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Interventions to reduce academic procrastination: A systematic review

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ABSTRACT

Procrastinating is a common phenomenon that consists of postponing or delaying an activity for later, replacing it with another of lesser importance. This behavior is associated with different variables (psychological, personal and pedagogical) that affect the subject and lead him/her to postpone activities, influencing both academic and well-being levels. In education, this behavior directly affects the teaching-learning processes of students, also affecting their academic performance linked to a failure in the students' self-regulation processes. This research aims to systematize the scientific production on educational interventions aimed at reducing academic procrastination in the classroom. To this end, a systematic review of the literature (PRISMA-P) of the interventions carried out in the last decade ($n = 32$) was conducted. The results of this study show that, although many variables are worked on in the classroom, self-regulation stands out as the central dimension detailed in the interventions and that there are fundamental aspects, such as personality or anxiety, on which there are fewer studies focused on working on these dimensions. The findings of this study could be helpful to evaluate the potential of existing interventions and serve as a theoretical corpus for the design of future interventions.

1. Interventions to reduce academic procrastination: a systematic review

In the teaching-learning process, many variables affect the correct development of students. Students experience problems in the academic sphere when they feel that acquiring knowledge is difficult. One of these problems present in students is academic procrastination. According to the study by Amarnath, Ozmen, Struijs, de Wit and Cuijpers (2023), it is estimated that 20% of adults perceive themselves as chronic procrastinators, a percentage that increases and reaches figures of 70% in university students (Klingsieck, Grund, Schmid & Fries, 2013), so it is a widespread phenomenon that can act at both academic and well-being levels, affecting effective learning processes and the development of states of anxiety or depression (Amarnath et al., 2023; Beutel et al., 2016).

According to Steel (2007), procrastination is the action of postponing one or several activities, both in their beginning and their development or completion, carrying out other activities of lesser importance, or even unnecessary ones, that prevent their timely completion. Other authors define procrastination as the process of not being able to complete a specific task on time or feeling unable to finish it in a favorable manner, which causes the subject to experience a feeling of discomfort and a tendency to feel overwhelmed

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

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(Palacios-Garay, Belito, Bernaola & Capcha, 2020). Similarly, authors such as Delgado, Raúl and Palos (2007) define procrastination as a synonym for procrastination, which is understood as an intentional decision that leads to postponing a task unnecessarily and leaving it incomplete, replacing it with another activity of minimum priority, knowing the negative consequences or possible disadvantages associated with this behavior.

In education, academic procrastination is an impairment in decision-making and in resolving conflicts that arise for students when deciding whether to satisfy the requirements of the environment or to complete academic homework (Ayala, Rodríguez, Villanueva, Hernández & Campos, 2020). This idea is associated with anxiety problems in students both at the beginning of the task and as a consequence of the decisions made or linked to poor time allocation (Marquina-Luján, Gomez-Vargas, Salas-Herrera, Santibañez-Gihua & Rumiche-Prieto, 2016). Other authors define academic procrastination as the unnecessary postponement of study-related activities such as doing homework, reading texts, or studying for exams due to the lack or absence of self-regulated performance and the behavioral tendency to postpone what is necessary to achieve a goal (Geara & Teixeira, 2017; Knaus, 2000).

As with definitions, the factors associated with procrastination depend on different approaches and authors, so the phenomenon of procrastination has often been associated with failure in the process of self-regulation (Correia & Moura, 2017; Geara & Teixeira, 2017; Steel & Klingsieck, 2016). However, other authors not only focus on procrastination as a problem linked to time management by students but also address it by including cognitive, affective, or behavioral aspects such as overconfidence in carrying out or achieving a proposed goal on time or self-efficacy behaviors (Alegre, 2013; Moreta, Durán & Villegas, 2018;Vargas, 2017). We can also find it associated with strategies for regulating negative emotions, such as fear of failure, as essential and difficult activities are postponed for others that present an immediate reward, thus achieving a temporary sense of well-being (Hen & Goroshit, 2020; Wang, Kou, Du, Wang & Xu, 2022).

In education, several studies negatively associate procrastination with academic performance, causing deficiencies in the educational process (Badia Martín, del & Daura Luján, 2018; Hussain & Sultan, 2010; Kim & Seo, 2015). According to Ayala et al. (2020), students are highly predisposed to procrastinating on some academic tasks, causing them not to submit their homework on time or not to comply with the time estimated or set by teachers. Procrastination of activities, in many cases, produces states of anxiety, low self-efficacy, and stress that, as a consequence, will result in a negative mark or grade and may even lead to cases of school failure, linked to the feeling of inefficiency or discomfort for not being able to achieve the proposed goals (Domínguez, Villegas & Centeno, 2014).

Just as there are differences in construct definitions, procrastinators' styles are not unique. While they exhibit common behaviors, there are typified differences in the literature. Chu and Choi (2005) classify procrastinators into two types: active and passive. Active procrastinators are those individuals who view procrastination as a positive thing, preferring to work under pressure and making deliberate decision to procrastinate. In contrast, passive procrastinators, the most frequent procrastinators, are indecisive and unable to make decisions quickly, and, despite not intending to postpone activities, they are paralyzed by their decision to act and usually do not finish the proposed tasks on time.

On the other hand, authors such as Ferrari, Johnson and McCown (1995), based on a psychological approach, divide procrastination into three groups: aural, avoidant, and decisional. Aurosal procrastination refers to a high level of sensation seeking, feeling greater satisfaction in completing the task quickly, and running the risk of failure. The avoidant procrastinator procrastinates for fear of failure, is afraid of facing his or her limitations, and therefore avoids performing the task. Finally, the decisional, procrastinates in deciding to carry out the activity to be performed. Similarly, Steel (2007) classifies four types of procrastinators by associating them with motivational factors in procrastination: Thrill Seekers who enjoy finishing tasks just in time, Impulsives are individuals who lack discipline and are easily distracted, Undecided have difficulty in making decisions and stagnate and Avoiders are afraid of failure or the disapproval of others.

