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Editorial

The Role of Generative Artificial Intelligence in Scientific Publishing

While artificial intelligence (AI) is not a new technology, it has gained extraordinary popularity in the last year and is expanding its use in various areas of our lives. Tools such as ChatGPT, Microsoft Copilot, Google Bard, Llama, DALL-E, or HeyGen, among many others, have sparked significant interest for their ability to automatically generate diverse content (text, images, videos, etc.) in response to specific instructions. This interest is justified by the potential of these technologies to reduce the workload dedicated to trivial tasks, leading to increased productivity.

This enthusiasm has also extended to the field of scientific production, where it is hoped that generative artificial intelligence (GAI) systems can improve the processes of writing, reviewing, and publishing scientific papers. However, their use also raises a series of ethical dilemmas that, as editors of scientific journals, we must consider in our task of ensuring the integrity, accuracy, and transparency of published research. Therefore, it is essential for editorial teams to establish clear editorial policies aimed at promoting ethical and responsible use of generative artificial intelligence during the process of preparing and reviewing scientific papers. With this purpose, we will reflect on the potential, implications, and limitations of incorporating AI-based tools in different activities related to the scientific publishing process.

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ARTIFICIAL INTELLIGENCE DURING THE MANUSCRIPT DEVELOPMENT PROCESS

When considering the use of these technologies during the manuscript development process, one of the first questions to address is whether AI-based tools can be considered co-authors of a scientific publication. The two fundamental requirements for attributing authorship to a publication are: making a substantial contribution to the work and taking responsibility for all parts of it (Committee on Publication Ethics, 2019). Education XX1 adheres to the ethical code outlined by the Committee on Publications Ethics (COPE), and one of the author's responsibilities is the originality of the manuscripts submitted to the journal. This raises the question: Can these tools be responsible for the originality of the content they generate? AI developments are trained using large amounts of pre-existing works, so the generated material could be protected by copyright (United States Copyright Office, 2023). For example, a text produced by GAI could include ideas from other authors without proper citation and referencing, constituting a form of plagiarism.

Considering the above, while GAI systems could draft the theoretical foundation of an article, interpret the results of a study, or even define the design of research, they can hardly take responsibility for the authorship and originality of the content they generate. Consequently, it is evident that, as they cannot be accountable for the content and integrity of the work submitted for publication, these technologies cannot meet the requirements of authorship or be included as authors of an article (Committee on Publication Ethics, 2023). Furthermore, copyright could not protect content generated with such systems since, as stated by the United States Copyright Office (2023), copyright can only protect material that is a product of human creativity.

Given that these artificial intelligence systems should not be considered authors of scientific publications, can the content generated by these tools be included in an article? Using these resources to write all or part of a manuscript constitutes a case of plagiarism, similar to claiming authorship of material published by third parties (Thorp, 2023). Therefore, any content generated by these artificial intelligence tools must be properly identified in the text. Since these technologies use advanced algorithms to create content, according to the American Psychological Association (APA) style guidelines, when citing generated results, credit must be given to the algorithm's author (McAdoo, 2023).

Table 1

How to cite and reference content generated by GAI tools according to APA style guidelines

In-text citations	Parenthetical citation: (Model author, Year of the version used) (OpenAI, 2023)
	Narrative citation: Model autor (Year of the versión used) OpenAI (2023)
	Model author. ((Year of the version used). Model name (version). [Additional description of the model]. Publisher. https://xxxxx/
References	OpenAI. (2023 OpenAI. (2023). ChatGPT (version 4) [Large-scale Language Model]. https://chat.openai.com/chat
	Note. If the model author and the publisher are the same, the publisher's name should not be repeated.

Additionally, from Education XX1, we recommend to our authors that they include as an annex or supplementary material the given instructions (known as prompts) and the results provided by these tools.

In light of the aforementioned, the use of artificial intelligence tools during the manuscript writing process should be limited to improving writing quality. These technologies can be used to obtain suggestions for spelling, grammar, and style corrections. They can also facilitate the correction of bibliographic references or adapt them to a specific style format. However, authors should ultimately be responsible for evaluating these suggestions and, if relevant, applying them.

Developments based on GAI can also be used in other stages of the research process, such as identifying relevant literature on a topic, generating hypotheses, or analyzing data (Organisation for Economic Co-operation and Development, 2023). Authors can also use these tools to obtain suggestions about potential journals to submit manuscripts to. In any case, whenever GAI technologies are used during the research process, it is necessary to precisely detail their usage in the methods section. Along with this, the limitations section should acknowledge potential biases and errors inherent in GAI use. It is important to be aware of the limitations of these tools, such as potential biases present in the data used to train the models (e.g., gender, cultural, or racial biases) or the obsolescence of this training data, especially in free versions. Additionally, it should not be forgotten that these technologies do

not comprehend the instructions provided to them or the content they generate, potentially leading to the creation of incorrect or nonsensical information (e.g., providing citations and bibliographic references for nonexistent works).

USE OF ARTIFICIAL INTELLIGENCE DURING THE REVIEW PROCESS

In recent months, there has been a broad debate on whether generative artificial intelligence tools can replace some of the functions currently performed by editors and external reviewers (Checco et al., 2021; Kayvan & Thelwall, 2023; Salvagno and Taccone, 2023). Given the high number of submissions that scientific publications receive daily, AI-assisted evaluation processes can be seen as an efficient response to analyze article quality with precision and impartiality, reducing evaluation times at a relatively low cost. However, considering the implications that peer review results can have on researchers' future careers and even on the progress of science, it seems prudent to take into account some technical and legal considerations before entrusting manuscript review processes to these tools.

One of these considerations is that, as mentioned earlier, the data used to train GAI systems may not be up to date. At the time of writing this editorial, for example, ChatGPT does not have information on events or developments in the last two years, as the last update of its training data is in January 2022. In a rapidly advancing scientific landscape, where scientific production is growing exponentially, are GAI systems prepared to evaluate whether a manuscript contributes to the scientific corpus, in our case, to education, with a current and innovative contribution? In the current state of development of these tools, it seems not. In addition to analyzing the originality or contribution of works by referencing the state of the art up to the date of their training data update, these technologies generate results by reproducing common patterns identified in extensive datasets they have been trained on (López-Martín & Martín-Gutiérrez, 2023). Thus, they can hardly simulate the judgment of reviewers in identifying the contribution and rigor of manuscripts.

On the other hand, GAI-based developments can be useful in checking the fit of articles with the formal criteria required by the journal—word count, number of bibliographic references, quality of written expression, originality of contribution, etc. These technologies have the ability to process a large amount of information in a very short time, so they can be used to verify the similarity of manuscripts to the vast amount of available scientific production and accurately detect possible cases of plagiarism. They can also be effective in proposing external reviewers based on the abstract, title, or keywords. Several AI-based tools have been developed in recent years to support editorial work, such as checking the initial quality of

received manuscripts or identifying suitable reviewers to evaluate manuscripts (Kousha & Thelwall, 2023).

In any case, when introducing GAI during the manuscript review process, it is crucial to consider the privacy and data protection policies of the tools used, especially regarding how they will use the information provided to them. Of all the manuscripts received, only a small percentage end up being published. The rest of the works may be sent to other publications that, like us, will assess the originality of the contributions received. This should be considered because, by uploading articles from third parties as editors, we could potentially influence their future publication since introducing any information into GAI systems relinquishes control over it. In fact, organizations like the National Institutes of Health (NIH) in the United States have prohibited the use of generative artificial intelligence technologies during the review of research projects and contracts to maintain the security and confidentiality of the process (National Institutes of Health, 2023).

IN CONCLUSION

In recent months, generative artificial intelligence models have experienced exponential growth, and their application is expanding to all tasks related to scientific production, from writing original manuscripts to disseminating articles after publication, through the entire review and editorial production process. Despite the fact that these technologies, as we have seen, can facilitate the work of authors, editors, and external reviewers, they cannot replace them under any circumstances.

Claiming authorship of text, images, or graphics produced by these tools represents a scientific malpractice. As indicated at the beginning of this editorial, as editors, we have the responsibility to ensure the ethical and responsible use of these tools. Therefore, we must encourage authors to be transparent about how they have used them, asking them to certify that they have not used GAI technologies during the writing of the originals, beyond using them as a possible style correction tool, and that any use of these technologies during the research process has been declared.

