



MAPPING THE INTELLECTUAL STRUCTURE OF PROCRASTINATION INTERVENTIONS: A BIBLIOMETRIC REVIEW

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Abstract

Purpose: The intellectual, conceptual, and social framework of procrastination intervention research is methodically mapped and analysed in this paper. By recognising prominent research streams, significant contributors, and new frontiers like digital and technology-mediated interventions, it aims to overcome the fragmentation in the current literature.

Methodology: A dataset of 373 legitimate citations from the Scopus database covering the years 2015-2025 was used in a bibliometric research design. VOSviewer was used for data analysis and visualisation, including bibliometric coupling, co-authorship mapping, keyword co-occurrence analysis, co-citation analysis, and descriptive statistics.

Main Findings: The field has entered a phase of tremendous growth, with 70 publications in 2025. The most significant recent contributions are **Zhang and Wu (2020)** and **Yang et al. (2019)**, indicating a shift toward examining digital behaviours such as smartphone addiction. Carlbring, Gerhard Andersson, and Alexander Rozental led to a unified Swedish research network that dominates the collaborative environment. **Steel (2007)**, who views procrastination as a failure in self-regulation, continues to serve as an intellectual cornerstone.

Theoretical Implications: The field has evolved from descriptive psychological models to a multifaceted, structured framework that integrates psychological outcomes with behavioural theory.

Keywords: Procrastination; Self-regulation; CBT; Bedtime procrastination; Digital.

1. Introduction

In academic, professional, and daily situations, procrastination, which is often described as the deliberate postponement of planned acts while foreseeing unfavourable outcomes, has become a ubiquitous behavioural characteristic. Research on procrastination has changed over the last few decades, moving from a descriptive psychology concept to a complex field including behavioural, affective, and cognitive components. Procrastination has been repeatedly linked to negative consequences, including decreased performance, elevated stress, poor well-being, and compromised self-regulation, especially in academic contexts. These repercussions have increased academic interest in comprehending procrastination's cause as well as practical intervention techniques meant to lessen its effects.

Procrastination research has been more and more focused on intervention-oriented strategies in recent years, such as self-regulation training, mindfulness-based therapies, cognitive-behavioural therapy (CBT), and digital or app-based behavioural nudges. This shift is indicative of a larger trend in the behavioural science toward practical, empirically supported answers. Procrastination habits are reduced by interventions based on psychological theories like the expectancy value framework and temporal motivation theory. Furthermore, the scope and delivery methods of procrastination interventions have been further increased by the use of cutting-edge technology like artificial intelligence (AI), internet-based interventions, and mobile health (mHealth), especially among younger people.

The field is nonetheless conceptually dispersed and fractured despite this expanding corpus of work. A thorough understanding of how the domain has changed over time is limited by the fact that existing research is frequently restricted



to particular intervention kinds, groups, or methodological approaches. The ability of narrative and systematic review to map large-scale intellectual structures, collaborative patterns, and theme trends within the subject is intrinsically limited, despite their attempts to synthesise data. As a result, there is a crucial vacuum in the identification of the leading research streams, new frontiers, and underlying knowledge architecture of procrastination intervention research.

Bibliometric analysis has become well-known as a reliable methodological technique for statistically and graphically mapping scientific knowledge to close this gap. Bibliometric techniques allow researchers to identify patterns of scientific production, influential authors, collaboration networks, and thematic structures within a research topic by utilising massive datasets and sophisticated visualisation tools. Tools like VOSviewer, in particular, make it easier to create networks of co-authorship, co-citation, and keyword co-occurrence, which offer insights into the conceptual and intellectual organisation of the literature.

While bibliometric studies have been conducted in related fields such as digital health interventions, self-regulated learning, and mental health research, there remains a dearth of thorough, focused bibliometric research on procrastination interventions. When bibliometric efforts are accessible, they typically focus on general procrastination research rather than intervention research studies, which ignore the complex development of therapeutic, behavioural, and technological approaches to procrastination.

In light of this, the current study uses bibliometric tools to methodically map and assess the intellectual, conceptual, and social structure of procrastination intervention research. This study offers a comprehensive overview of how the discipline has evolved, who the major contributors are, and which themes predominate in the discourse by utilising data gathered from the Scopus database and visualised in VOSviewer. More significantly, it identifies new research areas and trends that can direct future academic study and real-world applications. Thus, the following research questions serve as the basis for this study:

RQ1. How has research on procrastination interventions changed over time?

RQ2. Which writers and publications have the most influence in this field?

RQ3. How do authors and nations collaborate?

RQ4. Based on keyword co-occurrence, what is the research domain's conceptual framework?

RQ5. Based on co-citation and bibliometric coupling, what are the new research streams and intellectual underpinnings?

This study adds to the literature in a number of ways by answering these questions. First, it overcomes the drawbacks of conventional reviews by offering a methodical and quantitative synthesis of procrastination intervention research. Second, it uses co-citation analysis to pinpoint the fundamental body of knowledge and theoretical underpinnings of the topic. Third, it uses the term co-occurrence and overlay visualisations to reveal the domain's conceptual structure and theme progression. Lastly, it provides a research agenda for the future by emphasising new and unexpected areas, especially with regard to transdisciplinary approaches and digital interventions.

2. Theoretical Background and Research Foundations

2.1 Procrastination as a Self-Regulation Failure

Several individuals view procrastination as a failure in self-regulation, which is the ability to manage one's thoughts, feelings, and actions in order to achieve long-term objectives (Karoly, 1993). Stronger self-regulation abilities are consistently associated with improved academic performance and adaptive functioning (Bembenuitty & Zimmerman, 2003; Nota et al., 2004), while deficiencies in these abilities result in poor task initiation, ineffective time management, and behavioural disengagement (Duru et al., 2014). Procrastination is now viewed in the literature as a failure of self-regulatory



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mechanisms, including goal-setting, monitoring, and effort control, rather than just poor planning (Baumeister et al., 2007; Howell & Watson, 2007). Given that the majority of contemporary strategies seek to improve self-regulatory abilities, this viewpoint offers a fundamental theoretical framework for comprehending procrastination therapies.

2.2 Dual Pathways: Under-regulation and Mis-regulation

Theoretical development identifies two fundamental mechanisms of procrastination: under-regulation and mis-regulation. According to the under-regulation perspective, procrastination is caused by a lack of self-control, which is typified by low motivation, disarray, and inadequate planning skills (Howell & Watson, 2007; Rabin et al., 2011). Procrastinators have higher performance avoidance tendencies and frequently lack mastery orientation (Ozer & Altun, 2011). The mis-regulation approach, on the other hand, views procrastination as an emotion-focused coping mechanism in which people put off work in order to prevent unpleasant emotions like worry or irritation (Baumeister & Heatherton, 1996). Empirical research relating procrastination to anxiety, fear of failure, and negative emotional states has provided substantial support for this short-term mood healing process (Sirois & Pychyl, 2013; Steel, 2007). When taken as a whole, these viewpoints demonstrate that procrastination is a cognitive behavioural and emotional regulation issue, which directly influences the development of therapeutic methods like CBT and ACT.