Procrastination is, therefore, a multifaceted construct about which there are different studies that are addressed from different psychological and pedagogical approaches, and each of them provides a differential vision or focuses on different aspects of the construct. This phenomenon is only sometimes positive; sometimes, there is an excess of literature or a lack of specificity when finding the information required when studying the phenomenon. For this reason, it seems necessary to systematize and bring together the scientific production of recent years on academic procrastination to organize the information and facilitate the understanding of the construct related to educational contexts.

Most research considers procrastination a stable personality trait, but internal and external conditions can trigger or mediate students' behavior (Steel & Klingsieck, 2016). This idea highlights the importance of not only focusing on students' intrinsic or personal aspects but also using external factors that can help us manage these behaviors. In academic contexts, students must master different learning strategies that allow them to evaluate their study process and be aware of their limitations and achievements (Martins & Santos, 2019). For this, it is necessary to work on self-regulation processes, where the individual, consciously and voluntarily, manages their behaviors, feelings, and thoughts to achieve the proposed goals (Bandura, 1991; Machado & Schwartz, 2018), since, as many authors mention, procrastination, as a failure in the self-regulation process, implies an intention-action mismatch that increases the probability of experiencing unpleasant emotional states such as anxiety before evaluative activities, stress, exhaustion, decreased interest in the activities, among other aversive feelings (Lonka et al., 2014; Pereira & Ramos, 2021).

Based on the above, recent studies focus on intervening students by providing them with tools that enable them to cope with the procrastinating behavior of students, trying to mitigate its adverse effects. Some of the work in this line focuses on the cognitive aspects of procrastination, such as acceptance and control of thoughts and emotions, based on cognitive behavioral therapies (CBT) (Rozental et al., 2018; Ugwuanyi et al., 2020; Wang et al., 2017) or interventions based on acceptance and commitment therapy (ACT) (Gagnon, Dionne, Raymond & Grégoire, 2019; Glick & Orsillo, 2015; Scent & Boes, 2014). Other authors focus their interventions on aspects that relate to students' self-esteem (Schuenemann, Scherenberg, von Salisch & Eckert, 2022; Toker & Avcı, 2015) or self-efficacy (Çelik &

Odacı, 2018; Krispenz, Gort, Schültke & Dickhäuser, 2019).

Other studies focus on critical aspects of self-regulation in a more practical way, such as the effectiveness of time management through group counseling (Häfner, Oberst & Stock, 2014; Ja'afari, Refahi & Kazemi, 2017) or emotion management (Amarnath et al., 2023; Eckert, Ebert, Lehr, Sieland & Berking, 2018; Loeffler, Stumpp, Grund, Limberger & Ebner-Priemer, 2019). Similarly, we found other interventions that study the relationship between procrastination in students with their performance (Balderas, Capiluppi, Palomo-Duarte, Malizia & Dodero, 2019; Davis & Abbitt, 2013). These studies focus on one or more parts of the construct. However, as is the case when defining procrastination, they are carried out from different approaches or perspectives, which means that the results are not entirely clear. There is no theoretical corpus or model that allows for the evaluation of these interventions.

Bearing in mind the above, this study aims to analyze the educational interventions linked to procrastination that have been carried out over the last decade, identify how procrastination is being addressed in educational contexts, and assess the results obtained. Furthermore, these data can provide a deeper insight into the construct and explore those aspects of procrastination that are promoted in the literature and those that are being addressed in practice.

The results of this study could allow both teachers and counselors to maximize efforts and to be able to detect and evaluate the problems present in the classroom. Likewise, these data are intended to help evaluate or predict the pedagogical potential of existing interventions. They can also be used as a theoretical corpus to improve the design and impact of future interventions focused on those aspects of procrastination that need to be improved.

2. Methodology

The primary purpose of this review is to identify which dimensions of procrastination are being addressed in the classroom. To this end, a systematic review of educational interventions of the last decade aimed at reducing the degree of procrastination of students is carried out.

This general objective is specified in the following specific objectives:

1) Systematize the scientific production regarding academic procrastination through the study of interventions focused on its reduction, tracing its evolution in the last decade and identifying its main characteristics.
2) Extract a system of dimensions from the analyzed procrastination models that can be used t evaluate educational interventions for reducing procrastination.
3) Identify the dimensions of procrastination that are being worked on in practice through educational interventions focused on reducing procrastination.
4) Reflect on the interventions as an agent for improving the levels of procrastination present in students, their appropriateness, and correct understanding and implementation in educational contexts.

2.1. Procedure, materials, and data analysis

The scientific methodology followed is carried out in three stages. In the first stage, a review of the most representative models of academic procrastination in the scientific literature was carried out to extract the dimensions to which procrastination relates in educational contexts. In the second stage, a systematic review of the existing literature on educational interventions for reducing academic procrastination is carried out. This systematic review is carried out following the PRISMA protocol. In the third phase, a qualitative analysis of the selected studies is carried out to identify which academic procrastination dimensions are being addressed in educational contexts. For this last phase, according to Hsieh and Shannon (2005), the methodological procedure is applied: directed content analysis. This method consists of categorizing the selected studies based on a previous categorization, model, or approach, as long as these are duly justified and validated for their scientific rigor. For this third stage, the categories extracted from the first step of the study have been used as a system of categories. Each of these procedures is detailed below.

Phase 1. Literature review of relevant procrastination models

To carry out the study's first phase, a literature review was conducted using the combination of the terms 'procrastination' and 'academic procrastination' in Scopus and WOS. The existing models in the literature from the last ten years were reviewed. For their selection, we followed the criteria of the highest number of citations and most relevant citations and that the models were directly related to academic procrastination. For the final selection, 72 articles were analyzed, grouping their dimensions and selecting those most recurrent and present in the models. The emerging dimensions were grouped into three categories: psychological, personal, and pedagogical. The following table (Table 1) shows the emerging dimensions.

