1.3 Most prominent and active journals

VOSviewer was used to do a journal-level examination. The analysis reveals the top journals in the research sector in terms of number of documents and citation information, as presented in Table 1. Frontiers in Psychology ranks first, with 62 documents and 1,447 citations. BMC Psychology follows with 26 documents and 213 citations. International Journal of Environmental Research and Public Health and Current Psychology have 21 documents and 597 and 421 citations, respectively. The journal Personality and Individual Differences has 20 documents and 1,476 citations and the journal Frontiers in Psychiatry has 18 documents and 98 citations. Other prominent sources are: Behavioural Sciences, Journal of Rational-Emotive and Cognitive-Behavior Therapy, PLOS ONE, and Internet Interventions. The findings show that the articles on procrastination and mental health are scattered among journals in the fields of psychology, psychiatry, behavioural science and associated interdisciplinary domains. The results provide guidance to significant channels of publication to understand the evolution of this study topic.

Table 1. Most prominent journals (source: VOSviewer and author).

Rank	Journal	Documents	Citations
1	Frontiers in Psychology	62	1,447
2	BMC Psychology	26	213
3	International Journal of Environmental Research and Public Health	21	597
4	Current Psychology	21	421
5	Personality and Individual Differences	20	1,476
6	Frontiers in Psychiatry	18	98
7	Behavioral Sciences	17	157

Rank	Journal	Documents	Citations
8	Journal of Rational-Emotive and Cognitive-Behavior Therapy	14	720
9	PLOS ONE	13	280
10	Internet Interventions	12	243

6.1.4 *Highly cited work*

Citation analysis was completed using VOSviewer. The analysis shows articles with high citation numbers, which reflect their scholarly exposure and impact within the dataset. The most cited documents in the VOSviewer citation analysis are shown in Table 2. Tice (2001) ranks first, with 1,041 citations, followed by Cassady (2002), with 901 citations, and Wohl et al. (2010), with 780 citations. Davis (2002) ranks fourth with 602 citations, while Beutel (2016) occupies the fifth position with 591 citations. Other highly cited documents include Twenge and Baumeister (2002), with 393 citations; Onwuegbuzie (2004b), with 349 citations; Dienlin and Johannes (2020), with 305 citations; Geng et al. (2021), with 257 citations; and Rabin et al. (2011), with 243 citations. These citation counts indicate that the listed publications have received substantial scholarly attention in the dataset. However, citation counts should be interpreted as indicators of citation impact rather than direct measures of research quality. The full titles and bibliographic details of these publications should be verified before discussing their specific contributions to the field.

Table 2. Highly cited works (source: VOSviewer and author).

Rank	Author	Year	Citation
1	Tice	2001	1,041
2	Cassady	2002	901
3	Wohl	2010	780
4	Davis	2002	602
5	Beutel	2016	591
6	Twenge and Baumeister	2002	393
7	Onwuegbuzie	2004b	349
8	Dienlin	2020	305
9	Geng	2021	257
10	Rabin	2011	243

6.2 Science mapping

Science mapping involves visually examining connections among scientific disciplines, research subfields, publications, and authors (Small, 1999). Its primary purpose is to identify relationships among different elements of scholarly research and help explain their intellectual connections (Donthu et al., 2021). Co-citation analysis is a science-mapping technique that counts the number of times two references are mentioned together in subsequent scholarly articles, as seen in Figure 4.

6.2.1 *Co-citation analysis*

The co-citation of two references suggests a potential intellectual relationship between their underlying ideas, theories, or research contributions (Small, 1973). In this study, co-citation analysis

examines the intellectual foundations of research on procrastination and mental health. By identifying frequently co-cited references, this analysis reveals the influential theoretical perspectives and foundational studies shaping this research domain. The analysis is conducted using VOSviewer, with association strength used as the normalisation method to examine the relationships among cited references. A minimum citation threshold is applied to identify the most influential references for inclusion in the co-citation network. The resulting network is then examined in terms of its clusters, links, and total link strength to understand the intellectual structure of the field.