2.3 Psychological and Academic Consequences

A substantial amount of research demonstrates the negative effects of procrastination in both academic and psychological realms. Procrastination has a negative correlation with life satisfaction, academic well-being (Balkis, 2013; Özer & Saçkes, 2011), and a positive correlation with stress, anxiety, and depression (Sirois, 2007; Van Eerde, 2003). Procrastination has negative effects on academic achievement, academic engagement, and task completion (Chow, 2011). These results reinforce its multifaceted impact by reflecting both internal (such as negative emotion and decreased well-being) and external (such as poor grades) implications. Because of these pervasive consequences, procrastination is increasingly seen as both a personal behavioural problem and a more general educational and psychological issue that calls for formal solutions.

2.4 Intervention Approaches: From Therapy to Instructional Design

Despite its widespread occurrence, research on procrastination interventions is still somewhat small and dispersed. The two main categories of current techniques are instructional/behavioural treatments and therapeutic interventions. Targeting the maladaptive thoughts and behavioural patterns linked to procrastination, cognitive behavioural therapy (CBT) has become one of the most successful methods (Balkis & Duru, 2007). In a similar vein, the goal of Acceptance and Commitment Therapy (ACT) is to improve psychological adaptability and motivated behavioural change (Scent & Boss, 2015). Simultaneously, procrastination in an academic setting is effectively reduced by instructor-based treatments such as structured deadlines, ongoing assessment, and feedback mechanisms (Tuckman, 1998; Perrin et al., 2011). However, a crucial gap in the literature is highlighted by the lack of a standardised or widely acknowledged intervention model (Glick & Orsillo, 2015), highlighting the necessity of systematically mapping the body of existing research.

2.5 Emerging Directions: Digital Behaviour and Research Fragmentation

Procrastination has been linked to problematic smartphone use and internet-related behaviours in recent studies that expand procrastination research into digital environments. Procrastination cycles are reinforced by excessive digital involvement, which has been linked to low self-regulation (Billieux et al., 2015a; Gokcearslan et al., 2016). Concurrently, the discipline continues to be theoretically dispersed, encompassing various viewpoints such as situational impacts, clinical considerations, motivational processes, and personality features (Klingsieck, 2013a). Although this diversity adds value to the literature, it also results in a lack of integrated understanding, especially when it comes to therapies.



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3. Methodology

3.1 Research Design and Database Selection

The intellectual, conceptual, and collaborative structure of procrastination intervention research is thoroughly analysed in this study using a bibliometric research approach. Bibliometric analysis uses quantitative and visual methods to identify publishing trends, prominent contributors, and subject developments. It is especially useful for mapping an enormous collection of scientific literature. The Scopus database was the only source of the dataset used in this investigation. Scopus was chosen because of its broad coverage of excellent, peer-reviewed journals in many fields, especially psychology, behavioural science, and health research. Scopus offers more extensive metadata than other databases, such as author details, citations, affiliations, and indexed keywords, all of which are crucial for sophisticated bibliometric analysis.

3.2 Search Strategy

A structured keyword-based search query was created to guarantee a targeted and pertinent dataset. The purpose of the search phrase was to find material on procrastination and the psychiatric treatments that are related to it. The last Scopus query that was used was:

TITLE-ABS-KEY (procrastination AND ("psychological intervention" OR "therapy" OR "CBT" OR "mindfulness" OR "self-regulation"))

In order to maximise retrieval accuracy while preserving relevance, this query was applied to the title, abstract, and keyword columns. The dataset is guaranteed to accurately represent the intervention-oriented aspect of procrastination research rather than broad behavioural studies by incorporating intervention-related terms like therapy, CBT, mindfulness, and self-regulation. In order to capture interdisciplinary contributions, the search was initially carried out without topic area restrictions. Nevertheless, throughout the screening procedure, important records were subsequently filtered.

3.3 Inclusion and Exclusion Criteria

To guarantee transparency and reproducibility throughout the screening process, pertinent studies were chosen for this analysis in accordance with PRISMA 2020 (Figure 1) guidelines. Specific inclusion criteria were used to uphold high research standards: documents had to be published in English, have a clear focus on procrastination and related interventions, be peer-reviewed journal articles, and include authors, keywords, and references. Abstracts, editorials, notes, and other non-scholarly papers were not included in the analysis. An initial assessment of titles and abstracts was part of the multi-stage screening procedure, which was followed by a thorough verification of all metadata. A final dataset of 373 valid documents was produced by this meticulous process, and it was exported in CSV format for easy integration with bibliometric analytic tools.