Phase 2. PRISMA Protocol

To develop this study, a systematic review of the existing scientific literature on interventions developed to reduce academic procrastination was carried out. In order to carry out this review correctly and to ensure its validity and thoroughness, the recommendations and indications of the PRISMA statement were followed (Hutton, Catalá-López & Moher, 2016; Moher, Liberati, Tetzlaff & Altman, 2009; Urrútia & Bonfill, 2013). The process followed in carrying out the review is detailed below, explaining the different phases of the protocol.

Table 1
Most cited dimensions extracted from the literature. Source: authors.

Approach	Dimensions
Psychologic	Self-regulation
	Self-efficacy
	Self-esteem
	Motivation
	Perfectionism
	Personality
	anxiety
Personal	Authoritarian parenting
Pedagogic	Academic performance
	Student dropout

2.2. Initial search

The initial search began in February 2023 using the combination of the terms 'procrastination' and 'academic procrastination' in the WOS and Scopus databases. In a second phase, the search was expanded using the Boolean operators AND and OR in combination with the descriptors 'model', 'education', 'student', 'academic', and other descriptors. These searches showed an extensive amount of scientific productions, and thanks to this initial phase, it was possible to obtain a global vision of the subject matter, of the existing models in the literature of academic procrastination, and, therefore, of the relevance of carrying out a systematic review of the literature focused on the interventions that have been carried out in recent years in the classroom, intending to reduce the data on academic procrastination.

2.3. Systematic search

The systematic search was completed in March 2023 using the WOS and Scopus databases, using a search interval of 11 years (from 2013 to 2023 inclusive).

The final combination of terms used was: (procrastination) AND (intervention OR therapy OR training OR treatment OR trial OR experiment OR study OR project OR program) AND (university OR student OR education OR classroom OR adolescent). Finally, this search yielded a total of 9079 results, of which 8243 were obtained from Scopus and 836 from WOS. The inclusion and exclusion criteria used to filter the results following the PICO format are shown below (Table 2).

After identifying the 9079 results found in WOS and Scopus, we discarded duplicate articles in the two databases ($n = 374$), leaving us with 8705 results. Next, we began with the screening phase based on the inclusion and exclusion criteria mentioned above. According to these criteria, after reading the title, $n = 8614$ were discarded as they were articles that were not relevant to our object of study. Most of them were discarded as they did not deal with educational interventions, which was far from our study. Others, however, focused on or studied procrastination in other areas outside education: some articles referred to general procrastination without alluding to educational environments, many of them dealt with procrastination in different types of work environments, and other studies talked about other types of procrastination, such as bedtime procrastination. In addition, some systematic review articles were found, but these were also discarded. After this screening, a total of $n = 91$ records were selected for eligibility ($n = 22$ from WOS and $n = 69$ from Scopus). After reading the abstract, $n = 6$ that were not available for reading and $n = 36$ that did not meet the study's inclusion criteria were eliminated, leaving a sample of $n = 49$ records ($n = 8$ from WOS and $n = 41$ from Scopus). Finally, after reading the full text of the selected articles, $n = 17$ were discarded because they needed to meet some of the above criteria not detected in the previous filtering phases. Thus, $n = 32$ ($n = 3$ from WOS and $n = 29$ from Scopus) records are included in the systematic review. The summary of the process can be seen in Fig.1.

Phase 3. Analysis of documentary information

The analysis of the information is carried out using the methodological procedure of directed content analysis (Hsieh & Shannon, 2005). This method consists of categorizing the selected articles on the basis of a previous categorization, model, or approach, as long

Table 2
Inclusion and exclusion criteria according to PICO structure. Source: authors.

	Inclusion criteria	Exclusion criteria
Participant	Students	Any
Intervention	Any	None
Context*	Published in 2013–2023	Not published in 2013–2023
	Articles and published	No articles
		Unpublished
Outcomes	Linked to real-world experiences of classroom interventions to reduce academic procrastination	Others

* The Comparator section of the usual PICO format was modified by Context following (Reyes-de-Cózar, Pérez-Escolar & Navazo-Ostúa, 2022).