Regarding editorial work, although these technologies are evolving rapidly, in their current state of development, it is not possible to rely on their judgment when evaluating papers, and consequently, although they can assist in some tasks of the review process, at least in *Educación XX1*, we do not consider that they can replace the role played by the editorial team and external reviewers.

On the contrary, within the scientific publishing process, there are some activities in which the use of these technologies can provide great value. This is the case for tasks related to the editorial production process of accepted manuscripts and the

dissemination of articles after publication. Without aiming to be exhaustive and being aware that these tasks may vary as these technologies evolve, we will list some of them: style correction of the text, adaptation of references to the citation standards established by the journal, identification of relevant metadata that facilitates the location of the manuscript, adjustment of the most prominent contributions (highlights) to a specific number of characters, editing of images representing the content of articles for dissemination, writing tweets to share research conclusions, or preparation of multimedia material for results dissemination. In any case, when integrating them into these processes, we must not forget that we must be critical and carefully evaluate any results generated by these technologies. After all, they are just tools, and the responsibility derived from their misuse lies with those who use them.

Esther López-Martín
Editor-in-Chief of Education XX1

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Studies

Effectiveness of the flipped classroom methodology in higher education. A systematic review

Efectividad de la metodología de aula inversa en el ámbito universitario. Una revisión sistemática

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ABSTRACT

The flipped classroom (FC) is a methodological approach that reverses the traditional way of teaching by putting the active focus on the student. It is a dynamic methodology in which the teacher facilitates the students' learning in the classroom by providing adequate material

for the prior preparation of the classes and accompanying them in the deepening of the contents and the resolution of situations or problems related to the subject of study. For this reason, it is considered an innovative teaching methodology. The general objective of this paper is to analyse the scientific evidence of the effectiveness of FC at the university level. Following the PRISMA recommendations, a systematic review of the literature published in the Web of Science, Scopus and ERIC databases between 2016 and 2022 was carried out, analysing a total of 27 experimental or quasi-experimental studies that met the defined selection criteria. Descriptive and design variables, the efficacy, the opinion of the students and the conditioning factors that affect the efficacy of FC were assessed and analysed. The results show a higher number of publications in Asia and North and South America and in the fields of science and education. Eighty-seven percent of the articles study the undergraduate level and more than 81% use a control group in their study design. The evidence shows the effectiveness of the application of FC in terms of the academic results of students in different degree courses, as well as in the acquisition of skills considered transversal in the university environment. Student satisfaction with the methodology is good and improvements in its effectiveness are related to aspects that depend on the students themselves, the teachers and the university.

Keywords: flipped classroom, literature review, teaching methods, university students, higher education

RESUMEN

El aula inversa (AI) es un enfoque metodológico que invierte el modo de enseñanza tradicional poniendo el foco activo en el estudiante. Es una metodología dinámica en la que el profesor facilita el aprendizaje de los estudiantes proporcionando material adecuado para la preparación previa de las clases y acompañando en la profundización de los contenidos y resolución de situaciones o problemas relacionados con el tema de estudio dentro del aula. Por eso, está considerada como una metodología de innovación docente. El objetivo general del presente trabajo es analizar la evidencia científica sobre la efectividad del AI en el ámbito universitario. Siguiendo las recomendaciones PRISMA se realizó una revisión sistemática de la literatura publicada en las bases de datos Web of Science, Scopus y ERIC entre los años 2016 y 2022, se han analizado un total de 27 estudios experimentales o cuasiexperimentales que cumplieron los criterios de selección definidos. Se analizaron variables descriptivas, de diseño y la valoración de la eficacia, la valoración de los estudiantes y los condicionantes que inciden en la eficacia del AI. Los resultados muestran un mayor número de publicaciones en los continentes asiático y americano y en los ámbitos de ciencias y educación. El 87% de los artículos estudian el nivel de grado universitario y más del 81% utilizan grupo control en su diseño de estudio. La evidencia muestra la efectividad de la aplicación del AI en relación con los resultados académicos de los estudiantes en los distintos grados, así como en la adquisición de habilidades consideradas transversales en el ámbito universitario. La satisfacción de los estudiantes respecto a la metodología es buena y las mejoras en

su efectividad se relacionan con aspectos que dependen de los mismos estudiantes, los profesores y la universidad.

Palabras clave: aula inversa, revisión sistemática, metodologías docentes, estudiantes universitarios, educación superior

INTRODUCTION

In recent years, with university studies now fully integrated into the European Higher Education Area (EHEA), a change in teaching methodologies is underway. As Prieto et al. (2021) and Tourón et al. (2021) explain, this change is driven by the need to achieve an engaging and motivating learning experience that connects with students' interests, enabling them to achieve the skills they will eventually use in the workplace. (Lai et al., 2018). This implies rethinking the traditional classroom model in which information is only transmitted through lectures (Bok, 2017; McLaughlin et al., 2014). Moreover, the Covid-19 pandemic, which prompted a massive introduction of technology in teaching, has made this shift towards more active methodologies even more urgent. One of the methods that has attracted the most attention is the flipped classroom (hereafter, FC), also known as the inverted classroom, flipped learning, among other similar names. Prieto et al. (2021) demonstrate the growing volume of scientific publications focused on FC, which amounts to 52,000 citations in the last decade.

Bergmann and Sams (2012) argue that, broadly speaking, this methodological approach reverses the traditional way of teaching, in which teachers explain the theoretical content of their subject in class and students study and complete exercises or assignments at home. With FC, students are responsible for learning the theoretical concepts at home, before face-to-face sessions with teachers, from materials such as videos or explanatory texts prepared or proposed by their teachers. Classroom sessions with teachers are devoted to more meaningful tasks that require interaction between students and teachers, such as resolving doubts that may have arisen from individual lesson preparation, discussion, case studies, problem solving, etc. According to Prieto et al. (2021), FC provides the elements necessary to address the paradigm shift that higher education needs today: digitalisation, introduction of information technologies and a dynamic role of students in and out of the classroom that involves them in the learning process.

The basic principles of FC have been implemented through various teaching strategies, which can be considered precursors to FC. For example, Prieto et al. (2021), in a review of the evidence on FC, explain that these strategies were widely implemented prior to the popularisation of the term "flipped classroom". The most common are peer instruction (PI), just-in-time teaching (JiTT) and team-based

learning (TBL). According to Mazur (1997) and Medina et al. (2010), in the first case, students are responsible for raising and discussing questions that have arisen from studying the content previously at home. Novak et al. (1999) point out that in JiTT, teachers develop a questionnaire that they ask students to answer sometime before the face-to-face class (usually between 2 days and 1 hour). The teachers then use these answers to adapt the explanations and activities developed in class. This allows teachers to discover if any concepts have not been well understood, or to detect which aspects have generated the most interest in their students. By contrast, in TBL, according to Michaelsen et al. (2002), at the beginning of class, students individually answer a questionnaire (with content that they have previously prepared at home) and then meet in small groups to reach agreement on their answers. Finally, all the students (with the teacher) discuss the proposals and come up with the correct answers.

However applied, FC gives students a greater role in the classroom and motivates them more. This results in more meaningful learning and better understanding and retention of content (Prieto et al., 2014b; Romero-García et al., 2021).-

Several systematic reviews and meta-analyses have assessed the efficacy of this methodology in university classrooms. Most of these studies (Bao-Zhu Li et al., 2020; Bredow et al., 2021; Chen & Hsu, 2022; Doğan et al., 2021; Evans et al., 2019; Galindo-Domínguez, 2021; Ge et al., 2020; Hew et al., 2021; Lin et al., 2021; Lo & Hew, 2019; Manoj et al., 2018; Martínez et al., 2019; Özdemir & Şentürk, 2021; Prieto et al., 2021; Shi et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) agree that the methodology generally improves academic performance, albeit with only a moderate level of evidence. However, some systematic reviews (Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) include papers showing neutral or, in some cases, favourable results for the control group.