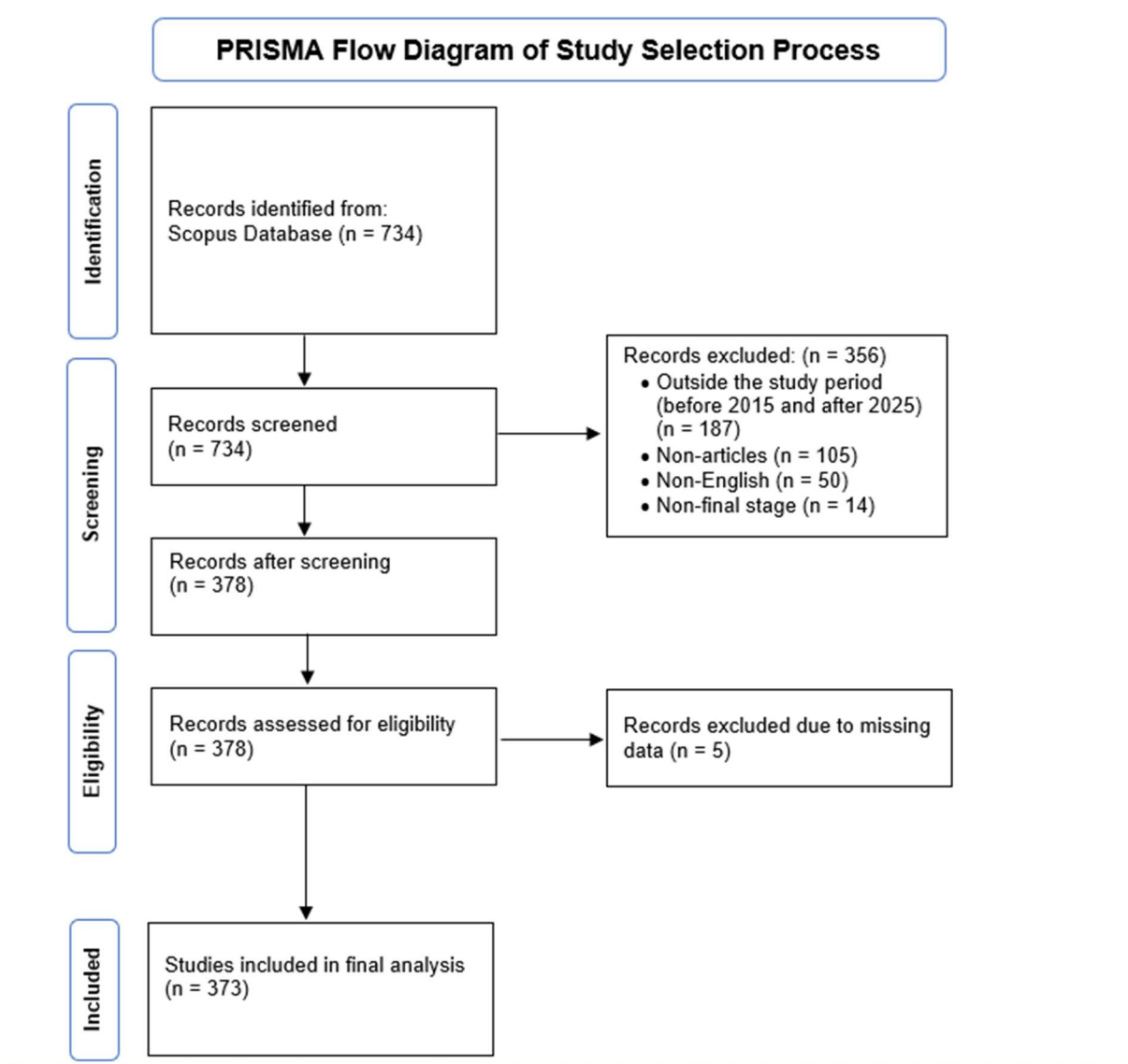


Figure 1 PRISMA 2020 flow diagram

3.4 |Data Preparation and Cleaning

To guarantee accuracy in network development, the dataset was cleaned and standardised before analysis. Inconsistencies such as differences in the spelling of keywords, Pluralisation, abbreviations, and synonyms are frequently seen in bibliometric data. If these discrepancies are not appropriately fixed, network architecture may become distorted. A thesaurus file was made and used in VOSviewer to fix this. Variations like this were standardised in the thesaurus file:

- Merging synonymous terms (e.g., academic procrastination, general procrastination → procrastination)
- Standardising terminology (e.g., self-regulation → self-regulation)
- Converting variations of therapy terms into unified labels (e.g., cognitive behavioural therapy, cognitive behaviour therapy → CBT)



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- Removing non-informative indexing terms (e.g., human, male, female, article)

This pre-processing step is crucial for improving the validity and interpretability of bibliometric networks.

3.5 Data Analysis Tools and Techniques.

The bibliometric analysis was carried out using VOSviewer, a popular program for building and displaying bibliometric networks because of its strong clustering methods, ability to manage big datasets, and useful visualisation features. To provide a thorough knowledge of procrastination intervention research, the analysis incorporated both descriptive and network-based methodologies. To capture the development and influence of the discipline, descriptive analysis was used to examine annual scientific output, key publications, and prominent authors. Co-occurrence analysis was used to determine the conceptual structure based on keyword correlations, while co-authorship analysis was used to investigate patterns of collaboration between writers and nations. Additionally, bibliographic coupling was utilised to suggest new research fronts by connecting publications with shared references, and co-citation analysis was used to unveil the field's intellectual foundation by identifying frequently co-cited references. Additionally, the temporal evolution of the study theme was examined using an overlay visualisation. When combined, these methods made for the analysis of the literature from several angles, including productivity, teamwork, conceptual structure, and the advancement of knowledge in the field.

4. Results

The results of the bibliometric analysis of procrastination intervention studies, which were based on information obtained from the Scopus database, are presented in this section. To reveal the field's structural, intellectual, and conceptual dynamics, the analysis combines network visualisation techniques with descriptive statistics. Several network analyses, including co-occurrence, co-citation, and bibliometric coupling, were conducted in VOSviewer. Together, these studies show how research production has changed over time, as well as important contributors, fundamental knowledge structures, and new thematic trends.

4.1 Descriptive Analysis

4.1.1 Annual Scientific Production

With a total of 373 publications, the annual publications trend shows a distinct increase in procrastination intervention research between 2015 and 2025. Figure 2 depicts a modest start in 2015-2017 (15-18 publications), a period of fluctuation that peaked in 2018 (32), and a brief fall in 2019 (14). Despite a minor decline in 2024 (50), a steady growing trend is seen starting in 2020, going from 23 publications in 2020 to a peak of 70 in 2025. This steady rise indicates that the field is evolving into a more developed and growing field of study and represents an increase in scholarly interest.