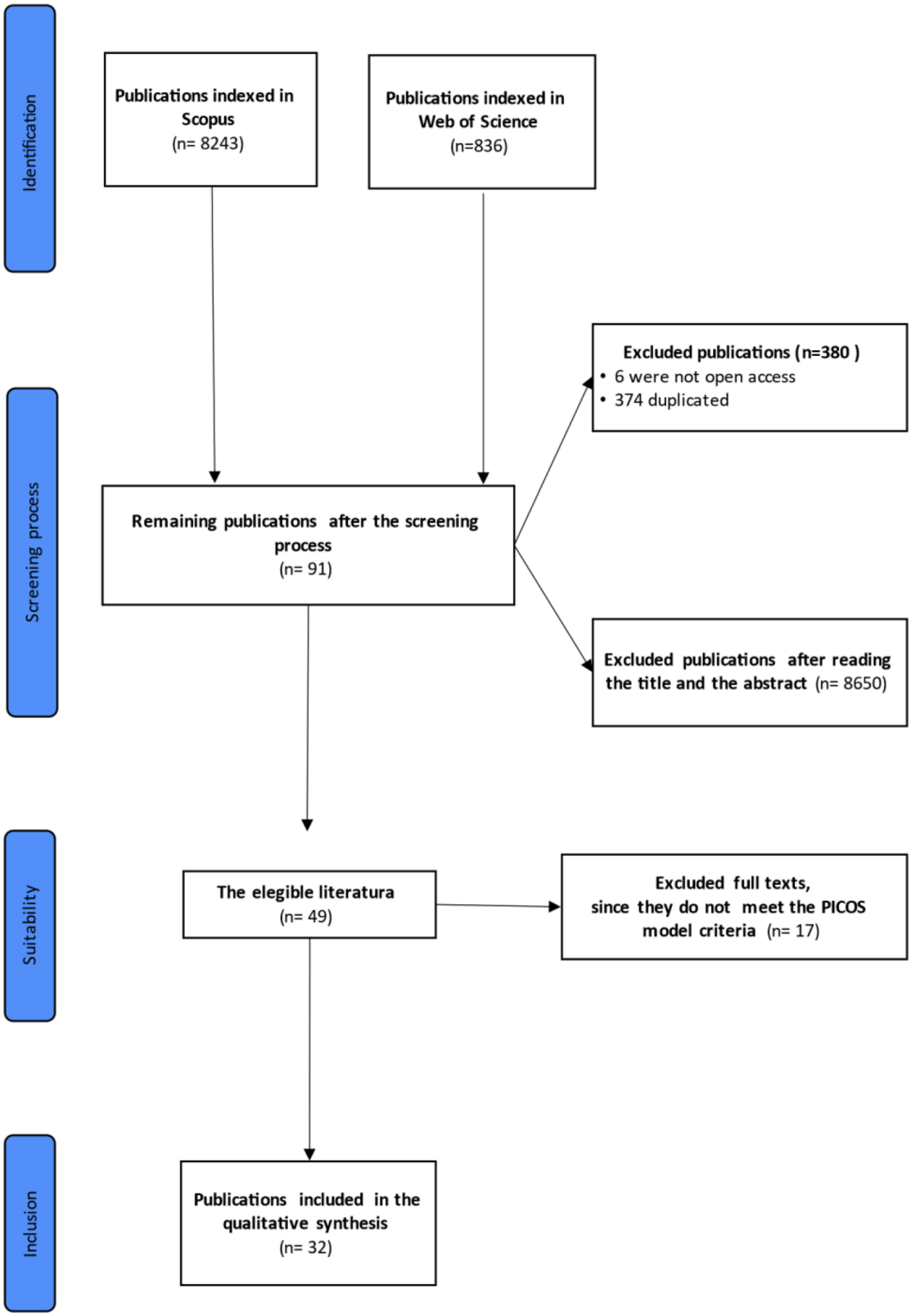


Fig. 1. Planning, identification and eligibility process workflow. Source: authors.

as these are duly justified and their scientific rigor is validated. This analysis will allow us to identify how procrastination is being addressed in the classroom and thus extract a system of dimensions or categories that will help us to evaluate educational interventions to reduce procrastination.

The following is a description of the dimensions that make up the categorization or preliminary approach used for the targeted content analysis extracted from the review carried out in Phase 1 of the study. As described above, this categorization is made up of those dimensions that are most present in the most relevant models of procrastination in the scientific literature. For our study, psychological variables have been used due to the nature of the construct and because these dimensions are measurable and assessable through the interventions studied.

The selected categories and their description are presented below:

1) Self-efficacy: personal perception or belief of one's own capabilities in a given situation.
2) Motivation: a set of internal or external factors that partly determine a person's actions.
3) Personality: a set of a person's psychological characteristics that determine the way he/she acts in particular circumstances.
4) Self-regulation: the ability to control and manage thoughts, emotions, actions, and motivation through a series of personal strategies that enable both the achievement of goals and the avoidance of undesirable outcomes.
5) Perfectionism: a personality trait that is related to the belief that it is necessary to do things extremely well, without making mistakes, and that decisions must be made that do not lead to any kind of mistake or loss.
6) Anxiety: a state of mind characterized by great restlessness, intense excitement, and extreme insecurity.

3. Results

3.1. Scientific production on academic procrastination through the study of interventions focused on its reduction in 2013–2023

In terms of the first specific objective of the study: to systematize the scientific production regarding academic procrastination through the study of interventions focused on its reduction, tracing its evolution over the last decade and identifying its main characteristics, Table 3 shows a summary of the articles analyzed in this work organized by their main characteristics: author, year, sample and research method. The code assigned to each article is also presented, which will serve as a reference for each work throughout this study.

Table 3
Main characteristics of the publications included in the qualitative synthesis. Source: authors.

ID	Authors (Year)	Sample	Methodology
A01	Amarnath et al. (2023)	176	Quantitative
A02	Balderas et al. (2019)	185 / 166	Quantitative
A03	Bendicho, Mora, Añorbe-Díaz and Rivero-Rodríguez (2017)	134 (2014) / 153 (2015)	Quantitative
A04	Blouin-Hudon and Pychyl (2017)	193	Quantitative
A05	Çelik and Odacı (2018)	36	Quantitative
A06	Davis and Abbitt (2013)	3	Mixed
A07	Eckert et al. (2018)	161	Quantitative
A08	Edwards, Martin and Shaffer (2015)	353	Quantitative
A09	Fathi, Azar, Mirnasab and Gargari (2015)	36	Quantitative
A10	Gading (2020)	61	Quantitative
A11	Gagnon et al. (2019)	36	Quantitative
A12	Glick and Orsillo (2015)	118	Quantitative
A13	Grunschel, Patrzek, Klingsieck and Fries (2018)	106	Quantitative
A14	Häfner et al. (2014)	96	Quantitative
A15	Ja'afari et al. (2017)	30	Quantitative
A16	Krispenz et al. (2019)	71	Quantitative
A17	Loeffler et al. (2019)	89	Quantitative
A18	Lukas and Berking (2018)	31	Quantitative
A19	Otermin-Cristeta and Hautzinger (2018)	175	Quantitative
A20	Ozer, Demir and Ferrari (2013)	10	Quantitative
A21	Patria and Laili (2021)	20	Quantitative
A22	Pogorskiy and Beckmann (2023)	157	Quantitative
A23	Rozental et al. (2018)	92	Quantitative
A24	Saputra and Lidyawati (2019)	14	Quantitative
A25	Scent and Boes (2014)	8	Qualitative
A26	Schuenemann et al. (2022)	148	Quantitative
A27	Toker and Avcı (2015)	26	Mixed
A28	Ugwuanyi et al. (2020)	64	Quantitative
A29	Visser, Schoonenboom and Korthagen (2017)	54	Quantitative
A30	Wang et al. (2017)	60	Mixed
A31	Wang, Xin, Zhang, Du and Wang (2022)	818	Quantitative
A32	Wessel, Bradley and Hood (2021)	107	Quantitative