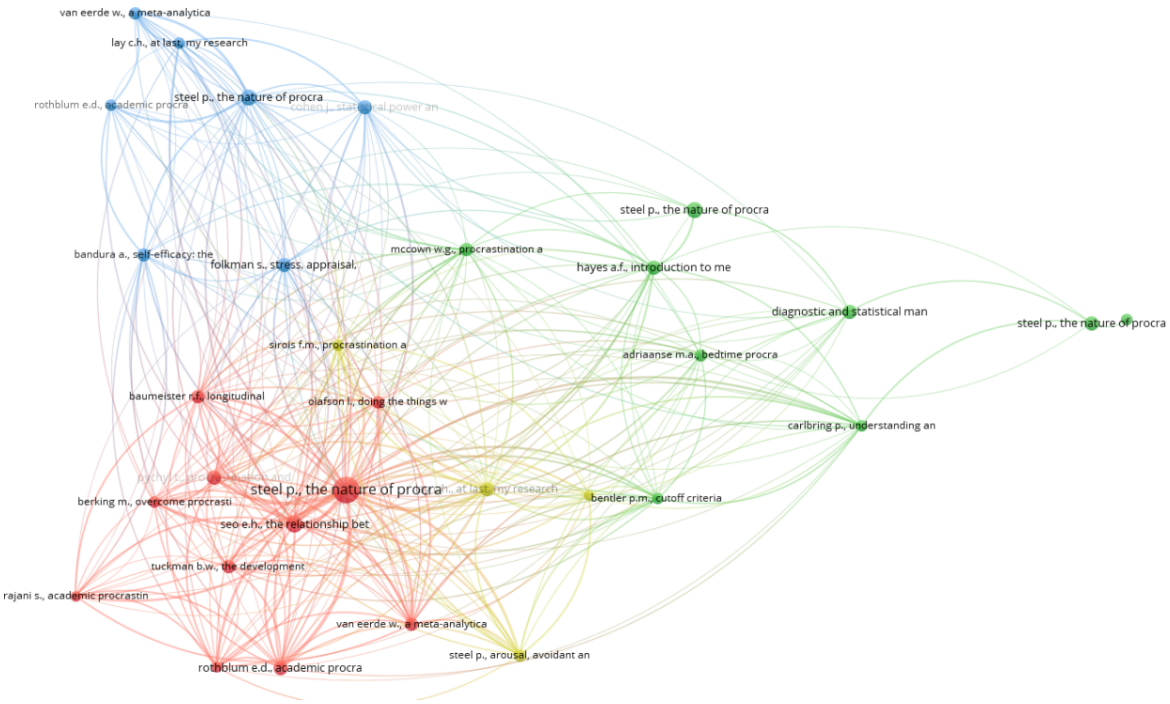


Figure 4. Co-citation network of cited references (source: VOSviewer).

Red Cluster 1: Theoretical Foundations and Academic Procrastination: The red cluster primarily reflects foundational research on procrastination, including its conceptual development, academic manifestations, and behavioural explanations. Important references visible in this cluster include Steel's (2007) work, The Nature of Procrastination, and Rothblum et al.'s (1986) research on academic procrastination. These studies provide a basis for understanding procrastination as a self-regulatory difficulty associated with task delay and the challenges of initiating or completing intended activities. The presence of work on longitudinal behaviour and the development of procrastination measures further indicates an interest in understanding how procrastination manifests and how it can be assessed. Overall, this cluster represents the foundational literature that supports subsequent investigations into procrastination and its psychological correlates.

Green Cluster 2: Procrastination, Self-Regulation, and Psychological Processes: The green cluster highlights research examining procrastination in relation to behavioural regulation, psychological processes, and the circumstances in which task delay occurs. References visible in this cluster include works by Steel (2012), McCown et al. (2012), and other researchers concerned with procrastination and its measurement. The network also contains references associated with bedtime procrastination and diagnostic or statistical classification. Together, these connections suggest that this cluster encompasses different contexts and psychological dimensions of procrastination. It provides a basis for examining how self-regulatory difficulties, motivational processes, and behavioural tendencies

may be relevant to procrastination research. However, the specific contribution of each reference should be confirmed by examining its full title and publication details.

Blue Cluster 3: Psychological Antecedents and Individual Differences in Procrastination: The blue cluster represents research connecting procrastination with individual differences and broader psychological processes. Visible references include Bandura et al.'s (2001) work on self-efficacy, Folkman & Lazarus (1985) work on stress and appraisal, and van Eerde's (2003) meta-analytic review of procrastination. These connections suggest that researchers have examined procrastination alongside beliefs about personal capability, responses to stressful situations, and evidence synthesised across previous studies. This cluster is relevant to understanding how cognitive and emotional factors may be associated with procrastination. Common techniques in scientific mapping include co-word analysis, co-authorship analysis, co-citation analysis and bibliographic coupling.

Yellow Cluster 4: Motivational and Arousal-Based Explanations of Procrastination: The yellow cluster appears to emphasise motivational and arousal-related perspectives on procrastination. Steel's work on arousal and avoidance approaches provides a theoretical foundation for understanding why individuals delay intended activities, particularly in relation to motivation, impulsiveness, and task-related preferences (Steel, 2007). Similarly, van Eerde (2003), through a meta-analytic examination of procrastination, provides insights into the personality and behavioural factors associated with procrastinatory tendencies. These perspectives are further supported by research highlighting the role of task aversiveness, temporal motivation, and self-regulatory difficulties in explaining procrastination (Steel & König, 2006; Sirois & Pychyl, 2013). Together, these findings imply that procrastination may be explained by motivational processes, task avoidance and problems in the implementation of goals. The cluster thus provides a different take on the fundamental and individual-difference literature represented in the other clusters. But its specific thematic limits should be treated with caution, for the cluster on the map provided contains relatively few clearly legible markings.