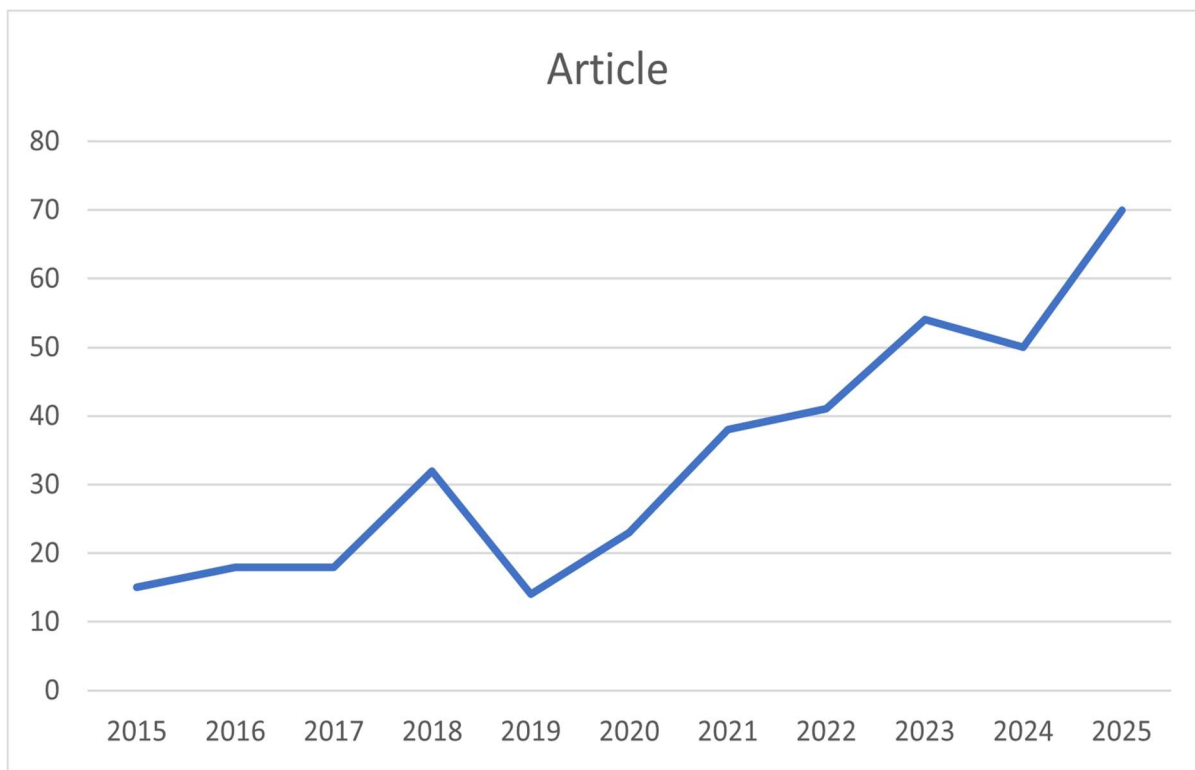


Figure 2: Annual Scientific Production

4.1.2 Most Influential Documents

The most influential studies in procrastination intervention research are found using citation analysis. The top 20 papers are shown in Table 1 according to total citations (TC) and citations annually (C/Y). Yang et al. (2019) and Zhang and Wu (2020) are the most prominent, emphasising the expanding relevance of digital behaviour (such as smartphone use) in procrastination research. Job et al. (2015) and Balkis and Duru (2016) highlight procrastination as a failing in self-regulation in their foundational works. Studies that focus on interventions, such as Rozental et al. (2015) and Glick and Orsillo (2015), show how successful CBT and acceptance-based methods are. A trend toward treatments with experimental validation is evident in recent contributions (e.g., Lindenberg et al., 2022). Self-regulation mechanisms, digital behaviour, and therapeutic interventions are the three main themes that organise the literature overall. This reflects the field's multidisciplinary and dynamic nature.

Table 1: Most Influential Articles in Procrastination Interventions between 2015 and 2025

R	Title	Authors	Year	TC	C/Y	R C/Y
1	Effects of smartphone addiction on sleep quality among Chinese university students: The mediating role of self-regulation and bedtime procrastination	Zhang M.X.; Wu A.M.S.	2020	195	32.50	1
2	An Exploration of Problematic Smartphone Use among Chinese University Students: Associations with Academic Anxiety, Academic Procrastination, Self-Regulation and Subjective Wellbeing	Yang Z.; Asbury K.; Griffiths M.D.	2019	178	25.42	2



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3	Implicit theories about willpower predict self-regulation and grades in everyday life	Job V.; Walton G.M.; Bernecker K.; Dweck C.S.	2015	151	13.72	9
4	Procrastination, self-regulation failure, academic life satisfaction, and affective well-being: underregulation or misregulation form	Balkis M.; Duru E.	2016	134	13.40	10
5	Examining the relations of time management and procrastination within a model of self-regulated learning	Wolters C.A.; Won S.; Hussain M.	2017	133	14.77	5
6	Examining procrastination across multiple goal stages: A longitudinal study of temporal motivation theory	Steel P.; Svartdal F.; Thundiyil T.; Brothen T.	2018	113	14.12	6
7	Academic interventions for academic procrastination: A review of the literature	Zacks S.; Hen M.	2018	102	12.75	11
8	Self-efficacy for self-regulation and fear of failure as mediators between self-esteem and academic procrastination among undergraduates in health professions	Zhang Y.; Dong S.; Fang W.; Chai X.; Mei J.; Fan X.	2018	101	12.62	12
9	Effectiveness of Cognitive Behavioural Therapy-Based Intervention in Preventing Gaming Disorder and Unspecified Internet Use Disorder in Adolescents: A Cluster Randomised Clinical Trial	Lindenberg K.; Kindt S.; Szász-Janocha C.	2022	100	25.00	3
10	When do you procrastinate? Sleep quality and social sleep lag jointly predict self-regulatory failure at work	Kühnel J.; Bledow R.; Feuerhahn N.	2016	100	10.00	15
11	Procrastination and Depression from a Cognitive Perspective: An Exploration of the Associations Among Procrastinatory Automatic Thoughts, Rumination, and Mindfulness	Flett A.L.; Haghbin M.; Pychyl T.A.	2016	97	9.70	16
12	The development of academic procrastination in first-year secondary education students: The link with metacognitive self-regulation, self-efficacy, and effort regulation	Ziegler N.; Opdenakker M.-C.	2018	90	11.25	13
13	An investigation of the efficacy of acceptance-based behavioural therapy for academic procrastination	Glick D.M.; Orsillo S.M.	2015	89	8.09	19
14	A Meta-analytic and Conceptual Update on the Associations Between Procrastination and Multidimensional Perfectionism	Sirois F.M.; Molnar D.S.; Hirsch J.K.	2017	86	9.55	17
15	Why don't you go to bed on time? A daily diary study on the relationships between chronotype, self-control resources and the phenomenon of bedtime procrastination	Kühnel J.; Syrek C.J.; Dreher A.	2018	84	10.50	14
16	Prediction of academic procrastination by fear of failure and self-regulation	Abdi Zarrin S.; Gracia E.; Paixão M.P.	2020	83	13.83	7



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17	Modelling of variables related to problematic internet usage and problematic social media usage in adolescents	Yıldız Durak H.	2020	83	13.83	7
18	“Fully Recharged” Evenings? The Effect of Evening Cyber Leisure on Next-Day Vitality and Performance Through Sleep Quantity and Quality, Bedtime Procrastination, and Psychological Detachment, and the Moderating Role of Mindfulness	Liu H.; Ji Y.; Dust S.B.	2021	83	16.60	4
19	Internet-based cognitive-behaviour therapy for procrastination: A randomised controlled trial	Rozental A.; Forsell E.; Svensson A.; Andersson G.; Carlbring P.	2015	82	7.45	20
20	Towards actionable learning analytics using dispositions	Tempelaar D.T.; Rienties B.; Nguyen Q.	2017	75	8.33	18
Total				2159		

Note: R = rank; TC = total citations; C/Y = citations per year

4.1.3 Leading Authors

The most productive and significant writers in procrastination intervention research from 2015 to 2025 are highlighted in Table 2. With seven publications, Heald Baumeister (Ulm University) is the most productive, followed by Alexander Rozental and Per Carlbring, who combine comparable output with far greater citation impact. With important contributors like David Forsstrom and Gerhard Andersson, a robust Swedish researcher like Y. Wang, on the other hand, has made more recent contributions and has fewer citations, which suggests that research is still in its early stages.

Timothy A. Pychyl and Jan Kuhnel have the most citations per manuscript in terms of impact, proving that a small number of publications can have a significant impact. Overall, citation-based metrics show the actual scholarly effect on the topic, whereas productivity indicates top contributors.