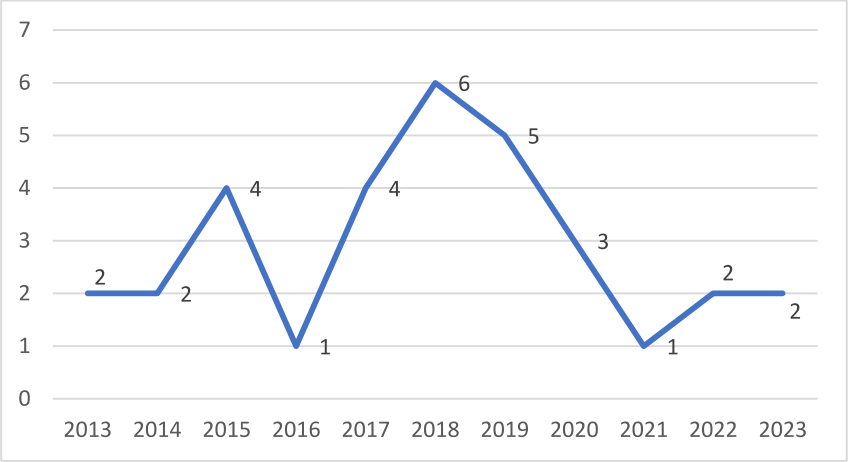


Fig. 2. Frequency of publication of studies by year. Source: authors.

As can be seen in Fig. 2, the scientific production on academic interventions to reduce student procrastination presents a balanced distribution over the last 11 years. An increase in scientific production was observed in 2018 and 2019, where the most significant number of articles analyzed in this paper are located, 11 of the 32 articles in the study. After 2020, we can see how the data for the studies analyzed are back in line with the data obtained before the production peak.

Regarding the nature of the type of study (Fig. 3), it can be seen that the vast majority of the studies selected and analyzed present a quantitative methodology, found in 28 of the 32 articles selected (87.5%) and 3 of the studies use a mixed methodology, present in 9.5% of the sample. Only one study is based on qualitative methodology (3%).

Concerning the educational level at which the interventions in the study are developed (Fig. 4), it can be seen that most of these have been carried out on university students (23), compared to the studies carried out on postgraduate students (6) and the few studies found carried out on secondary school students (3). No studies addressed procrastination in students at lower levels (primary school).

3.2. Identify the dimensions of procrastination being addressed through educational interventions focused on its reduction

About the objective of identifying the dimensions of procrastination that are being addressed in practice through educational interventions focused on its reduction, the results obtained after analyzing the interventions included in this review are shown below.

Considering as a frame of reference the dimensions extracted in the first phase of this study, and following the methodological procedure: directed content analysis (Hsieh & Shannon, 2005), the selected interventions are analyzed based on the system of categories extracted and the dimensions that are being worked on in practice through educational interventions focused on reducing students' procrastination are identified (Table 4).

As seen in Table 4, the results show self-regulation as the central dimension worked on in the classroom to combat procrastination, with a 90.6% percentage found in almost all the studies analyzed. Self-efficacy is the second most crucial dimension, with a percentage of 28,2%, followed by motivation and self-esteem in the studies, with a percentage of 21.8% and 18,7%, respectively. Personality is addressed in two of the studies analyzed with a percentage of 6.2%, and anxiety is only explicitly addressed in one of the interventions analyzed (3.1%).

These categories are detailed below using examples from the articles and describing the subcategories found.

3.3. Self-regulation

Following the analysis of interventions, different studies focus on self-regulation. These studies are approached from different approaches and focus on different subcategories. Within these subcategories, the one that is extracted in the most significant number of interventions analyzed is time management, as in study A05 in which in the sixth session, aspects such as functional use of time, learning time management strategies, practical use of plans and strategies for a day and understand the importance of determining goals are worked on, or in the seventh session, which deals with aspects such as efficient use of time in everyday and academic life and the implementation of plans for efficient use of time. Another example of a study working on time management is A08, in which, through active reflection, students are made to reflect on their time management behavior and how it affects their performance. They also use planning sheets or timetables to encourage students to set small intermediate deadlines and reflect periodically on their progress with these tasks.

Another of the most frequently cited aspects of self-regulation is the management of emotions (Emotion regulation). In study A11 in module 5: Being willing to deal with discomfort, participants are encouraged to be aware of the discomfort they may encounter during tasks. In A07, in its third session, subjects learned to overcome affective obstacles that created gaps between their intentions and behaviors. They worked on emotions to reduce procrastination by tolerating and modifying aversive emotions.

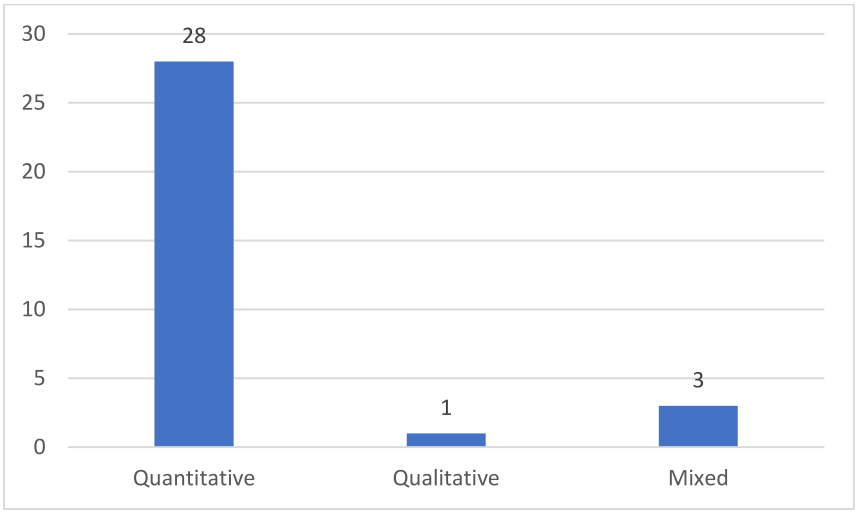


Fig. 3. Types of methodologies present in the study. Source: authors.