The co-citation network is composed of 31 items distributed in four clusters, which are connected by 301 links with a total link strength of 1,103. The network suggests that the intellectual roots of procrastination research are interconnected through conceptual, behavioural, motivational and psychological aspects. The prominence of foundational contributions on procrastination (Steel, 2007; van Eerde, 2003), together with references addressing self-efficacy (Klassen et al., 2008), stress appraisal (Lazarus & Folkman, 1984), and meta-analytic evidence (Steel, 2007), suggests that the field draws on several complementary approaches to understanding task delay. Furthermore, research connecting procrastination with emotion regulation and psychological well-being highlights the relevance of these intellectual foundations to mental health research (Sirois, 2014; Mohammadi Bytamar et al., 2020). These clusters provide an intellectual framework for investigating the relationship between procrastination and mental health. Nevertheless, co-citation clusters indicate patterns of references being cited together; they do not independently demonstrate causal relationships or confirm that every reference directly investigates mental health.

6.2.2 Co-authorship network of countries

Co-authorship analysis is used to examine research collaboration among countries and understand the social structure of a scientific field (Donthu et al., 2020; Zupic & Čater, 2015). In this work, we apply this technique to the examination of international cooperation in research on procrastination and mental health. Figure 5 presents the country-level co-authorship network, in which nodes represent countries, and connecting lines indicate collaborative relationships. The size and position of the

nodes, along with the connections between them, provide a visual representation of countries' participation and collaboration within the research domain. The network shows that the United States and China occupy prominent positions and maintain connections with several other countries. The United Kingdom and Germany also appear as important nodes, with links to multiple countries. Other visible contributors include Australia, Canada, the Netherlands, Spain, Italy, India, Japan, South Korea, and Malaysia. The network further illustrates collaborative connections involving countries in Europe, Asia, North America, and Oceania, suggesting that research on procrastination and mental health has an international collaborative dimension.

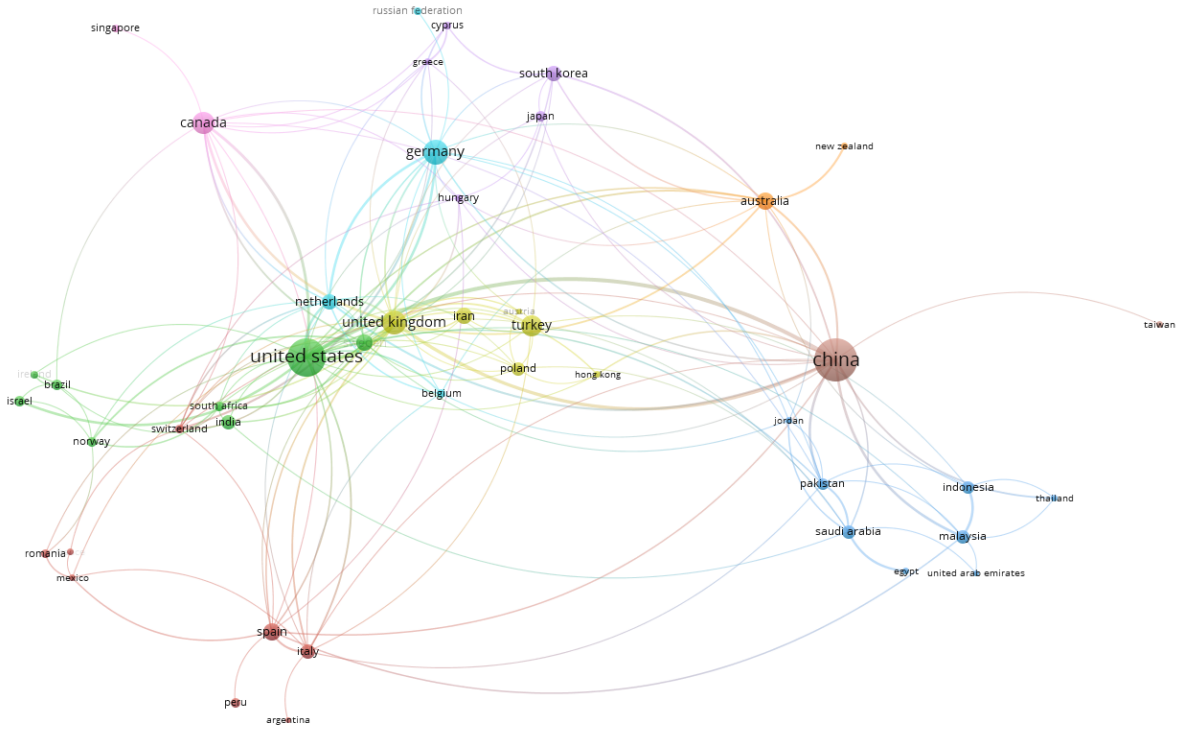


Figure 5. Co-authorship network of countries (source: VOSviewer).