Table 2 Leading authors in Procrastination Interventions between 2015 and 2025

R	Author	Affiliated Institute	Country	TP	TC	C/P	AoY	C/Y	R TC	R C/P
1	Baumeister H.	Ulm University	Germany	7	107	15.29	2022.71	32.57	9	14
2	Carlbring P.	Stockholm University	Sweden	7	195	27.86	2017.71	23.53	3	6
3	Rozental A.	Luleå University of Technology	Sweden	7	195	27.86	2017.71	23.52	3	6
4	Andersson G.	Linköping University	Sweden	6	165	27.50	2018.17	21.06	6	8
5	Wang Y.	South China Normal University	China	6	32	5.33	2024.17	17.45	16	18
6	Forsström D.	Stockholm University	Sweden	5	98	19.60	2018.40	12.89	10	10



7	Kühnel J.	Goethe University Frankfurt	Germany	5	240	48.00	2019.20	35.29	1	3
8	Sirois F.M.	Durham University	United Kingdom	5	189	37.80	2019.80	30.48	5	5
9	Cuijpers P.	Vrije Universiteit Amsterdam	Netherlands	4	60	15.00	2023.50	24.00	13	15
10	Ebert D.D.	Technical University of Munich	Germany	4	87	21.75	2022.00	21.75	11	9
11	Pestana J.V.	University of Barcelona	Spain	4	63	15.75	2022.75	19.38	12	13
12	Pychyl T.A.	Carleton University	Canada	4	233	58.25	2018.25	30.06	2	1
13	Zhang H.	Zhengzhou University	China	4	19	4.75	2024.00	9.50	19	19
14	Bledow R.	Singapore Management University	Singapore	3	150	50.00	2019.00	21.43	7	2
15	Codina N.	University of Barcelona	Spain	3	53	17.67	2022.33	14.45	14	11
16	de Wit L.	Vrije Universiteit Amsterdam	Netherlands	3	8	2.67	2024.33	4.80	20	20
17	Ebner-Priemer U.W.	Karlsruhe Institute of Technology	Germany	3	53	17.67	2020.67	9.94	14	11
18	Forsell E.	Karolinska Institutet	Sweden	3	119	39.67	2015.67	11.52	8	4
19	Küchler A.-M.	Technical University of Munich	Germany	3	20	6.67	2024.00	10.00	18	17
20	Ma X.	Jiamusi University	China	3	32	10.67	2023.33	12.00	16	16
Total				89	2118					

Note: R = rank according to TP; TP = total papers; TC = total citations; C/P = citation per paper; AoY= average of year; C/Y = citations per year

4.2 Network Analysis

This study uses network analysis in addition to descriptive statistics to investigate the structural linkages found in the literature on procrastination interventions. Visual maps are created using VOSviewer to look at the connections between important bibliometric units, including authors, Nations, and keywords. These networks show topic groups, important contributors, and patterns of collaboration within the area. Furthermore, bibliographic coupling is used to organise papers according to common references, making it possible to identify the domain's intellectual structure and key research streams.

4.2.1 Author Co-authorship Network

The collaborative structure of the procrastination intervention study is revealed by the author co-authorship network created with VOSviewer. Two notable clusters in Figure 3 represent separate but related study groups. Prominent writers like Per Carlbring, Gerhard Andersson and Alexander Rozental dominate the green cluster, demonstrating a robust and integrated



Swedish research network. These writers hold prominent positions with numerous connections, demonstrating a high level of cooperation and scholarly impact in the subject.

Another closely related group is the red cluster, which includes writers like David Forsstrom and related collaborations. Additionally, there is a substantial correlation between this cluster and the green cluster, indicating intergroup cooperation as opposed to solitary research work. Carlbring and Andersson, in particular, serve as important bridging nodes that link various clusters and promote knowledge sharing among research teams. Procrastination intervention research is extremely collaborative and concentrated among a few major scholarly networks, especially in Europe, as seen by the thick interconnections. All things considered, it shows a cohesive framework for collaboration, with a core group of prominent writers spearheading the field's advancement and bolstered by robust connections both inside and between clusters.

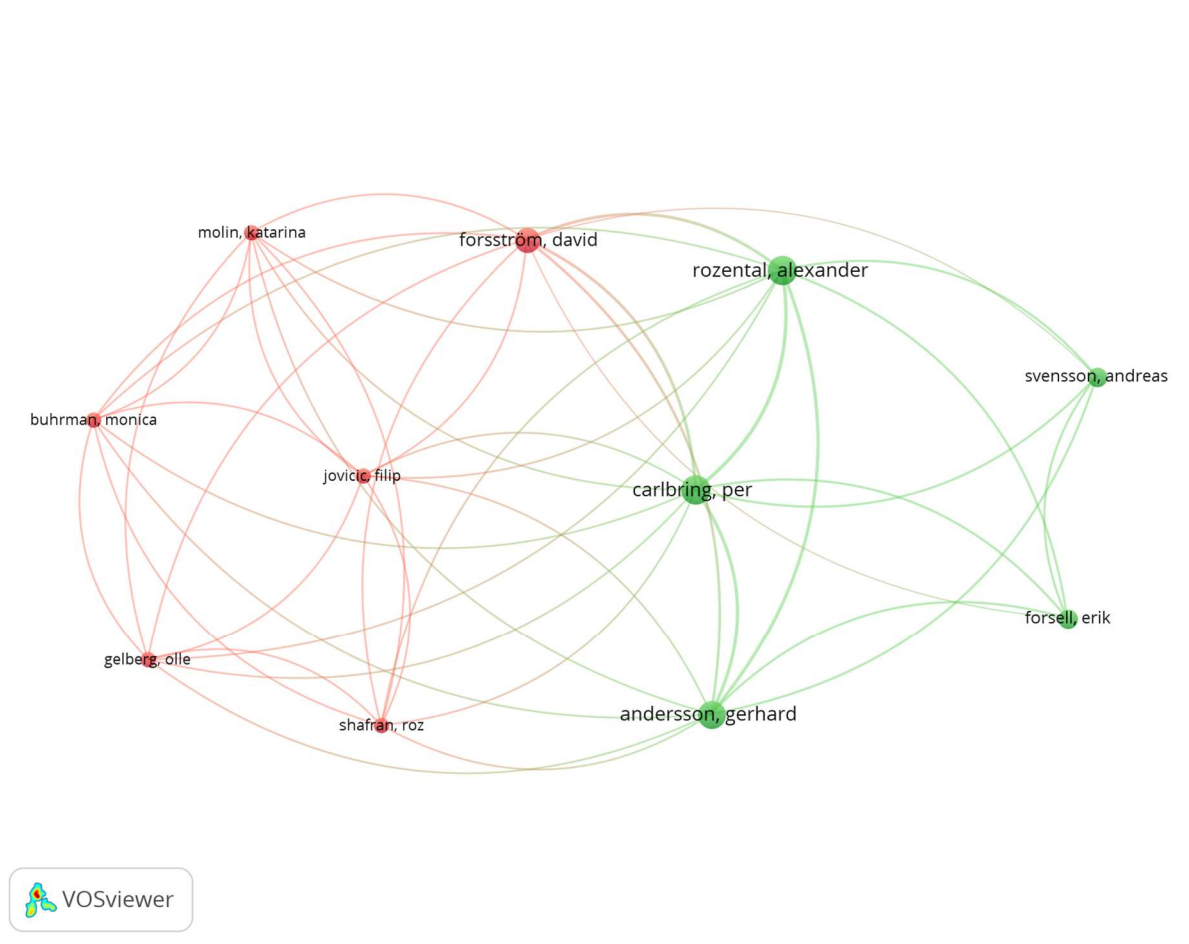


Figure 3: Co-authorship of authors using VOSviewer. This figure shows the co-authorship network of authors publishing at least two documents with at least 10 citations in Procrastination Interventions during the period 2015–2025.