The results of other research (Chen & Hsu, 2022; Ge et al., 2020; Martínez et al., 2019; Oudbier et al., 2022; Prieto et al., 2021; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) point to benefits of FC such as improved student motivation. The results of Talan and Batdi's (2020) study highlight students' ability to overcome fear of failure, while the work of Alan and Batdi (2020) and Manoj et al. (2018) also indicate improved attendance and active participation in the classroom. Moreover, other authors (Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) observe that students who follow this methodology seem to master self-learning skills better. Some researchers (Ge et al., 2020; Sisi Li et al., 2020; Xu et al., 2019) highlight problem solving and others (Chen & Hsu, 2022; Ge et al., 2020; Sisi Li et al., 2020) teamwork. In addition, some studies (Senali et al., 2022; Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) point out that students working with FC improve communication skills, and several papers (Hew et al., 2021; Oudbier et al., 2022; Talan & Batdi, 2020) note the ability to self-manage time, while others

(Oudbier et al., 2022; Senali et al., 2022; Talan & Batdi, 2020) highlight creativity and one (Turan & Akdag-Cimen, 2019) notes ICT proficiency.

With regard to the analysis of the areas of knowledge in which FC is applied in universities, the consulted works focus on the field of health (Bao-Zhu Li et al., 2020; Conte et al., 2021; Evans et al., 2019; Ge et al., 2020; Lin et al., 2021; Manoj et al., 2018; Oudbier et al., 2022; Sisi Li et al., 2020; Xu et al., 2019), foreign language teaching (Turan & Akdag-Cimen, 2019), engineering (Lo & Hew, 2019), the sciences (Doğan et al., 2021) and business and economic sciences (Senali et al., 2022). Other research includes different areas of knowledge. These include the work of Brewer and Movahedazarhouligh (2018), Hew et al. (2021), Martínez et al. (2019), Prieto et al. (2021), Shi et al. (2020) and Talan and Batdi (2020).

However, some recently published systematic reviews focusing on FC (Galindo-Domínguez, 2021; Hew et al., 2021; Oudbier et al., 2022; Prieto et al., 2021) note that a significant part of the studies published so far are not sufficiently rigorous in terms of their methods of analysis. In addition, they point out the need to increase the number of studies on the effectiveness of FC in the university context, to better specify more of the variables that influence the efficacy of FC or to compare the effectiveness of a specific intervention over time with specific groups. Therefore, our work consists of a systematic review of experimental or quasi-experimental studies focused on the university setting with the aim of gathering empirical evidence regarding the effectiveness of the application of FC, considering the following aspects: academic results, development of personal skills and competences, students' assessment of FC and factors affecting its efficacy.

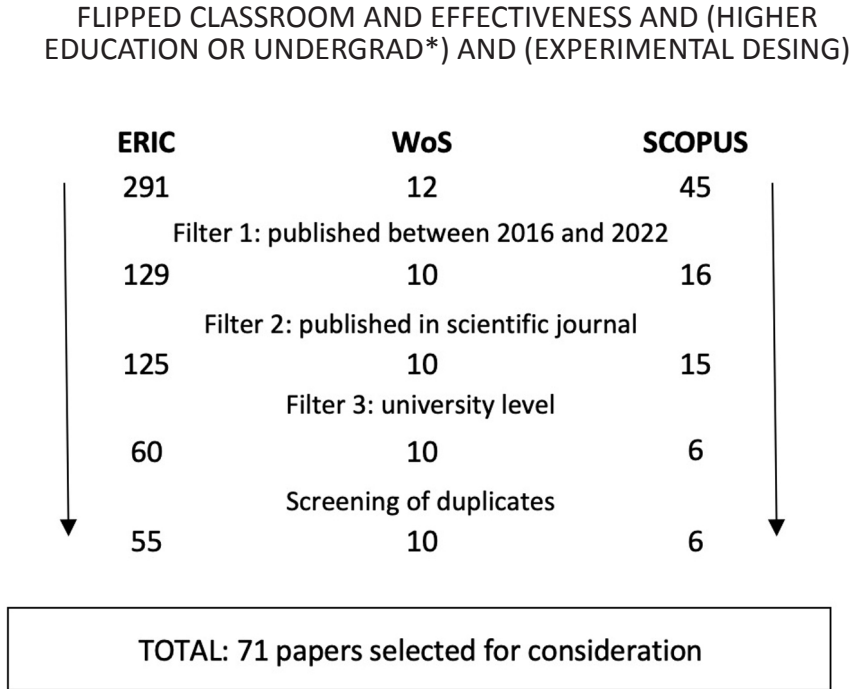
METHOD

The method used to achieve the proposed objectives was the systematic review of the published literature, following the indications of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (Tricco et al., 2018) for this type of scientific review and its applications in the field of education (Sánchez-Serrano et al., 2022).

Search strategy, data sources and selection

The search for articles focused on three databases of scientific articles: Education Resources Information Center (ERIC), Web of Science (WoS) and Scopus. The systematic search included the following keywords: flipped classroom; effectiveness; higher education; undergrad*, experimental design. Each of the databases was scanned using the strategy described in Figure 1:

Figure 1
Flow diagram



The search procedure was first followed at the end of 2020 and then repeated with the same method in June 2022 to update the results. In this second search, six new studies met the parameters described above. Studies published between 2016 and June 2022 and dedicated to the evaluation of FC experiences with an experimental or quasi-experimental design were identified.

Inclusion of the studies

Articles were included in the review if they met the following criteria:

- Evaluation of FC experiences.
- Publication in 2016 or later.
- Experimental or quasi-experimental design.
- Focus on higher education.
- Publication in peer-reviewed journals.

As the focus of this study is on experimental or quasi-experimental studies and given that this was included in the search filters, qualitative studies, descriptions of experiences, literature reviews, articles on educational methodology and grey literature were excluded from the review.

Selection of the studies

The articles were reviewed independently by pairs of research team members, based on the aforementioned inclusion and exclusion criteria, and on an assessment rubric designed ad hoc by consensus of the research team and containing information on the following: identification and type of article selected, year and country of publication, type of study (review, meta-analysis, experimental or quasi-experimental, non-experimental), results (positive, negative, neutral), conclusions and other aspects (advantages, disadvantages, other lines of research). Studies that raised concerns were discussed at a meeting of the research team, at which a consensus was reached on whether to accept them for review.

The searches according to the strategies described resulted in 71 articles, of which 27 were included in the present study, as shown in Table 1. Based on the above criteria, most of the papers excluded did not focus on FC.

Table 1

Accepted and rejected studies

SELECTED STUDIES
71 for further reading
27 accepted
24 quasi-experimental studies
3 experimental studies
44 rejected
19 studies not focused on FC
21 non-experimental studies (qualitative or grey literature)
4 studies outside the university environment

Data extraction and results

The initial data extraction for each article was carried out by pairs of research team members and subsequently agreed upon in meetings of the entire research team, which initially consisted of eight members, one of whom subsequently left the team. The 71 studies selected were divided between pairs of researchers, following the order in which they were searched in databases and, within these, alphabetically by surname of the first author. Eighteen articles were assigned to each two-member group for analysis. No substantive or content criteria were used for the distribution of the reading and analysis work. The variables listed in Table 2 were included.

Table 2

Variables included in the data extraction

Socio-demographic variables	Year of the study
	Country
	Age of the students
	Employed (yes/no)
	Family environment
Study design	Control group (yes/no)
	Sampling (random/convenience)
	Tools (ICT, networks, video, etc.)
	Learning assessment methods (questionnaires, rubrics, tests, etc.)
	FC strategies (JiTT/TBL/PI/mixed)
	Level (undergraduate/graduate)
	Organisation (pre-sessions, groups, etc.)
Assessment of FC efficacy	Type (face-to-face/online)
	Duration
	Improvement of academic results
	Improvement in the acquisition of personal skills and competences

Students' assessment	Satisfaction with FC
Conditions affecting the efficacy of FC	Students (readiness, willingness, attitudes, etc.)
	Teachers (dedication, planning, choice of activities, etc.)
	Institution (support, resources, infrastructure, etc.)

Based on the definitions provided in the works studied, we understand the efficacy of FC to be a) improvements in academic performance and b) improvements in the acquisition of personal skills and competences. Data were also collected on c) student satisfaction with the method when compared to traditional systems and d) factors affecting the efficacy of FC.