6.2.3 Keyword analysis

Cluster 1: Psychological Interventions and Mental Health Outcomes: The red cluster seems to center on psychological therapies and mental health outcomes. Keywords such as cognitive behavioural therapy, randomised controlled trial, anxiety disorder, and quality of life indicate an emphasis on interventions and the assessment of psychological outcomes. This cluster links procrastination research to broader investigations into psychological difficulties and approaches to improving well-being.

Cluster 2: Academic Procrastination and Student Performance: The green cluster centres on procrastination in academic settings. Prominent keywords include academic procrastination, students, universities, academic performance, achievement, and self-regulated learning. These terms indicate substantial research attention to student procrastination and its relationship with learning behaviours and academic outcomes.

Cluster 3: Self-Control, Adolescence, and Behavioural Addictions: The blue cluster brings together themes related to self-control, adolescents, college students, internet addiction, and insomnia. These connections suggest an interest in the relationship between self-regulatory processes and behaviour-

al or psychological difficulties. This cluster provides a potential link between procrastination research and studies of digital behaviour and sleep-related problems.

Cluster 4: Sleep, Bedtime Procrastination, and Circadian Rhythms: The yellow cluster highlights sleep-related research, including bedtime procrastination, sleep latency, sleep-wake disorders, circadian rhythm, and chronotype. These keywords indicate growing conceptual connections between procrastination, sleep behaviour, and the timing of daily activities. This theme is particularly relevant to research examining how delaying bedtime may relate to sleep and psychological well-being.

Cluster 5: Neuroimaging and Neuroscientific Research: The purple cluster includes terms such as brain mapping, diagnostic imaging, functional magnetic resonance imaging, and neuroimaging. These keywords represent a particular stream of research into neurological and physiological processes. The relevance to the wider literature on procrastination–mental health should be understood based on the actual relationships depicted in the network.

Cluster 6: Measurement, Scale Development, and Psychological Assessment: The cyan cluster appears to be focused on the measurement and assessment of psychological variables. Keywords including scale development, factor analysis, validity, reproducibility, and assessment suggest attention to the development and evaluation of research instruments. Such work contributes to the methodological foundations of psychological research.

Cluster 7: Motivation, Personality, and Psychological Well-being: The orange cluster appears to connect procrastination with motivational processes, personality characteristics, and psychological well-being. The visible keywords suggest that researchers investigate individual differences and psychological factors associated with procrastination and related outcomes. Further investigation of the underlying studies is needed to define the precise linkages represented by this cluster.

Figure 6 shows the co-occurrence network of keywords (source: VOSviewer).