4.2.2 Country Collaboration Network

The global collaborative patterns in procrastination intervention research are demonstrated by the country co-authorship network created with VOSviewer. Figure 4 shows several interrelated clusters that show both local concentration and global research connections. With significant collaborative linkage to nations like Canada, the Netherlands, Germany, and Turkey,



the United States emerges as a central centre, underscoring its crucial role in fostering international research alliances. In a similar vein, Germany and the Netherlands constitute a tightly knit European cluster that demonstrates robust intraregional cooperation.

With connections to nations like Malaysia, Iran, Italy, and Japan, the China-centred cluster is another significant research organisation that shows increased international cooperation and research activity from Asia. Interestingly, Japan serves as a hub that links research networks in Asia and Europe. Sweden may seem like a modest node, but its ties to important nations indicate that it is integrated into the larger European research framework. Peripheral nations like Brazil and Poland show little cooperation, suggesting comparatively solitary efforts. With significant contributions from North America, Europe, and increasingly Asia, the network's overall structure is both globally connected and regionally grouped, understanding the growing internationalisation of procrastination intervention research.

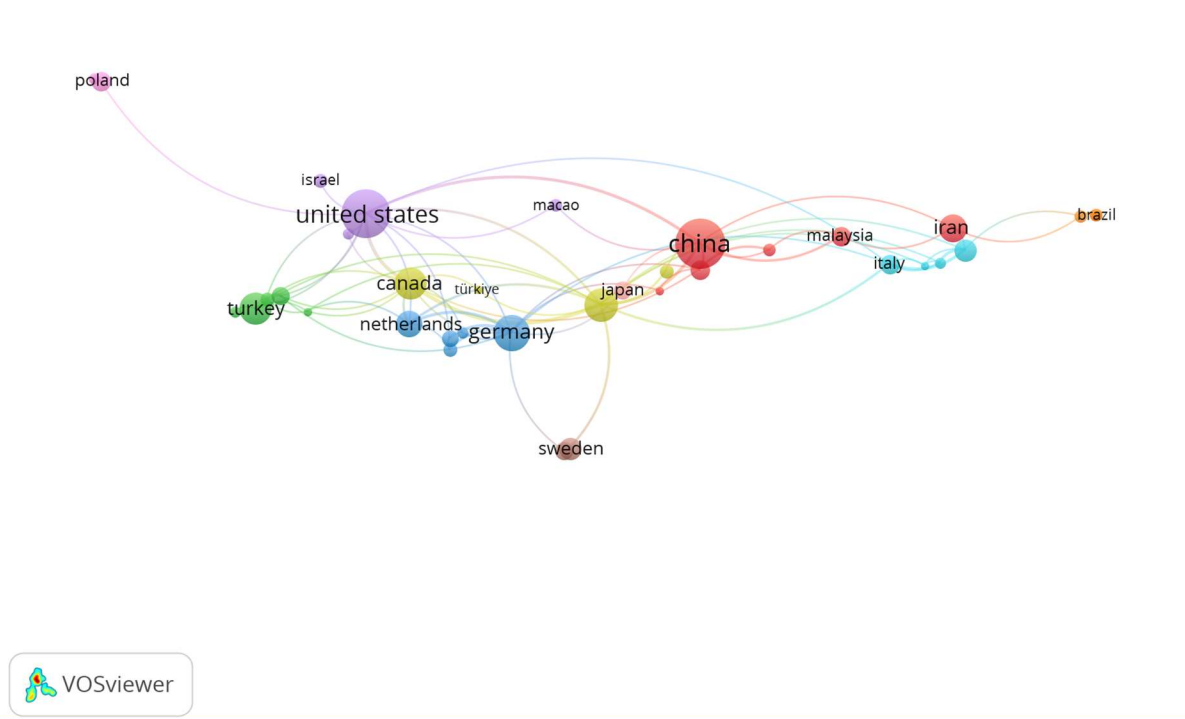


Figure 4 Co-authorship of countries using VOSviewer, this figure shows the country-level co-authorship network of procrastination intervention research, including countries publishing a minimum of two documents with at least 10 citations during the period 2015–2025.

4.2.3 Keyword Co-occurrence Network

The conceptual framework of procrastination intervention research is revealed via the keyword co-occurrence network created with VOSviewer. The prevalent term “Procrastination” in Figure 5 illustrates its crucial position in the literature. There are several different clusters are seen. The theoretical underpinnings of procrastination behaviour are highlighted by the blue cluster seen. The theoretical underpinnings of procrastination behaviour are highlighted by the blue cluster, which is driven by self-regulation, motivation, and self-regulated learning. The green cluster, which reflects empirical and therapeutic approaches, focuses on intervention-oriented themes including CBT, students, adolescents, and randomised controlled trials.



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The red cluster highlights the negative effect of procrastination on psychological outcomes, such as stress, anxiety, depression, and academic performance. Conversely, the yellow cluster connects personality qualities with behavioural inclinations through categories like impulsivity and emotional control. The purple cluster, which suggests useful intervention techniques, stands for management-oriented themes like time management and ACT. Interestingly, self-regulation shows up as a crucial bridging term that links several clusters and highlights its crucial function in comprehending and dealing with procrastination. All things considered, the network exhibits a multifaceted study structure that incorporates behavioural theory, psychological results, and intervention-based methodologies.