Improvements in academic performance and in the acquisition of personal skills and competences are extracted from quiz results, mid-term and final exam grades, and drop-out rates. In all cases, student satisfaction with FC is drawn from surveys and questionnaires developed for this purpose.

The level of evidence of the studies included in the review has been classified according to the guidelines of the Scottish Intercollegiate Guidelines Network (SIGN, 2019). The level of evidence can be found in the annexes.

RESULTS

This review aims to pool the evidence regarding the effectiveness of FC at university. Twenty-seven experimental or quasi-experimental studies were selected. The main data of the articles included are presented in the annexes.

The works analysed are in two main geographical areas. Asia accounts for more than half of the articles, with Turkey (3), Taiwan (3) and China (2) standing out. The United States (7) is the country with the most publications on experimental or quasi-experimental FC studies.

Regarding the fields of knowledge of the selected articles, education and health-related degrees are clearly in the majority, and to a lesser extent those related to the fields of science and technology. Some disciplines are under-represented in these publications, and there is a complete absence of articles devoted to the humanities (except for English as a foreign language).

In terms of the level of the studies, in general, experimental or quasi-experimental studies have been conducted on undergraduate students in 24 articles, while in only a few cases (only 3 articles, 11% of the total) has work been done with students at higher levels.

Twenty-two studies with a control group and five studies without a control group or without a specified one have been identified and included in this review. In most of the studies, the control group followed a traditional lecture-based teaching method. Almost half (9 out of 22) have done so by randomly separating students, following the usual experimental method, while the rest have applied a criterion of convenience, using in previously formed class or subject groups (quasi-experimental).

Some studies have explored the influence of socio-demographic variables on the effectiveness of FC. For example, Fuentes et al. (2020) found that older students had higher levels of efficacy with this methodology and that having an occupation was associated with lower levels of FC efficacy. These authors (Fuentes et al., 2020) also point out that adequate values of family environment, motivation, self-esteem and autonomy were associated with higher levels of FC efficacy.

The results related to the aim of the review are presented below. These results are classified into a) assessment of efficacy (academic results and personal skills and competences), b) students' assessment and c) conditioning factors affecting the efficacy of FC.

Assessment of efficacy

For the assessment of efficacy, we present the results from two perspectives: on one hand, the improvement of academic results and, on the other, the improvement

of the acquisition of personal skills and competences. Like Fuentes et al. (2020), we present the results based on the improvement in the marks obtained in the assessment tests and the acquisition of personal skills and competences—such as the ability to work collaboratively, student participation (in face-to-face and online sessions) or improved problem-solving skills. Table 3 summarises the results of the different studies in relation to the efficacy of FC from the two perspectives.

Table 3

Assessment of FC efficacy in the studies according to the effect on academic results and on the acquisition of personal skills and competences

Study	Effect on academic results	Effect on the acquisition of competences and personal skills
Afzal and Masroor (2019)	Neutral	Not reported
Aksoy and Pasli (2022)	Positive	Positive
Cabi (2018)	Neutral	Negative
Campbell et al. (2022)	Negative	Not reported
Canelas at al. (2017)	Not reported	Positive
Craft and Linask (2020)	Neutral	Positive
Dong et al. (2021)	Positive	Positive
El Sadik and Abdulmonem (2021)	Positive	Positive
Fanguy et al. (2017)	Positive	Not reported
Fuentes et al. (2020)	Positive	Positive
Goh and Ong (2019)	Positive	Not reported
Guo (2019)	Positive	Neutral
Hava and Gelibolu (2018)	Positive	Neutral
Huang et al. (2020)	Positive	Not reported
Hung (2017)	Neutral	Positive
Khan et al. (2022)	Neutral	Neutral
Leis and Brown (2018)	Positive	Not reported
Loveys and Riggs (2019)	Positive	Positive
Maheswari and Seth (2019)	Positive	Positive
Saglam and Arslan (2018)	Positive	Not reported
Sezer and Abay (2019)	Positive	Not reported
Shaari et al. (2021)	Positive	Positive

Study	Effect on academic results	Effect on the acquisition of competences and personal skills
Sun and Wu (2016)	Positive	Positive
Webb and Doman (2016)	Positive	Not reported
Wilton et al. (2019)	Positive	Not reported
Wozny et al. (2018)	Positive	Not reported
Zhamanov et al. (2018)	Positive	Positive

Regarding the effect on the evaluation test scores, 20 studies (Aksoy & Pasli, 2022; Dong et al., 2021; El Sadik & Abdulmonem, 2021; Fanguy et al., 2017; Fuentes et al., 2020; Goh & Ong, 2019; Guo, 2019; Hava & Gelibolu, 2018; Huang et al., 2020; Hung, 2017; Khan et al., 2022; Leis & Brown, 2018; Loveys & Riggs, 2019; Maheshwari & Seth, 2019; Saglam & Arslan, 2018; Sezer & Abay, 2018; Sun & Wu, 2016; Webb & Doman, 2016; Wilton et al., 2019; Wozny et al., 2018) of the 27 analysed report an improvement in academic results in the experimental group. Five other studies (Afzal & Masroor, 2019; Cabi, 2018; Craft & Linask, 2020; Hung, 2017; Khan et al., 2022) report a neutral effect of FC compared to the traditional classroom. Campbell et al. (2022) find in their longitudinal research study in mathematics that the pass rate in the subject increases, but the average performance on the assessment test decreases with the introduction of FC. Goh and Ong (2019) find that FC is more beneficial in terms of academic performance for students with low performance in previous years. In contrast, the results of the study by Wozny et al. (2018) indicate that FC had a positive impact on mid-term assessments, and that this impact was greater for students with above-average academic achievements. Moreover, in the final (long-term) evaluations, the impact was only sustained for students with above-average marks. FC is also found to improve understanding of content in five studies (El Sadik & Abdulmonem, 2021; Khan et al., 2022; Maheshwari & Seth, 2019; Shaari et al., 2021; Webb & Doman, 2016). Regarding the sustainability of the results obtained, the authors of two studies (Craft & Linask, 2020; Wozny et al., 2018) note that FC influences the achievement of better results in the medium term, but not in the long term, while one study (Webb & Doman, 2016) shows that the results are only maintained in the long term in the control group. Table 4 summarises the results with respect to academic performance.

Table 4

Results of the studies with regard to FC and academic performance

Academic performance	Improved performance: 18 studies	Aksoy and Pasli (2022); Dong et al. (2021); El Sadik and Abdulmonem (2021); Fanguy et al. (2017); Goh and Ong (2019); Hava and Gelibolu (2018); Huang et al. (2020); Hung (2017); Khan et al. (2022); Leis and Brown (2018); Loveys and Riggs (2019); Maheshwari and Seth (2019); Saglam and Arslan (2018); Sezer and Abay (2018); Sun and Wu (2016); Webb and Doman (2016); Wilton et al. (2019); Wozny et al. (2018)
	Neutral effect: 3 studies	Afzal and Masroor (2019); Cabi (2018); Craft and Linask (2020)
	No improvement in performance: 1 study	Campbell et al. (2022)
According to student grades	Greater benefit for low-achieving students: 1 study	Goh and Ong (2019)
	Greater benefit for students with above-average grades: 1 study	Wozny et al. (2018)
Understanding of content	Improvement: 5 studies	El Sadik and Abdulmonem (2021); Khan et al. (2022); Maheshwari and Seth (2019); Shaari et al. (2021); Webb and Doman (2016)
Sustainability of results	Medium-term effect: 2 studies	Craft and Linask (2020); Wozny et al. (2018)
	Long-term effect on control group: 1 study	Webb and Doman (2016)

In addition to academic performance, FC is associated with higher and better development of generic skills and competences (Guo, 2019; Khan et al., 2022). Table 5 presents the findings in relation to this aspect.