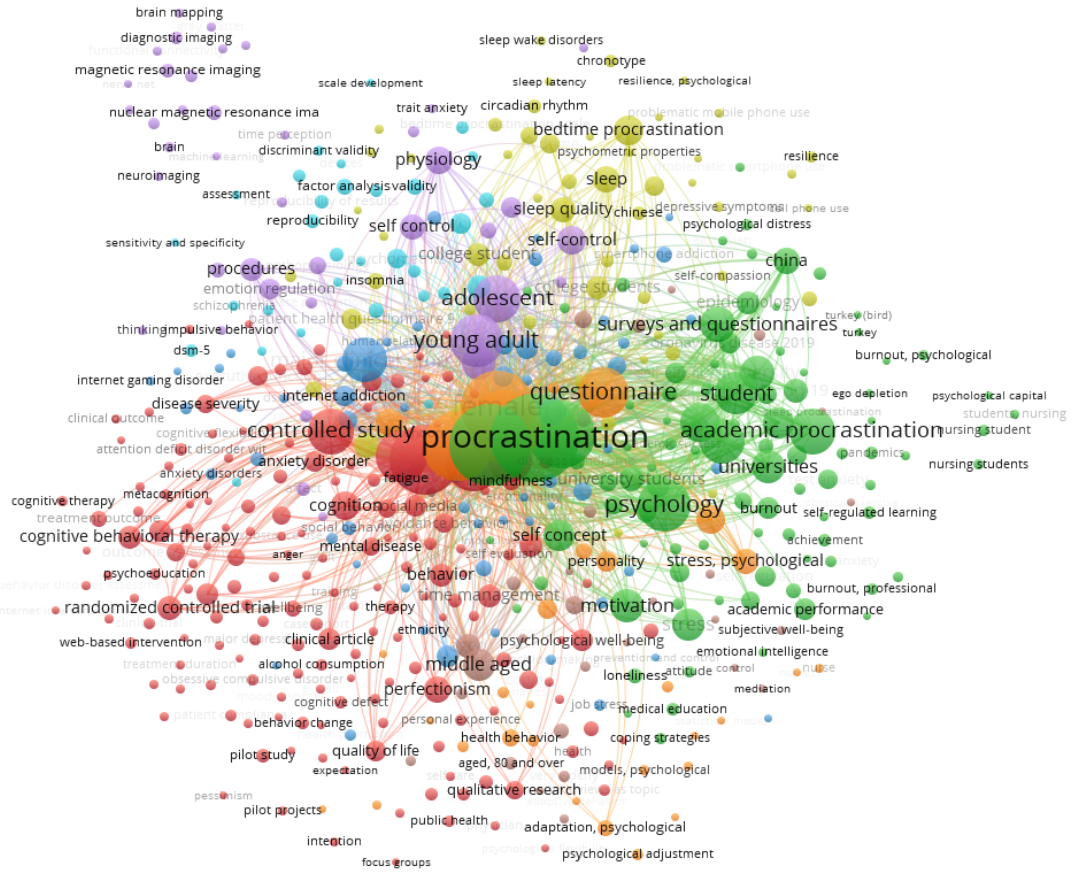


Figure 6. Co-occurrence network of keywords (source: VOSviewer).

Overall, the keyword co-occurrence network shows a multidisciplinary research landscape connecting procrastination with academic achievement, psychological evaluation, self-regulation, sleep habits, and mental health-related consequences. The clusters are summarised in Table 3. They offer an organised way of looking at existing and specialised research issues and highlight areas needing further research.

Table 3. Clustering analysis (source: VOSviewer and author).

S. no.	Main theme	Keywords
1	Psychological Interventions and Mental Health Outcomes	Cognitive behavioural therapy, randomised controlled trial, anxiety disorder, depression-related terms, quality of life, health behaviour
2	Academic Procrastination and Student Performance	Procrastination, academic procrastination, students, universities, academic performance, self-regulated learning, achievement
3	Self-Control, Adolescence and Behavioural Addictions	Adolescent, college student, self-control, internet addiction, insomnia, DSM-5
4	Sleep, Bedtime Procrastination and Circadian Rhythms	Sleep, bedtime procrastination, sleep latency, sleep-wake disorders, circadian rhythm, chronotype
5	Neuroimaging and Neuroscientific Research	Brain mapping, diagnostic imaging, functional magnetic resonance imaging, neural imaging, neuroimaging
6	Measurement, Scale Development and Psychological Assessment	Scale development, factor analysis, validity, reproducibility, assessment, trait anxiety

S. no.	Main theme	Keywords
7	Motivation, Personality and Psychological Well-being	Motivation, personality, perfectionism, psychological well-being, stress-related terms

7 Discussion

The present study explores the development, intellectual underpinnings, and primary research issues that link procrastination and mental health. The results suggest that this field of research covers different interrelated aspects such as academic procrastination, self-regulation, psychological discomfort, sleep habits and mental health therapies. The increase in publications indicates a rising scholarly interest in learning more about procrastination than simply the postponing of intended actions. This finding is in line with Steel (2007), who conceptualised procrastination as a sort of self-regulation failure. Increased publication activity should be understood as increasing academic interest and not as evidence for a rise in the actual prevalence of procrastination or mental health problems. The journal analysis identifies Frontiers in Psychology as the most productive journal in the dataset, with 62 publications and 1,447 citations. This finding highlights the contribution of psychology-oriented scholarly outlets to the development of this research domain. The highly cited publications further indicate the influential contributions that have shaped the intellectual development of procrastination research. These findings provide useful insights into the journals and publications that have attracted considerable scholarly attention and may guide researchers in identifying relevant sources for future investigations.

The co-citation analysis identifies four clusters associated with the theoretical foundations of procrastination, self-regulation, individual differences, and motivational processes. These clusters suggest that the intellectual development of this field draws upon multiple psychological perspectives. In particular, the prominence of self-regulation and motivational processes reinforces the understanding that procrastination involves broader behavioural and psychological difficulties rather than merely poor time management. The keyword co-occurrence analysis further identifies seven thematic clusters covering academic procrastination, psychological interventions, self-control, sleep behaviour, psychological assessment, motivation, and neuroscientific research. The prominence of academic procrastination and student-related keywords indicates the continued importance of educational settings within this literature. At the same time, the appearance of sleep-related and psychological well-being themes suggests that scholarly attention extends beyond academic performance towards broader aspects of individual functioning and mental health.

The country co-authorship network identifies the United States, China, the United Kingdom, and Germany as prominent contributors to international research collaboration. These patterns demonstrate the international dimension of the field and indicate opportunities for strengthening collaboration across geographical regions and research disciplines. Overall, the findings portray procrastination and mental health as an interdisciplinary research domain in which behavioural, motivational, and psychological perspectives intersect. The identified intellectual foundations and thematic clusters provide a basis for understanding the current structure of the field and identifying areas that warrant further investigation.