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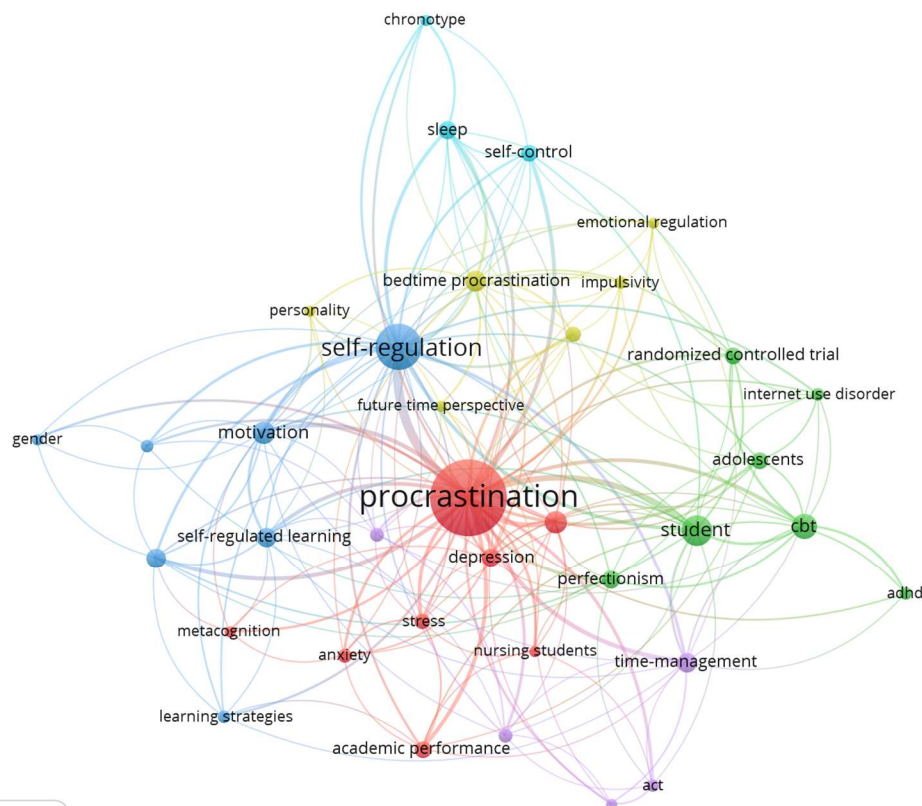
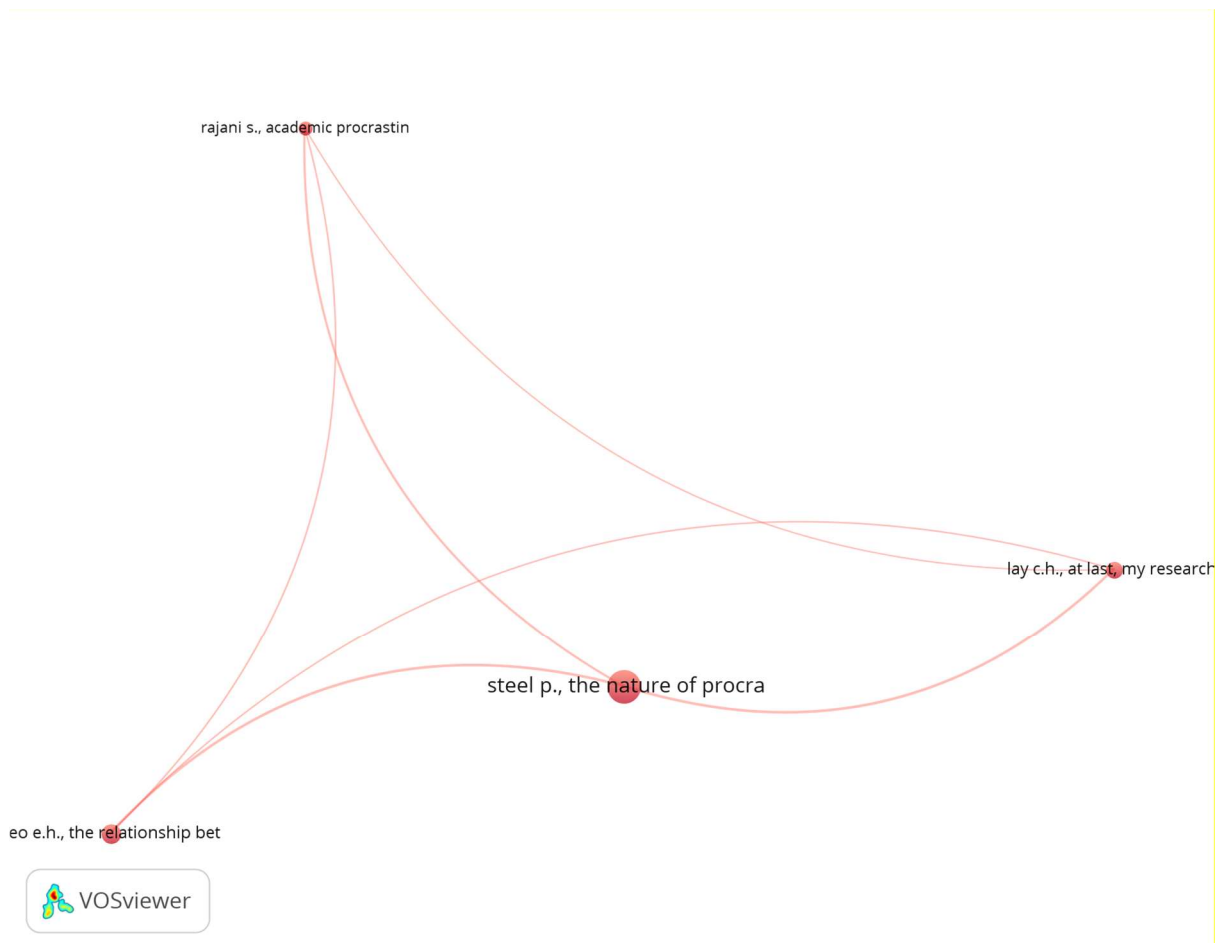




Figure 5 Co-occurrence network using VOSviewer, this figure shows the co-occurrence network of author keywords, including keywords with a minimum occurrence of five, in procrastination intervention research during the period 2015–2025.

4.2.4 Co-citation Network

The fundamental ideas behind procrastination intervention research are exposed via the co-citation network created by VOSviewer. Figure 6 seems condensed, suggesting a knowledge base that is theory-driven and targeted. Steel (2007) stands out as the most significant source and serves as the main theoretical pillar. Its importance in conceptualising procrastination, a lack of self-regulation, is confirmed by its significant co-citation linkages. Rajani et al. expand these findings within academic contexts, while closely related studies such as Lay (1968) and Seo (2008) contribute to viewpoints on academic performance and measurement. All of these studies support the behavioural and self-regulatory aspects of procrastination. These references' intricate connections point to a coherent philosophical framework based on a small number of foundational books. All things considered, the network suggests that the subject is theoretically cohesive, with development continuously based on well-established basic frameworks.





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Figure 6: Co-citation network of cited references using VOSviewer. This figure displays the network of influential references with a minimum of 20 citations in procrastination research, illustrating the intellectual structure of the field from 2015 to 2025.