Table 5

Results of the studies in relation to the acquisition of personal skills and competences from FC

Collaborative work	Canelas et al. (2017); Maheshwari and Seth (2019); Sun and Wu (2016)
Problem solving	Shaari et al. (2021); Maheshwari and Seth (2019)
Ability to collect data or draw conclusions	Canelas et al. (2017)
Clarification of doubts with better understanding and learning of the subject matter	Maheshwari and Seth (2019); Loveys and Riggs (2019)
Critical thinking and metacognition	Aksoy and Pasli (2022); Craft and Linask (2020); Dong et al. (2021)
Self-efficacy	Cabi (2018); Loveys and Riggs (2019); Maheshwari and Seth (2019); Saglam and Arslan (2018)
Self-regulated learning	Shaari et al. (2021)
Autonomy in learning	Saglam and Arslan (2018); Webb and Doman (2016)
Responsibility	Cabi (2018); Saglam and Arslan (2018)
Self-confidence	Goh and Ong (2019); Loveys and Riggs (2019); Saglam and Arslan (2018); Webb and Doman (2016)
Managing test anxiety	Aksoy and Pasli (2022)
Time management	Aksoy and Pasli (2022); Saglam and Arslan (2018)
Motivation to attend class and learn	Khan et al. (2022); Loveys and Riggs (2019); Maheshwari and Seth (2019); Saglam and Arslan (2018)
Willingness of students to communicate	Hung (2017); Wilton et al. (2019)
Interaction among students	Guo (2019)
Student participation	Canelas et al. (2017); Maheshwari and Seth (2019)
Interaction with teachers	Maheshwari and Seth (2019); Sezer and Abay (2018)
Creating a richer and more dynamic physical environment	Sun and Wu (2016)

Regarding the increase in collaborative work, one study considers that FC represents a qualitative improvement (Sun & Wu, 2016) and another a quantitative improvement (Guo, 2019) in student interactions. Also, Maheshwari and Seth (2019) find that students in the experimental group are more engaged in their own learning. The same study considers that the interactive and more practical activities carried out in FC (participation in debates, classroom activities, application of practical concepts based on cases) lead to higher class attendance. Finally, three studies (Khan et al., 2022; Maheshwari & Seth, 2019; Saglam & Arslan, 2018) conclude that, from the perspective of students, they are more motivated to attend class and learn. From the teachers' perspective, FC favours collaborative learning, in particular group work and problem solving (Maheshwari & Seth, 2019). In FC, the teaching is more dynamic and participative and doubts are more easily clarified, facilitating the understanding and learning of the subject (Maheshwari & Seth, 2019). According to two of the studies reviewed (Maheshwari & Seth, 2019; Sezer & Abay, 2018), this results in increased interaction with teachers.

Students' assessment

Table 6 presents the results of students' satisfaction with FC. Twelve studies report a high level of satisfaction. Notably, in Goh and Ong's (2019) study, more than two-thirds of students in the experimental group responded that FC is very interactive and motivating; however, 40% still preferred the traditional method. Along these lines, in a quasi-experimental study (Afzal & Masroor, 2019) in which no significant improvement was found in the results of the students taught with FC, an increase in the acceptance and appreciation of FC was observed. Finally, another study (Cabi, 2018) concludes that negative evaluations towards FC are due to a lack of clarification of the topics to be prepared before class, a lack of resources and problems students have concentrating outside the classroom to work autonomously, leading to a preference for a traditional type of teaching. Regarding the assessment of student workload, in a quasi-experimental study, Canelas et al. (2017) report no significant differences between FC and the traditional method.

Table 6*Results of students' satisfaction with FC*

Positive satisfaction	Afzal y Masroor (2019); Campbell et al. (2022); El Sadik and Abdulmonem (2021); Guo (2019); Huang et al. (2020); Hung (2017); Khan et al. (2022); Loveys and Riggs (2019); Maheswari and Seth (2019); Sun and Wu (2016); Webb and Doman (2016); Zhamanov et al. (2018)
Neutral satisfaction	Canelas et al. (2017); Dong et al. (2021); Wozny et al. (2018)
Dissatisfaction	Cabi (2018)

Conditions affecting the efficacy of FC

The reviewed studies agree that to be able to apply FC effectively, a series of conditions must be met by students, teachers and institutions.

Regarding the students, appropriate learning behaviour is necessary and dependent on the willingness and readiness of the students to accept this methodology (Shaari et al., 2021). Goh and Ong (2019) point out that it is necessary to implement FC gradually to facilitate students' adaptation. On the other hand, Maheshwari and Seth's (2019) study indicates that students need self-discipline, which is difficult at the beginning but is acquired over time. Time commitment is also higher: Craft and Linask (2020) compared FC with the traditional method, and found that its use has a statistically significant and positive effect on the number of hours students spend on the subject (3.1 hours per week more than their peers in traditional classes). Cabi's (2018) study found that, in the experimental group, students previously spent between 1 and 2 hours outside the classroom studying the proposed topics. This effort and commitment of more time to prepare the background material in the classroom is also noted by Maheshwari and Seth (2019).

As for teachers, Maheshwari and Seth (2019) consider that the success of FC lies in their ability to create a learning climate for students by managing possible shortcomings and dedicating time, effort and innovation to them. The study by Hava and Gelibolu (2018) highlights that it is essential for the teacher to explain the objectives and activities of FC at the beginning of the term, as students may show resistance to new methods or activities or, as Cabi (2018) explains, have difficulties in relating the content to the area of knowledge they are studying. Lack of motivation due to the effort involved in FC and being overwhelmed or bored are difficulties that need to be considered. For this reason, to prevent distraction and boredom, the reviewed studies highlight the importance of planning well and choosing activities that are entertaining and meaningful. Hava and Gelibolu (2018) recommend engaging students'

interest by using audio-visual material as a teaching resource instead of more traditional PowerPoint presentations. Sezer and Abay (2018) point to the desirability of using methods to encourage students to visualise game-based materials before coming to class. The success of FC, then, will depend not only on the technological tools used but also on how they are implemented. (Hung, 2017). Shaari et al. (2021) regard highly several advantages of materials that are prepared specifically for FC. They allow for increased student interest and motivation and the development of curiosity and critical thinking by helping students relate new learning to prior knowledge. Another study (Sezer & Abay, 2018) explains that effective planning is required before using this methodology. It is necessary to ensure the quality of the materials used, the technical problems that may arise, and the different capacities of teachers to implement the methodology and manage the process effectively. Students' access to the materials must also be ensured (Craft & Linask, 2020) and, according to Cabi (2018), the appropriateness of the content to be studied (level of difficulty, amount of content, availability of resources, etc.) must be foreseen. It also requires content to be tailored to real-life problems and organised according to students' learning needs (Cabi, 2018).

In relation to the teaching load, two articles (Dong et al., 2021; Fuentes et al., 2020) state that FC implies an increase in teacher dedication, as it requires a double effort: preparing before class and then conducting face-to-face classes. Finally, Craft and Linask (2020) stress that assessment formats must be considered. If students learn through problem solving in the classroom and are then tested in a different format, this may limit the results that are assessed.

Regarding institutions, two articles (Maheshwari & Seth, 2019; Sezer & Abay, 2018) explain that schools need to provide adequate resources and infrastructure to be able to implement FC and to support the teachers who implement it.

DISCUSSION

The purpose of this article is to provide evidence on the efficacy of FC at the university level. From a strictly descriptive point of view of the articles selected for this review, it is worth noting that there have been few experimental or quasi-experimental studies in European countries. In contrast, this methodology has been widely studied in Asian countries. These results are partly in line with another recent study by Al Mamun et al. (2022), which finds a high number of studies and scientific publications related to the use of FC in higher education in the USA, Taiwan and Australia.

As for the fields of knowledge in which the application of FC has been studied, education, health, science and technology predominate. One question is whether there are no published studies on the application of FC in the social sciences and humanities, or whether the methodology is not generally applied in these fields. It is also unclear whether studies have not been published because FC has not been implemented or whether unsuccessful attempts have been made and the results have not been published because they were unsatisfactory. This latter scenario has been noted as a possible research bias in some of the papers studied (Talan & Batdi, 2020; Xu et al., 2019).

With respect to the methodological rigour of the studies included in this review, a significant number show deficits in the information provided (e.g., more detailed data on students such as gender and age, methodological aspects, etc.). This aspect is also mentioned in other reviews and meta-analyses such as Chen et al. (2018) and Conte et al. (2021). Regarding the level of scientific evidence regarding the methodology of the studies, even though they are all experimental or quasi-experimental, they are classified as medium-low. This assessment is in line with the results obtained by Barranquero-Herbosa et al. (2022) in a recent systematic review on the application of FC in nursing studies. They conclude that the methodological rigour of the studies carried out is medium-low.