8 Managerial implications

The study contributes to the existing literature by mapping the intellectual foundations and thematic development of research connecting procrastination with mental health. The identification of clusters related to self-regulation, individual differences, and motivational processes highlights the importance of multiple psychological perspectives in understanding procrastination. Furthermore, the presence of themes associated with psychological distress, sleep behaviour, and mental health interventions indicates that research has expanded beyond traditional discussions of academic delay and task completion. These findings provide a structured overview of the concepts and perspectives represented in the literature and offer a foundation for further theoretical investigation into the relationship between procrastination and mental health. The findings offer practical implications for universities, mental health professionals, policymakers, and research institutions. Universities may use these insights to develop student-support initiatives involving goal setting, time-management skills, academic guidance, and regular feedback to address procrastination-related difficulties. Mental health professionals may also consider procrastination alongside stress, anxiety, emotional difficulties, and self-regulation problems when assessing individuals experiencing persistent psychological distress. Educational institutions can further promote awareness of healthy sleep routines, digital distractions, and balanced daily schedules as part of broader student well-being initiatives. Institutional leaders and policymakers may strengthen existing support systems by integrating academic assistance with accessible counselling services and early intervention programmes. Rather than relying exclusively on punitive measures for delayed academic submissions, institutions may benefit from approaches that address the underlying difficulties associated with procrastination. The findings also highlight the importance of interdisciplinary and international research collaboration. Research institutions and funding agencies may encourage collaborative projects involving psychology, education, health sciences, and behavioural research to develop a more comprehensive understanding of procrastination and mental health. Such initiatives can also support the development and evaluation of evidence-based interventions.

9 Limitations and future directions

Some limitations in the present study should be acknowledged when interpreting the findings. Firstly, the study is based on Scopus-indexed articles only; hence, relevant studies available in other academic databases may have been excluded. Future research could merge several databases to provide a more general outlook on the subject field.

Second, the findings are influenced by the selected search terms, database coverage, and inclusion and exclusion criteria. Consequently, some relevant publications may have remained outside the scope of the analysis. Future bibliometric investigations could consider alternative search strategies, additional keywords, and broader terminology to capture a wider range of research perspectives.

Third, bibliometric techniques primarily identify publication patterns, influential contributions, collaboration networks, and thematic relationships. They do not independently establish causal relationships between procrastination and mental health outcomes or provide a detailed evaluation of the empirical evidence. Future studies could complement bibliometric findings with systematic reviews, meta-analyses, and empirical investigations to examine the nature and strength of these relationships.

Finally, the identified themes indicate several opportunities for further research. Longitudinal studies could provide deeper insights into the relationship between procrastination and mental health over

time, while cross-cultural investigations could examine whether these relationships vary across geographical and sociocultural settings. Further empirical research may also explore the psychological processes associated with procrastination, including self-regulation, motivation, stress, and emotional difficulties. In addition, intervention-based studies could evaluate the effectiveness of approaches designed to reduce procrastination and improve psychological well-being. Greater attention to underrepresented populations and research contexts may also help broaden the scope of this developing field.

10 Conclusion

The present study provides a bibliometric examination of research connecting procrastination and mental health, highlighting its publication development, influential contributions, intellectual foundations, international collaboration patterns, and thematic structure. The findings indicate increasing scholarly attention to this research domain, particularly after 2020, with annual publications exceeding 100 in 2023 and continuing to grow during 2024 and 2025. Among the leading publication sources, Frontiers in Psychology emerged as the most productive journal, with 62 publications and 1,447 citations, demonstrating its prominent contribution to this field.

The intellectual structure of the literature, examined through co-citation analysis, comprised 31 items distributed across four clusters, connected by 301 links with a total link strength of 1,103. These clusters reflect interconnected foundations relating to the theoretical development of procrastination, self-regulation and psychological processes, individual differences, and motivational explanations. This pattern indicates that procrastination research draws upon multiple psychological perspectives rather than being limited to the study of delayed task completion.

Furthermore, keyword co-occurrence analysis identified seven thematic clusters, demonstrating the multidisciplinary scope of the research domain. The major themes discussed in the analysis include psychological interventions and mental health outcomes, academic procrastination and student performance, self-control and behavioural addictions, sleep and bedtime procrastination, neuroimaging, psychological assessment, and motivation, personality, and psychological well-being. These themes suggest that scholarly attention extends beyond academic procrastination towards broader psychological, behavioural, and health-related dimensions. The country-level co-authorship network also highlights the prominent collaborative contributions of the United States, China, the United Kingdom, and Germany, indicating the international character of research in this area.

Overall, the findings identify self-regulation, motivational processes, psychological interventions, sleep-related behaviour, and psychological well-being as important areas within the intellectual and thematic development of procrastination research. The study contributes by consolidating the existing scholarly landscape and showing how different psychological perspectives intersect in research on procrastination and mental health. However, bibliometric patterns represent the structure and development of published research and do not independently establish causal relationships between procrastination and mental health outcomes. Future investigations could therefore complement bibliometric mapping with systematic reviews, meta-analyses, and longitudinal and cross-cultural empirical studies. Greater attention to underrepresented populations, occupational settings, and intervention-based research may further strengthen understanding of the psychological mechanisms connecting procrastination with mental health and inform the development of evidence-based interventions.