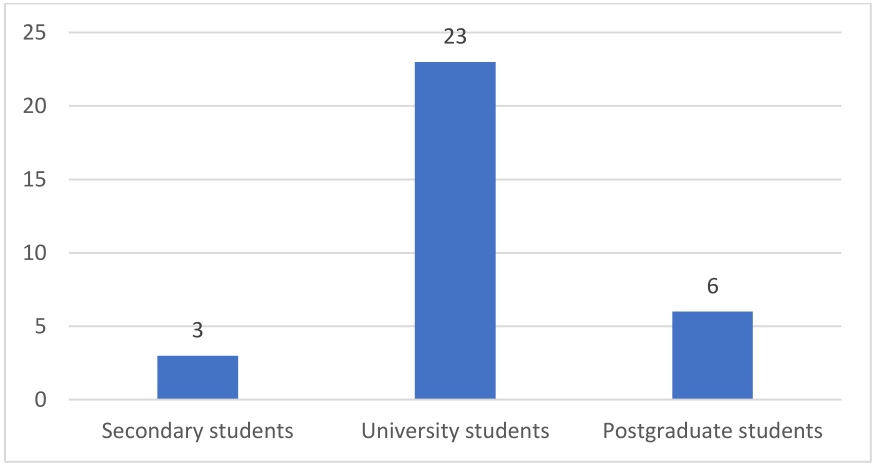


Fig. 4. Educational levels of studies. Source: authors.

Table 4
Main dimensions, frequency, percentages of appearance and articles. Source: authors.

Dimensions	Description	n	%	Articles
Self-regulation	Ability to control and manage thoughts, emotions and actions through a series of personal strategies that allow the achievement of objectives and the avoidance of undesired results.	29	90,6%	A01, A02, A03, A05, A06, A07, A08, A09, A10, A11, A12, A13, A14, A15, A17, A18, A19, A20, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30, A32
Self-efficacy	Personal perception or belief of one's own capabilities for a given situation.	9	28,1%	A05, A07, A16, A19, A22, A23, A27, A31, A32
Motivation	A set of internal factors that can determine a person's actions	7	21,8%	A03, A13, A17, A21, A23, A27, A28
Self-esteem	Sets of perceptions, thoughts, evaluations and feelings directed towards oneself.	6	18,7%	A17, A24, A26, A27, A28, A30
Personality	Set of psychic characteristics of a person that determine the way he/she acts under particular circumstances.	2	6,2%	A09, A19
Anxiety	Mental state characterized by great restlessness, intense excitement and extreme insecurity.	1	3,1%	A16

Closely linked to the management of emotions is Thoughts regulation, which is worked on in the interventions to deal with intrusive thoughts that attack procrastinators, as in A28, where they try to help students to become aware of possible false automatic thoughts that may appear during exams or other activities and to develop and implement alternative thoughts. In A29, they discussed in their third session the power of ideals, and the difference between limiting and helping thoughts, in which they worked with guided reflection on their ideals about their studies and how awareness of these ideals could be helpful during study activities. Participants discovered which helpful thoughts they had in successful study situations and which limiting thoughts played a role in situations of academic procrastination.

In study A21′s training session, students learned about self-regulation through goal setting using the SMART method (Specific, Measurable, Achievable, Realistic, and Time-based) goals or in A17, where goal-setting techniques are included in tutorials, as the authors consider it an essential part of overcoming procrastination and also having beneficial effects on motivation and performance.

Finally, self-regulation includes self-control, which the authors of study A24 focus on through a self-instruction procedure designed to improve self-control independently, using verbal affirmations to encourage and guide. In the case of A13, self-control focused on distractions and temptations. First, trainers started by defining and distinguishing social temptations (e.g., requests from friends to meet spontaneously) and cognitive distractions (e.g., irrational thoughts, dysfunctional mood) and introduced the strategy of self-instructions labeled as if-then clauses. After working through examples with the students, they reflect on the most challenging situations that could lead to academic procrastination in the future and generate the most useful self-management strategies to cope with these situations.

3.4. Self-efficacy

Self-efficacy is the second most cited dimension in the articles analyzed. In study A05, they encourage in their sessions the use of strategies to complete academic tasks and the awareness of positive and negative aspects to enhance the positive ones and thus increase the belief in self-efficacy. In the case of A07, during one of their sessions, named the evaluative session, they promoted self-efficacy expectations as a significant negative predictor of procrastination. To do so, participants evaluated situations where they successfully reduced their procrastination, thus increasing their self-efficacy expectations as a reinforcing author to reduce procrastination in future situations. In addition to generically working on self-efficacy, subcategories are extracted from the study that are explored in depth from different approaches, as is the case of A32, in which metacognition is worked on. This study uses an intervention that works with a combination of regular progress reports and open-ended questions aimed at reflecting on the expectation and value of the task in order to mitigate sensitivity to delay and thus promote students' metacognition.

Two of these subcategories, problem-solving and decision-making, are mentioned in study A19, along with other dimensions of the study also associated with time management, since in their sessions, instead of trying to increase the time participants spent on solving procrastinated tasks, they restricted the time they could work on it.

In the case of self-assessment, as a measure of self-efficacy, in A22 in the study interventions, modules were included to support the different phases of lifelong learning, such as planning, goal setting, self-monitoring, and self-assessment.