Regarding the academic results of students who learn using FC, it is widely acknowledged by the results of numerous studies on the subject that the academic results of these students are better than those of students who follow other learning methodologies (Barranquero-Herbosa et al., 2022; Chen et al., 2018; Conte et al., 2021; Evans et al., 2019; Ge et al., 2020; Lo & Hew, 2019; Martínez et al., 2019; Prieto et al., 2021; Shi et al., 2020; Sisi Li et al., 2020; Talan & Batdi, 2020; Xu et al., 2019). These studies reach similar conclusions regarding the improvement of academic performance. The experimental group experiences an overall positive effect compared to the control group. However, they also note that there are some studies with neutral results — in line with the studies in this systematic review by Afzal and Masroor (2019), Cabi (2018), and Craft and Linask (2020) — and, in a

minority of cases, the results favour the control group. Along these lines, Chen et al. (2018) conducted a systematic review on the efficacy of FC in which they found favourable results for experimental groups only in quasi-experimental cohort studies; in studies with randomised groups, no improvements in academic performance were observed. Another longitudinal study (Maya, et al. 2021) following the same subject with different groups of students finds that after the application of FC for several years, students' academic results improve in relation to the pass rate, from 88% to 100%.

Numerous studies included in this review highlight the development of students' personal skills and competences as a result of the application of FC. In this regard, Brewer and Movahedazarhouligh (2018) credit the application of FC with enhancing the acquisition of 21st century skills¹, which include lifelong learning. Sousa et al. (2021) also attribute to FC good results in soft skills (personal, social and communication skills), which are in demand by employers, according to Robles (2012). Other published studies provide evidence on other specific personal skills, such as active participation in the classroom (Bao-Zhu Li et al., 2020; Ge et al., 2020; Talan & Batdi, 2020; Xu et al., 2019); self-learning skills (Barranquero-Herbosa et al., 2022; Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019); problem-solving and creative-thinking skills (Bao-Zhu Li et al., 2020; Ge et al., 2020; Sisi Li et al., 2020; Talan & Batdi, 2020; Xu et al., 2019); teamwork (Bao-Zhu Li et al., 2020; Ge et al., 2020; Sisi Li et al., 2020; Xu et al., 2019); communication skills² (Bao-Zhu Li et al., 2020; Ge et al., 2020; Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019; Xu et al., 2019); the ability to self-manage time (Talan & Batdi, 2020); and increased confidence (Barranquero-Herbosa et al., 2022). Other skills not been found in this review are found in the literature, such as the ability to overcome fear (Talan & Batdi, 2020), class attendance (Kumar et al., 2017; Talan & Batdi, 2020), resilience (Bao-Zhu Li et al., 2020; Ge et al., 2020; Xu et al., 2019) and ICT proficiency (Turan & Akdag-Cimen, 2019).

Along the same lines, and from the student's perspective, there is greater motivation, supported by studies such as those of Romero-García et al. (2021), Talan and Batdi (2020) and Turan and Akdag-Cimen (2019). In his review of the literature, Prieto (2021) calculated the size of the effect in the meta-analysis by Zheng et al. (2020): a 24% percentile increase in the level of students' motivation to learn in FC environments. Studies included in this review by Maheshwari and Seth (2019) and Sezer and Abay (2018) highlight the greater interaction with teachers using FC than with other methodologies. In the same vein, other authors (Brewer & Movahedazarhouligh, 2018; Sisi Li et al., 2020; Turan & Akdag-Cimen, 2019)

¹ <https://www.oecd.org/site/educeri21st/40756908.pdf>

² Improved L2 English skills are also mentioned (Turan & Akdag-Cimen, 2019).

conclude that students feel more engaged³ with the subject, the teaching staff⁴ and their peers. In summary, the results of our review agree, as mentioned by Asksoy and Pasli (2022), that FC is a promising, learner-centred didactic approach.

On the other hand, research studies report varied and sometimes conflicting experiences from the perspective of students who have been taught using FC. In general, despite the drawbacks of FC, most of the reviewed literature (Barranquero-Herbosa et al., 2022; Kumar et al., 2017; Prieto et al., 2021; Sisi Li et al., 2020; Talan & Batdi, 2020; Turan & Akdag-Cimen, 2019) concludes that students prefer FC to other more lecture-based methodologies, although some research (Brewer & Movahedazarhouligh, 2018) indicates that results vary in this regard. In line with the results found in this research, the following negative aspects (from the students' point of view) were also highlighted: firstly, according to Barranquero-Herbosa et al. (2022) and Sisi Li et al. (2020), learners have to carry a heavier workload than in traditional classrooms; secondly, according to Brewer and Movahedazarhouligh (2018), some learners are uncomfortable with FC because they are used to traditional classes; and finally, according to the results obtained by Barranquero-Herbosa et al. (2022), more technology is needed to apply FC and to motivate students through the use of narrative and gamification strategies to change their study habits with FC (Prieto et al., 2014a).

Cabi (2018) and Hew and Lo (2018) note that content planning is critical to academic improvement and conclude that the best results are obtained when the teacher provides a short review of students' previous homework at the beginning of the face-to-face lesson. However, Conte et al. (2021) consider that if supplementary online materials were made available, results like FC could be obtained in traditional classes. In the meta-analysis by Shi et al. (2020), some variables concerning the implementation of FC in relation to its effectiveness are also controlled and it is observed that FC is more effective when teachers integrate active and collaborative individualised pedagogical approaches, namely team learning. On the other hand, the results of a longitudinal study (Campbell et al., 2022) conducted with a sample of university students conclude that the effectiveness of FC may not be fully observed, especially in the early stages of implementation, and a certain amount of implementation time is required before a positive change in student performance is observed.

The limitations of this review include the heterogeneity of the educational, geographical, cultural and linguistic environments in which experimental or quasi-experimental FC studies are conducted. This fact makes it difficult to establish

³ Teachers are more committed to the subject and to the students (Brewer & Movahedazarhouligh, 2018).

⁴ For example, they value the possibility of receiving immediate feedback from teachers in class (Turan & Akdag-Cimen, 2019).

uniformity in establishing common criteria to ensure the efficacy of the application of this methodology. And many studies do not provide data on the type of FC carried out. Another limitation is the lack of methodological rigour in quasi-experimental studies, as they do not use randomised groups and therefore do not provide a high level of evidence in relation to the type of methodology according to the SIGN classification (2019).

FUTURE LINES OF RESEARCH

Although FC has been proven to be effective, certain aspects have not yet been validated. Future lines of research could explore how the acquired skills are maintained over time and applied outside the classroom (Canelas et al., 2017; Wilton et al., 2019). Secondly, it is necessary to explore which active methodologies have a greater impact on the effectiveness of FC. Finally, it is necessary to analyse how to further study the impact of FC in terms of socio-demographic and academic variables such as gender (Craft & Linask, 2020; Saglam & Arslan, 2018), academic achievements, previous knowledge and timetable planning, among others (Craft & Linask, 2020). The effects of FC on other university disciplines that have been studied less (especially in the humanities) and non-university disciplines (primary and secondary education) could also be investigated (Saglam & Arslan, 2018).

CONCLUSIONS

After the analysis of the evidence on the effectiveness of the application of FC in the university setting, it can be concluded that the objectives of this systematic review, which studies the effectiveness of FC, have been achieved in relation to the following aspects:

- Academic results. FC is shown to improve academic outcomes (specifically in comparison with lecture-based teaching methodologies).
- The development of personal skills and competences related to transversal competences. FC contributes to the acquisition of personal skills related to the competences recognised as transversal in the university environment and, therefore, contributes to the comprehensive training of students.
- The students' assessment. Most students give a positive assessment of FC.

Finally, it should be noted that both the characteristics of the students (motivation, self-discipline and dedication) and of the teachers (time, motivation for innovation and the use of quality audio-visual material), as well as those of the academic institutions (adequate infrastructure and sufficient resources) condition the success of the application of this methodology.