References

[1] Bandura A, Caprara GV, Barbaranelli C, Pastorelli C, Regalia C (2001). Sociocognitive self-regulatory mechanisms governing transgressive behaviour. *Journal of Personality and Social Psychology*, 80(1), 125. https://doi.org/10.1037/0022-3514.80.1.125

[2] Beutel ME, Klein EM, Aufenanger S, Brähler E, Dreier M, Müller KW, et al. (2016). Procrastination, distress and life satisfaction across the age range – A German representative community study. *PLoS ONE*, 11(2), e0148054. https://doi.org/10.1371/journal.pone.0148054

[3] Cassady JC, Johnson RE (2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology*, 27(2), 270–295. https://doi.org/10.1006/ceps.2001.1094

[4] Davis RA, Flett GL, Besser A (2002). Validation of a new scale for measuring problematic Internet use: Implications for pre-employment screening. *Cyberpsychology & Behavior*, 5(4), 331–345. https://doi.org/10.1089/109493102760275581

[5] Dienlin T, Johannes N (2020). The impact of digital technology use on adolescent well-being. *Dialogues in Clinical Neuroscience*, 22(2), 135–142. https://doi.org/10.31887/DCNS.2020.22.2/tdienlin

[6] Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

[7] Eisenbeck N, Carreno DF, Uclés-Juárez R (2019). From psychological distress to academic procrastination: Exploring the role of psychological inflexibility. *Journal of Contextual Behavioral Science*, 13, 103–108. https://doi.org/10.1016/j.jcbs.2019.07.007

[8] Ferrari JR (1993). Procrastination and impulsiveness: Two sides of a coin? In: McCown WG, Johnson JL, Shure MB (eds), *The impulsive client: Theory, research, and treatment*. American Psychological Association, Washington, DC, pp. 265–276. https://doi.org/10.1037/10500-014

[9] Ferrari JR, Díaz-Morales JF (2014). Procrastination and mental health coping: A brief report related to students. *Individual Differences Research*, 12(1), 8.

[10] Flett GL, Blankstein KR, Martin TR (1995). Procrastination, negative self-evaluation, and stress in depression and anxiety: A review and preliminary model. In: Ferrari JR, Johnson JL, McCown WG (eds), *Procrastination and task avoidance: Theory, research, and treatment*. Springer, Boston, MA, pp. 137–167. https://doi.org/10.1007/978-1-4899-0227-6_7

[11] Folkman S, Lazarus RS (1985). If it changes it must be a process: study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, 48(1), 150. https://doi.org/10.1037/0022-3514.48.1.150

[12] Geng Y, Gu J, Wang J, Zhang R (2021). Smartphone addiction and depression, anxiety: The role of bedtime procrastination and self-control. *Journal of Affective Disorders*, 293, 415–421. https://doi.org/10.1016/j.jad.2021.06.062

[13] Graff M (2019). Self-efficacy beliefs and academic procrastination. *North American Journal of Psychology*, 21(1), 81.

[14] Gustavson DE, Miyake A (2017). Academic procrastination and goal accomplishment: A combined experimental and individual differences investigation. *Learning and Individual Differences*, 54, 160–172. https://doi.org/10.1016/j.lindif.2017.01.010

[15] Hu Y, Van der Hallen R, Jansen PW, Nederhand M (2026). Perfectionistic concerns over mistakes and mental health: Examining the dual role of procrastination. *Current Psychology*, 45(21), 1685. https://doi.org/10.1007/s12144-026-10141-5

[16] Kim S, Fernandez S, Terrier L (2017). Procrastination, personality traits, and academic performance: When active and passive procrastination tell a different story. *Personality and Individual Differences*, 108, 154–157. https://doi.org/10.1016/j.paid.2016.12.021

[17] Klassen RM, Chiu MM (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology*, 102(3), 741. https://doi.org/10.1037/a0019237

[18] Lazarus RS, Folkman S (1984). Stress, appraisal, and coping. *Springer Publishing Company*, New York.

[19] Maria-Ioanna A, Patra V (2022). The role of psychological distress as a potential route through which procrastination may confer risk for reduced life satisfaction. *Current Psychology*, 41(5), 2860–2867. https://doi.org/10.1007/s12144-020-00739-8

[20] McCown B, Blake IK, Keiser R (2012). Content analyses of the beliefs of academic procrastinators. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 30(4), 213–222. https://doi.org/10.1007/s10942-012-0148-6

[21] Mohammadi Bytamar J, Saed O, Khakpoor S (2020). Emotion regulation difficulties and academic procrastination. *Frontiers in Psychology*, 11, 524588. https://doi.org/10.3389/fpsyg.2020.524588

[22] Nie Y, Wang W, Zhou F, Wang T, Li S, Liu C, Gao J (2025). The association between procrastination and negative emotions in healthy individuals: A systematic review and meta-analysis. *Frontiers in Psychiatry*, 16, 1624094. https://doi.org/10.3389/fpsyt.2025.1624094