3.5. Self-esteem

Another dimension of the study that emerges from the interventions analyzed is self-esteem, as in the case of the work described in A28, where students are helped to gain awareness of false attributions of failure (academic self-esteem beliefs). They also help students to develop self-confidence, realize the habits that prevent lifelong learning, and help them to understand the reasons for success rather than failure. All of this helps students understand the significant long-term impact that avoiding challenging academic tasks can have on their self-esteem. All of this helps students understand the significant long-term impact that avoiding challenging academic tasks can have on their self-esteem. In study A30, the intervention showed promising effects concerning self-esteem, as it could teach individuals not to avoid experiences, to be congruent with their values, and to commit and take action, as well as correct irrational beliefs, reducing self-devaluation thinking and help individuals to overcome the fear of failure. Other studies mention this dimension by focusing on fear or self-doubt, such as in A17, which explains how some procrastinators tend to use procrastination as a defensive ego strategy to excuse themselves for not having completed a task satisfactorily, suffering from fear of failure, self-doubt, low self-esteem and vulnerability to specific irrational beliefs. They offer various intervention programs to help individuals address irrational and negative thought patterns through questioning and rethinking strategies.

3.6. Motivation

Motivation is present in several studies, such as A23, where the treatment content was based on research on procrastination and interventions, including goal-setting techniques, motivation, and behavioral activation. Study A03 focuses on arousing students' motivation by introducing technologies to help reduce procrastination. One way to stimulate student motivation is novelty. In this case, augmented reality is used to stimulate learning. To this end, they establish various motivational strategies linked to emotional, affective, cognitive, and behavioral components.

3.7. Personality

Another of the dimensions found in the review carried out is personality, as in the case of A23, in which they allude to perfectionism as a fundamental trait of procrastinators, working in their sessions on the beliefs and ideas associated with procrastination,

Table 5
Emerging categories and subcategories of the study. Source: authors.

	Subcategories
Self-regulation	Emotion regulation
	Time management
	Goal setting
	Thoughts regulation
	Self-control
Self-efficacy	Metacognition
	Problem solving
	Decision making
	Self-evaluation
Self-esteem	Fear/self-doubt
Motivation	–
Personality	Locus of control Perfeccionism
Anxiety	–

perfectionism, self-criticism, and fear as underlying causes of procrastination and the thoughts associated with procrastination focused on overcoming the inner child. Study A19 refers to the locus of control, a personality variable fundamental to students' behavior. During the sessions, we focus on enhancing the internal locus of control.

3.8. Anxiety

Finally, looking at anxiety, study A16 works on interventions to reduce both procrastination and anxiety, focusing, in this case, on test anxiety. This study investigates the relationship between both with self-efficacy, finding in its results a stable decrease in participants' test anxiety due in part to the increase in self-efficacy and a lasting decrease in academic procrastination.

As a summary, the categories and subcategories described above are presented in Table 5.

4. Discussion

The results obtained from the systematic literature review on classroom interventions to reduce procrastination are discussed below.

In order to obtain the categorization necessary to carry out the systematic review, and after reviewing the existing models in the literature, we extracted dimensions that allow us to categorize procrastination along three axes: psychological (self-regulation, self-efficacy, self-esteem, motivation, perfectionism, personality and anxiety), pedagogical (academic performance and student dropout) and personal (authoritarian parenting). Within this categorization, the most commonly found in the literature are those with a psychological focus, with subcategories such as self-efficacy, self-regulation and perfectionism particularly noteworthy. It is logical to obtain these categories as the most frequently found, since many studies mention psychological aspects such as low self-esteem, self-efficacy beliefs, or personal characteristics as critical factors when defining an eminently psychological construct such as procrastination (Hajloo, 2014; Parwez, Khurshid & Yousaf, 2023).

Concerning the nature of the studies analysed and the methodologies used, a quantitative methodology predominates over a qualitative or mixed methodology. Only three studies out of the thirty-two reviewed used a mixed methodology, even though the use of mixed methodologies helps to obtain a broader and deeper vision of the research, helping to obtain a greater understanding of the research problems (Ortiz, 2023). Furthermore, only one of the studies analysed employs a purely qualitative methodology, with authors mentioning that qualitative study characteristics are of particular interest in social science contexts, where results are heterogeneous and highly context-dependent (Baškarada & Koronios, 2018). These results highlight the need to expand the literature by developing interventions evaluated using a mixed methodology. This methodology, in addition to quantifying the results obtained through the use of relevant scales, uses pre- and post-intervention interviews to learn about and delve deeper into pupils' input and feedback. Given the subjective nature of procrastination and its link to students' personalities and contexts, knowing students' opinions and contributions can help highlight positive aspects and areas for improvement for the development of future interventions.

On the other hand, considering the educational levels of the interventions found in this study, no work was found for primary school students. Although the Boolean search terms: *university* OR *student* OR *education* OR *classroom* OR *adolescent* specifically mention adolescent or university, the search was carried out using other more generic terms such as student, education or classroom, which does not exclude the possibility of obtaining any possible results of interventions carried out at lower levels. Future work could expand this search with specific parameters or Booleans such as children. This finding coincides with others such as González-Brignardello, Sánchez-Elvira Paniagua and López-González (2023), in which they place particular emphasis on the need to develop more appropriate assessment instruments to measure academic procrastination at primary school levels and that take into account their specific developmental characteristics, since many of the scales commonly used to assess academic procrastination have not been created for this age group and, therefore, the studies focus on university students. They also mention the need to study the construct longitudinally and thus observe the transition through the different educational stages that students go through and how adaptation to the different changes and increasing demands of autonomy impact procrastination levels.

As for the results obtained after the directed content analysis, using the categorization obtained and focusing on the psychological approach to the construct, it can be seen that self-regulation is the dimension most worked on in the classroom, being present in twenty-nine of the thirty-two interventions analysed (90.6%). This data coincides with studies that highlight the importance of students' self-regulation in their learning process and how a failure in this process, involving an intention-action mismatch, increases the likelihood of procrastination and the development of aversive feelings in students (Lonka et al., 2014; Pereira & Ramos, 2021). Several authors point out that students who show a high capacity for self-regulation and use meta-cognitive and repetition strategies that are contrary to procrastination, show better results in their academic performance (Wolters, Won & Hussain, 2017). Therefore, it is essential to work on self-regulation in schools, with these interventions positively impacting both procrastination behaviors and students' academic performance.