These conclusions should be contextualised by considering that the level of evidence found is assessed as medium-low. On the other hand, experimental studies with larger, randomised, control group samples are needed to increase the evidence currently available for the application of FC at university level. Despite this, the application of FC is considered to be a good option in university education, as it offers good results for students and teachers, achieving more meaningful learning accompanied by the development of transversal skills and competences needed in today's labour market.

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ANNEX 1

Summary of the main characteristics and level of evidence from experimental studies

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results	
				Intervention	Control					Total sample
Aksoy and Pasli (2022)	2018-2019	Experimental	Yes	47	47	94	Random	Not specified	1+	The experimental group scored higher on internal motivation, task appraisal, self-efficacy, elaboration and organisation, and effort regulation. They scored lower on test anxiety. The experimental group's theory and ability test scores were higher.
Hung (2017)	Not specified	Experimental	Yes	20	20	40	Random	JITT, PI	2+	One group does JITT and the other PI. They generally observe greater skill development and higher satisfaction. Greater effectiveness with the PI methodology.

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results	
				Intervention	Control					Total sample
Maheshwari and Seth (2019)	Not specified	Experimental	Yes	40	40	80	Convenience	JITT	2-	FC develops critical thinking and offers the possibility of self-directed learning. It improves understanding of the subject.

ANNEX 2

Summary of the main characteristics and level of evidence from quasi-experimental studies

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results	
				Intervention	Control					Total sample
Afzal y Masroor (2019)	2018	Quasi-experimental	Yes	20	20	40	Convenience	Not specified	2-	No significant impact of FC is observed. There is an increase in the perceived value and acceptability of the model.
Cabi (2018)	2015-2016	Quasi-experimental	Yes	28	31	59	Random	JITT	2+	There are no significant differences between the two groups. The main problems related to FC are grouped into motivation, content and learning.

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results
				Intervention	Control				
Campbell et al. (2022)	2014-2017	Quasi-experimental	No		287	Convenience	Not specified	2-	Better pass rates are found with FC, although with lower average final exam performance. Positive differences in teacher and student satisfaction related to longer application time of FC.
Canelas et al. (2017)	Not specified	Quasi-experimental	Yes	297	270	Random	JITT	2+	The benefits of collaborative learning methodologies highlighted. With FC, a greater development of generic skills is observed. Greater workload compared to the control group not observed.

Reference	Year of study	Design	Control group	Sample size		Total sample	Type of sampling	Method	Level of evidence	Results
				Intervention	Control					
Craft and Linask (2020)	2014-2017	Quasi-experimental	Yes	119	118	237	Random	JITT	2+	No statistically significant effect of FC found. Better results in the short term, but not in the long term. The use of specific active learning techniques more important than the method used.
Dong et al. (2021)	2018	Quasi-experimental	Yes	98	90	188	Convenience	Not specified	2-	FC promotes students' knowledge acquisition, which resulted in improved academic performance and the development of critical thinking, self-cognition and evaluation.
El Sadik and Abdulmonem (2021)	2017-2019	Quasi-experimental	Yes	49	46	95	Convenience	Not specified	2-	Benefits in the intervention group; those related to content highlighted.
Fanguy et al. (2017)	2016	Quasi-experimental	Yes	80	55	135	Convenience	JITT	2-	The group that uses FC obtains better results.
Fuentes et al. (2020)	2015-2018	Case study	No	-	-	231	Convenience	JITT	3	Factors external to the methodology influence its efficacy.

Reference	Year of study	Design	Control group	Sample size		Total sample	Type of sampling	Method	Level of evidence	Results
				Intervention	Control					
Goh and Ong (2019)	2016-2017	Quasi-experimental	Yes	119	114	233	Convenience	Not specified	2-	Student performance with FC is improved. FC is effective for low achievers.
Guo (2019)	Not specified	Quasi-experimental	Yes	42	59	101	Convenience	O-PIRTAS	2-	Students in the FC group have a more positive perception of teaching and have better results in competencies and exams.
Hava and Geilbolu (2018)	Not specified	Quasi-experimental	Yes	26	33	59	Convenience	JITT	2-	FC had a significant effect on academic performance.
Huang et al. (2020)	Not specified	Quasi-experimental	Yes	38	24	62	Not specified	Not specified	2-	FC can improve the efficacy of learning. The method has been well accepted by students.





Reference	Year of study	Design	Control group	Sample size		Total sample	Type of sampling	Method	Level of evidence	Results
				Intervention	Control					
Khan et al. (2022)	Not specified	Quasi-experimental	Yes	58	47	105	Convenience	Not specified	3	Benefits found in the intervention group in all the aspects studied: student participation in the classroom, clarity of task orientation, course effectiveness, learning outcomes achieved and overall student satisfaction.
Leis and Brown (2018)	Not specified	Case study	No	-	-	38	Convenience	JITT	3	FC is effective on students' competences. Weaknesses in the study recognised.
Loveys and Riggs (2019)	2011-2017	Case study	No	40	40	80	Convenience	JITT	3	The inclusion of pre-lab activities increased students' academic results.
Saglam and Arslan (2018)	2015-2016	Quasi-experimental	Yes	29	27	56	Convenience	Not specified	2-	Better results and better attitude of the students in the experimental group. FC is more effective and motivating for the students.

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results
				Intervention	Control				
Sezer and Abay (2018)	2014-2015	Quasi-experimental	Yes	19	19	Random	JITT	2+	Better performance in academic results in the experimental group. Greater student involvement.
Shaari et al. (2021)	Not specified	Quasi-experimental	No		133	Convenience	Not specified	2-	FC improves students' knowledge and understanding of grammar.
Sun and Wu (2016)	2015	Quasi-experimental	Yes	90	91	Convenience	JITT	2-	The experimental group improves their academic results. A qualitative improvement is also observed in interactions with students.
Webb and Doman (2016)	2015	Quasi-experimental	Yes	39	25	Not specified	JITT	2-	Based on their own previous skills, better results are observed in the experimental group. The results are more sustained in the control group in the long term.

Reference	Year of study	Design	Control group	Sample size		Type of sampling	Method	Level of evidence	Results	
				Intervention	Control					Total sample
Wilton et al. (2019)	2015-2017	Quasi-experimental	Yes	583	1029	1612	Not specified	Diverse methodologies	2-	Active learning systems such as FC (together with other methods) significantly improve academic results.
Wozny et al. (2018)	Not specified	Quasi-experimental	Yes	Not specified	Not specified	137	Random	JITT	2+	Statistically significant positive impact of FC on mid-term evaluations.
Zhamanov et al. (2018)	2016-2017	Quasi-experimental	Yes	80	90	170	Not specified	JITT	2-	Improved performance and acceptance by students in the FC group.

Learner Engagement, academic motivation and learning strategies of university students

Learner engagement, motivación académica y estrategias de aprendizaje de estudiantes universitarios

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ABSTRACT

The establishment and promotion of effective learning strategies in the university context is essential for improving academic performance and personal development. This stage is based on the convergence of behavioural, cognitive and emotional factors, which allow students to successfully adjust to the demands of the academic context as well as define their strategies. The aim of this research is to study the learner engagement enhancement effect between motivation and learning strategies. A reflective structural equation model (PLS-SEM) was applied according to the proposed theoretical framework, from an explanatory-predictive perspective. In this study, 648 university students participated, 417

were women (64.3%) and 231 were men (31.7%), with a mean age of 19.40 years (± 3.67). The instruments used were: *Échelle de Motivation en Éducation* (EME), *Utrecht Work Engagement Scale* (UWES) and *Learning Strategies Scale* (ACRA). The results showed the relationship between variables, with the following coefficients of determination: learning strategies [($Q^2 = .295$); ($R^2 = .456$)]; engagement [($Q^2 = .314$); ($R^2 = .364$)], in the model estimation, indicating an adequate fit. In addition, the learner engagement enhancement effect between motivation and learning strategies was corroborated and contrasted with the empirical evidence. This research has shown that there is a significant relationship between the variables under study. This confirms the need to implement cross-disciplinary training in learning strategies based on internal factors, such as learner engagement and motivation, in order to strengthen both adaptive processes and personal and academic performance.