[23] Onwuegbuzie AJ (2004). Academic procrastination and statistics anxiety. *Assessment & Evaluation in Higher Education*, 29(1), 3–19. https://doi.org/10.1080/0260293042000160384

[24] Peixoto EM, Pallini AC, Vallerand RJ, Rahimi S, Silva MV (2021). The role of passion for studies on academic procrastination and mental health during the COVID-19 pandemic. *Social Psychology of Education*, 24(3), 877–893. https://doi.org/10.1007/s11218-021-09636-9

[25] Pychyl TA, Sirois FM (2016). Procrastination, emotion regulation, and well-being. In: *Procrastination, health, and well-being*. Academic Press, pp. 163–188. https://doi.org/10.1016/B978-0-12-802862-9.00008-6

[26] Rabin LA, Fogel J, Nutter-Upham KE (2011). Academic procrastination in college students: The role of self-reported executive function. *Journal of Clinical and Experimental Neuropsychology*, 33(3), 344–357. https://doi.org/10.1080/13803395.2010.518597

[27] Rice KG, Richardson CM, Clark D (2012). Perfectionism, procrastination, and psychological distress. *Journal of Counseling Psychology*, 59(2), 288. https://doi.org/10.1037/a0026643

[28] Rothblum ED, Solomon LJ, Murakami J (1986). Affective, cognitive, and behavioral differences between high and low procrastinators. *Journal of Counseling Psychology*, 33(4), 387. https://doi.org/10.1037/0022-0167.33.4.387

[29] Rozental A, Carlbring P (2014). Understanding and treating procrastination: A review of a common self-regulatory failure. *Psychology*, 5(13), 1488–1502. https://doi.org/10.4236/psych.2014.513160

[30] Sak M, Pietluch A (2024). Sources and outcomes of distressing emotions in directed motivational currents. *System*, 123, 103317. https://doi.org/10.1016/j.system.2024.103317

[31] Schwarzer R (2014). Thought control of action: Interfering self-doubts. In: *Cognitive interference*. Routledge, pp. 99–116.

[32] Shalev I (2018). Use of a self-regulation failure framework and the NIMH research domain criterion (RDoC) to understand the problem of procrastination. *Frontiers in Psychiatry*, 9, 213. https://doi.org/10.3389/fpsyt.2018.00213

[33] Sirois FM (2014). Procrastination and stress: Exploring the role of self-compassion. *Self and Identity*, 13(2), 128–145. https://doi.org/10.1080/15298868.2013.763404

[34] Stead R, Shanahan MJ, Neufeld RW (2010). "I'll go to therapy, eventually": Procrastination, stress and mental health. *Personality and Individual Differences*, 49(3), 175–180. https://doi.org/10.1016/j.paid.2010.03.028

[35] Steel P (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133(1), 65. https://doi.org/10.1037/0033-2909.133.1.65

[36] Steel P (2012). The procrastination equation: How to stop putting things off and start getting stuff done. *FT Press*, Upper Saddle River, NJ.

[37] Steel P, König CJ (2006). Integrating theories of motivation. *Academy of Management Review*, 31(4), 889–913. https://doi.org/10.5465/amr.2006.22527462

[38] Tice DM, Bratslavsky E, Baumeister RF (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology*, 80(1), 53. https://doi.org/10.1037/0022-3514.80.1.53

[39] Van Eerde W (2000). Procrastination: Self-regulation in initiating aversive goals. *Applied Psychology*, 49(3), 372–389. https://doi.org/10.1111/1464-0597.00021

[40] Van Eerde W (2003). A meta-analytically derived nomological network of procrastination. *Personality and Individual Differences*, 35(6), 1401–1418. https://doi.org/10.1016/S0191-8869(02)00358-6

[41] van Hooft EAJ (2025). When do we put things off? A volitional-task attractiveness framework of personality and task-related factors in predicting procrastinatory behavior. *European Journal of Personality*, 39(5), 715–731. https://doi.org/10.1177/08902070241293615

[42] Wohl MJ, Pychyl TA, Bennett SH (2010). I forgive myself, now I can study: How self-forgiveness for procrastinating can reduce future procrastination. *Personality and Individual Differences*, 48(7), 803–808. https://doi.org/10.1016/j.paid.2010.01.029

[43] Wu F, Fan W (2017). Academic procrastination in linking motivation and achievement-related behaviours: a perspective of expectancy-value theory. *Educational Psychology*, 37(6), 695–711. https://doi.org/10.1080/01443410.2016.1202901

[44] Yan B, Zhang X (2022). What research has been conducted on procrastination? Evidence from a systematical bibliometric analysis. *Frontiers in Psychology*, 13, 809044. https://doi.org/10.3389/fpsyg.2022.809044

[45] Zupic I, Čater T (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. https://doi.org/10.1177/1094428114562629