4.2.5 Bibliographic Coupling

By classifying widely cited publications according to common reference patterns, the bibliographic coupling network created with VOSviewer shows the conceptual structure of procrastination intervention research. Five closely related clusters, each of which represents a different research stream, make up the network (figure 7). Important research on self-regulated learning, time management, and motivational theory, such as Wolters (20217), Steel (2018), and Glick (2015), forms the network's primary core. Several clusters are connected by these works, which serve as the conceptual framework

Balkis (2016) and Sirois (2017) serve as the foundation for the green clusters, which highlight student-focused outcomes and well-being, such as academic life satisfaction and the psychological effects of procrastination. The stream illustrates how theoretical ideas are applied in psychological and educational settings. JOB (2015), Zhang (2020), and Kuhnel (2018) lead the red cluster, which emphasises psychological mechanisms and performance-related outcomes, including self-control, willpower beliefs, and procrastination before bed. Within the network, these investigations constitute a dense empirical core.

With a focus on self-efficacy, metacognition, and the emergence of academic procrastination, the cyan cluster, which is centred on Zieger (2018), measurement and development viewpoints. This cluster acts as a conceptual gateway that connects fundamental ideas with practical research. In particular, digital settings and technology-related behaviours like smartphone use, and the online environment are captured by the purple cluster, which includes Yilsiz Duark (2020) and Lindenberg (2022).

Balkis (2016), Wolters (2017), and Ziegler (2018) stand out as high-centrality nodes that serve as intermediaries between clusters. The network's core dense connection shows that research is increasingly depending on a common theoretical framework that incorporates motivation, self-regulation, and intervention-based strategies. All things considered, the network exhibits a mature and well-intergroup knowledge structure, clearly moving from basic theories and measurement to practical, intervention-focused, and context-specific research in procrastination studies.

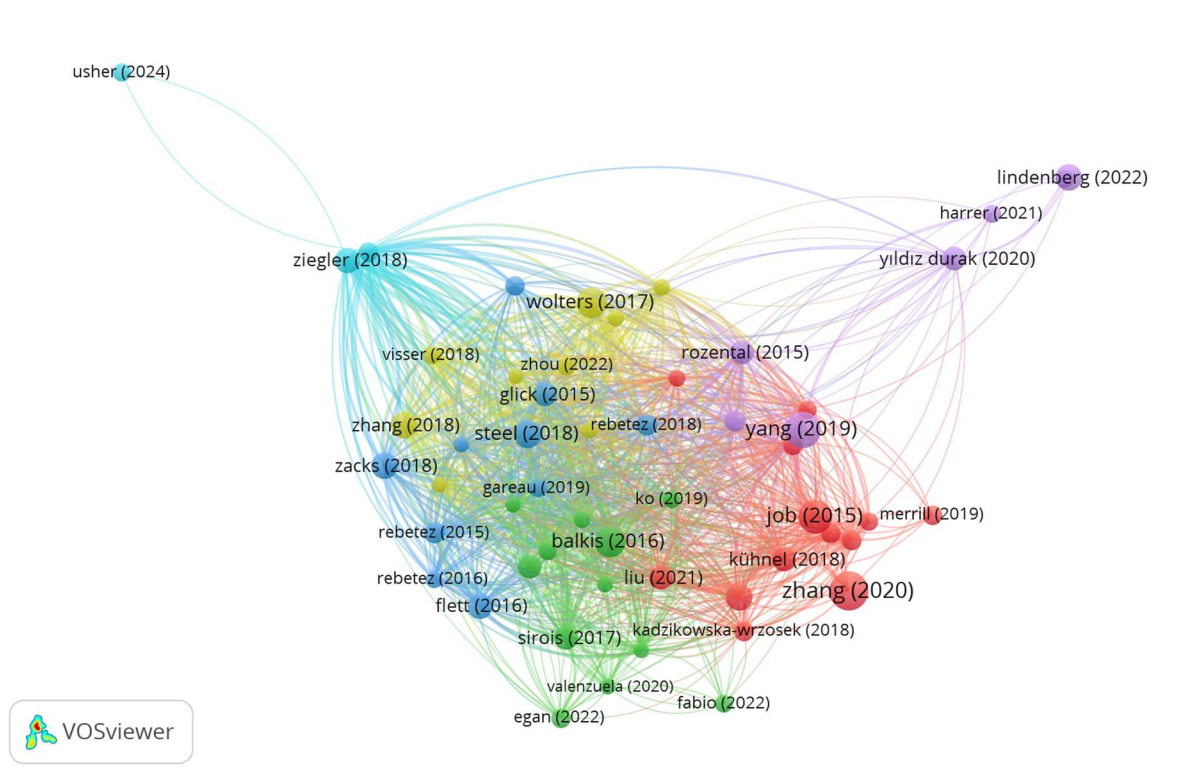


Figure 7: Bibliographic coupling of documents using VOSviewer. This figure displays the network of influential papers with a minimum of 40 citations in procrastination research, illustrating the evolution of the field from 2015 to 2024.

5. Summary and Conclusions

Based on 373 papers pulled from the Scopus database, the study provides a thorough bibliometric overview of procrastination intervention research from 2015 to 2025. The analysis, which maps the subject's intellectual, conceptual, and collaborative frameworks, shows that the discipline has clearly matured, with steady expansion and a move away from descriptive theory and toward evidence-based treatments. With significant contributions like Zhang and Wu (2020) and Yang et al. (2019) emphasising the significance of smartphone use and technology-driven environments, the literature is progressively emphasising digital behaviour. In addition to more extensive international connections, a robust Swedish research network is headed by Carlbring. Andersson and Rozental dominate the highly concentrated collaborative landscape. China is an emerging and quickly growing contributor, while the United States serves as a focal point for cooperation.

Steel (2007). Who conceptualises procrastination as a failure in self-regulation? Five interrelated study streams are a coherent and theory-driven intellectual underpinning. Five interrelated study streams are identified by bibliometric coupling, which shows a development from fundamental measurement to applied, intervention-based, and technology-mediated investigations. Important works that serve as bridging nodes between these streams are Balkis (2016), Wolter (2017), and Ziegler (2018). With a rising focus on digital and scalable solutions, such as mHealth and specialised therapies like ACT, the area is conceptually multifaceted, integrating self-regulation, psychological results, and intervention tactics. This change suggests a trend toward multidisciplinary and more pragmatic methods.

Despite these advances, the study's limitations stem from the qualitative character of bibliometric techniques and their development on the Scopus database. Multi-database analyses, qualitative insights, and new fields like AI-driven interventions and customised behavioural tactics should all be included in future studies. All things considered,



procrastination intervention research has developed into a disciplined, cooperative, and quickly evolving field that provides a solid basis for creating practical, empirically supported methods to deal with procrastination in modern settings.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research. The authors have no financial, professional, or personal relationships that could have influenced the conduct or findings of the study.

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