On the other hand, the second most worked dimension in the interventions is self-efficacy. Although the data are far from those obtained in the previous category, this is present in the study in almost 30% of the interventions. Many studies relate self-efficacy to students' performance and personality. This dimension relates to students' overall self-belief, which enables them to overcome any challenges they encounter effectively (Li, Ran, Zhang & Hu, 2019; Wang, Liu, Wang & Wang, 2023). Overall, the result obtained in our study reveals a positive finding, as there are nine studies in which this variable is worked on in the classroom. It is interesting to continue working on this dimension since, as mentioned by several authors, self-efficacy can positively predict academic performance (Ke, Liu & Yuan, 2015).

However, just as self-regulation and self-efficacy are found to be the most frequently studied categories, the dimensions that emerge from the study with the worst results are anxiety, personality, self-esteem, and motivation. The data obtained highlight the need for educational environments to work on aspects such as these since the demands of the academic environment, exams, deadlines, competitive context, etc., are perceived negatively by students, triggering stress or anxiety processes (Trigueros et al., 2020), which, as mentioned in the study by Watson and Watson (2016), can also affect students' performance, as well as their mental and physical health. Other studies also relate stress or anxiety to depression, poor academic performance, and school dropout (Karaman & Watson, 2017; Pascoe, Hetrick & Parker, 2020), so there is a high correlation in adolescents between their stress levels and the presence of behavioral or emotional problems (Anggoro, 2021), highlighting the need to work on aspects such as anxiety in educational settings since only one intervention of those studied focuses on it.

In addition, personality is crucial in understanding how students perform in academic contexts. Some studies relate personality to individual students' educational attainment and academic performance (Wang et al., 2023). However, only two of the interventions analyzed emphasize aspects involving students' personalities. This idea highlights the need to consider the different personality traits of students when developing interventions in the classroom and to pay special attention to the reasons and mechanisms underlying this phenomenon.

On the other hand, if we focus on how self-esteem affects students and the results obtained from this review, only 18% of the interventions analyzed cover this category in their studies, a trigger dimension for procrastination processes. Studies have linked low self-esteem with procrastination and increased anxiety (Parwez et al., 2023). Likewise, self-esteem as a process of evaluating students' self-worth or self-perception, with the boom in the use of electronic devices and addiction to social networks, is damaged as it negatively affects the moods and self-esteem of those who consume it (Collantes, 2023). Likewise, Rodríguez and Moreno (2019) find that students with low self-esteem or self-efficacy tend to take refuge in social networks and abuse the Internet, procrastinating or postponing other tasks, so paying greater attention to this finding is necessary.

Finally, low self-esteem, excessive use of social networks, and screen exposure lead to procrastination and demotivation behaviors in students. In the literature, we find that motivation is necessary for students to carry out their learning activities effectively (Kemal, Riniati, Haetami, Wahab & Pratiwi, 2023) and that academic procrastination is very common among students, associated with a lack of motivation (Anggoro, 2021). As some authors mention, this poses a challenge in academic settings, thus giving rise to exploring and enhancing motivation in educational settings by creating motivational programs and environments (Kucharcikova, Miciak, Malichova, Durisova & Tokarcikova, 2019; Lorincová, Hitka, Čambál, Szabó & Javorčíková, 2016).

Therefore, in a context where the authors are susceptible to aspects such as motivation, mental health, or anxiety, which are affected by the massive use of social networks or the indiscriminate use of screens by young people, it is all the more necessary to highlight the importance of working on these dimensions in the classroom. This data reflects the convenience of investing efforts in developing future interventions that work on all these dimensions that emerge from the study, which are fundamental and very necessary to consider when it comes to improving students' academic procrastination.

5. Conclusions

In the last decade, studies have been developed around academic procrastination that attempt to define this complex construct, following the same trend this year. Based on the production per year about the studies of academic interventions, it can be seen that these are being worked on during all the years of the last decade, hence the relevance of carrying out this study, in order to bring together and update how procrastination is being worked on in the classroom.

Based on the models analysed in the study, procrastination is divided into different categories according to the different approaches to the construct. Psychological categories (self-regulation, self-efficacy, self-esteem, motivation, perfectionism, personality and anxiety), pedagogical categories (academic performance and student dropout) and personal categories (authoritarian parenting) are obtained, the most repeated categories being self-efficacy, self-regulation and perfectionism, which belong to the psychological approach.

Targeted content analysis is a helpful tool for evaluating how procrastination is understood and worked with in schools through educational interventions, since having a frame of reference makes it possible to evaluate which aspects are being focused on and, therefore, to see if it is necessary to pay more attention to other aspects or dimensions.

The interventions analysed focus on aspects that are related to students' procrastination levels, such as self-regulation and self-efficacy, but other aspects such as anxiety, stress or self-esteem, which should be addressed or given more focus, especially in a world where, due to the characteristics of our time, the abuse of screens and other cultural aspects, young people suffer from anxiety, demotivation and problems related to mental health, are overlooked.

The limitations of the study include the choice of search booleans, in which specific references for primary education levels were not introduced, as well as the possibility of broadening this search and not focusing only on procrastination in academic environments, but extending it to other contexts (jobs, sectors, at home…) and carrying out comparative studies, in order to analyze whether procrastination has the exact incidence at school as in other contexts or not, and whether they have common characteristics. Finally, procrastination continues to be a highly relevant construct in the literature, and just as 72 articles have been selected for this study to extract the models, new ideas will continue to emerge over time, so it will be necessary to carry out another review of these and thus trace their evolution.

Declaration of Competing Interest

The authors report there are no competing interests to declare.

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