Keywords: learner engagement, learning strategies, university students, motivation

RESUMEN

Establecer y promover estrategias de aprendizaje eficaces en el contexto universitario resulta fundamental para la mejora del rendimiento académico y desarrollo personal. Esta etapa se sustenta en la confluencia de factores estratégicos conductuales, cognitivos y emocionales, que permiten al alumnado ajustarse satisfactoriamente a las demandas del contexto académico y definir sus estrategias. El objetivo de esta investigación es estudiar el efecto mediador del *learner engagement* entre la motivación y las estrategias de aprendizaje. Se aplicó un modelo reflectivo de ecuaciones estructurales (PLS-SEM) en función del marco teórico propuesto, desde una perspectiva explicativa-predictiva. En este estudio, participan 648 estudiantes universitarios, de los Grados de Educación, 417 son mujeres, (64.3%) y 231 hombres (31.7%), con una edad media de 19.40 años (± 3.67). Se utilizaron los instrumentos: *Échelle de Motivation en Éducation* (EME), *Escala Utrecht de Engagement en el Trabajo* (UWES) y *Escala de Estrategias de Aprendizaje* (ACRA). Los resultados mostraron la relación entre variables, siendo los coeficientes de determinación: estrategias de aprendizaje [($Q^2 = .295$); ($R^2 = .456$)]; learner engagement [($Q^2 = .314$); ($R^2 = .364$)], en la estimación del modelo, indicando un ajuste adecuado. Además, se corroboró el efecto potenciador del *learner engagement* entre la motivación y las estrategias de aprendizaje. La presente investigación ha demostrado que existe relación significativa entre las variables de estudio, constatando la necesidad de implementar formación transversal en estrategias de aprendizaje a partir de factores internos, como *learner engagement* y motivación, para fortalecer tanto los procesos adaptativos como el rendimiento personal y académico.

Palabras clave: *learner engagement*, estrategias de aprendizaje, estudiantes universitarios, motivación

INTRODUCTION

The university stage is a complex time because of the combination of different factors related to the environment and an increased independence, where greater responsibilities, dedication and academic efforts must be assumed in a new and demanding environment (van Rooij et al., 2018). This adaptive process to the university context is related to motivation, emotional development, development of learning strategies and academic performance (Cobo-Rendón et al., 2022). This connection involves a process that forces students to be aware of their motives and to control the selection and use of strategies in their learning task. This link between motivation, task involvement and strategy build a dynamic set of relationships that come together in the act of learning (Biggs, 1993). Research has shown that learner engagement and motivation are key factors influencing students' academic adaptation and performance (Li et al., 2017). To ignore the difference between motivation and feelings of well-being regarding an academic challenge would be to neglect the essence that promotes closer interrelation with the environment and predisposition towards the task, as well as the use of better strategies (Santana-Monagas et al., 2022).

Most research related to academic performance and task predisposition of university students has considered the early identification of socio-emotional factors as predictors of university dropout (Denle et al., 2020). Similarly, other studies have considered this stage as a critical period. It could be addressed through institutional strategies (Bélanger & Ratelle, 2021), to identify those factors that positively affect academic performance, including components associated with cognitive and affective processes that highlight the determinant role of motivation, learner engagement, self-concept or learning goals (Sandoval-Muñoz et al., 2018). Thus, the research we propose seeks to explore in depth from this perspective, to discover whether motivation and learner engagement are related and, if so, in what way they are related to learning strategies.

Learner engagement

One of the variables closely related to student achievement and the adaptive process in the university context is learner engagement or involvement in the task (van Rooij et al., 2018). This is expressed through the feeling of well-being to overcome obstacles (Salanova & Schaufeli, 2009; Schaufeli, 2017), beyond the conditioning factors and commitments acquired. It includes three dimensions: vigour or mental strength, which is manifested during the development of the task and allows to remain in the activity constantly; dedication or mental process, where

the student performs the task with motivation, involvement and enthusiasm; finally, absorption or state of well-being where the student can abstract in the development of the activity, (Schaufeli, 2017). Learner engagement is an ability to engage emotionally, cognitively and behaviourally in a task, activity or situation in the university educational context. It relates to the active and positive involvement of students in their learning process and has been shown to be associated with higher academic performance and greater long-term knowledge retention. In the university context, learner engagement is key for the development of better learning strategies in students. There is a close relationship between learner engagement and motivation, being relevant its development in educational contexts, related to learning strategies (Sharp et al., 2020; Truta et al., 2018).

Academic motivation

Another of the relevant variables for the development of learning strategies is motivation, which is defined as those perceived forces that induce a person to act and develop those strategies that are most suitable for achieving their academic goals (Ryan & Deci, 2019). In the university context, different studies have highlighted the incidence of greater or lesser motivation in the development of learning strategies. This construct is understood as a key factor in behaviour, depending on a set objective, focusing its content on the importance of internal resources for personal development, self-regulated behaviours and contextual aspects that favour or diminish motivation, according to the Theory of Self-Determination (Deci & Ryan, 1985). From this perspective, motivation is an internal factor that helps to develop self-motivation mechanisms for study, coexistence with peers and involvement in the task (Ben-Eliyahu et al., 2018). Research has shown that self-motivated students learn more, have a better understanding and retention of information, and experience less anxiety and distress in the academic context (Oriol-Granado et al., 2017). By achieving this, the desire to continue learning, which is one of the main goals of education, is fostered. Similarly, motivation is also influenced by external factors (Werner & Milyavskaya, 2018).

Motivation can be intrinsic, i.e., performing an action for satisfaction without expecting a tangible reward; and extrinsic, as a construct that is applied whenever an activity is performed to achieve some result (Zimmerman, 2008). Some research that has analysed motivation in university contexts from the perspective of achieving the goals set (Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018), has noted the importance and prevalence of the contributions of goal orientation theory in the development of learning strategies. These theories (Ben-Eliyahu et al., 2018) explain learner motivation based on interests and commitments to the task.

Learning strategies

Learning strategies consist of making decisions about the most appropriate means to achieve the objectives and goals established. It is essential to create appropriate situations for the development of learning strategies (Williams-Oyarce et al., 2022), which include control and socio-emotional elements, related to the student's internal regulation. Research on learning strategies has corroborated their relevance, by differentiating people with different cognitive traits, which allows the transfer of knowledge according to complexity and adaptive processes, key to effective learning (Ergen & Kanadli, 2017). In the university context, a qualitative step forward takes place, where the student must establish different learning strategies that allow him/her to relate, apply and transfer knowledge to achieve the objectives set (De la Fuente & Justicia, 2003). Specifically, it has been corroborated that the development of learning strategies is related to cognitive and emotional factors, and that this relationship favours better academic performance (Ergen & Kanadli, 2017). Specifically, this research uses the 44-item Learning Strategies Scale (ACRA), which has shown good psychometric properties (De la Fuente & Justicia, 2003). Similarly, this scale has been positively related to socio-emotional support and academic engagement (Álvarez et al., 2015), in addition to increased positive emotions and greater motivation towards academic activity.

Academic motivation and learner engagement

Personal resources are self-assessments related to one's perceived ability to control and influence the surrounding context. These self-evaluations predict goal setting, goal development and increased task motivation (Ben-Eliyahu et al., 2018). Learner engagement is a persistent motivational state that students develop in relation to their academic activity, which manifests itself in the level of active participation in academic activities (Reeve, 2013). Therefore, learner engagement and academic motivation are factors that have shown a positive relationship, related to higher academic performance of university students (Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018), being predictor variables of higher or lower performance adjustment and learning strategies.

Hypothesis 1 (H1): Academic motivation and learner engagement are related variables, which indicate the intensity and persistence of individuals' effort to achieve their goals.

Academic engagement in the development of learning strategies

Learner engagement as a positive attitude of involvement towards the development of learning strategies and persistence towards the academic task, includes behavioural and affective elements, such as a positive predisposition towards the task; and cognitive elements, such as a preference for challenges, autonomy and involvement in the tasks (Sandoval-Muñoz et al., 2018). In other words, a high level of learner engagement is positively related to the predisposition towards homework and the development of study habits. High-achieving students are characterised by being more autonomous, having a positive self-perception of their own learning strategies and having extensive control over their study habits, managing adverse situations adaptively (Ferrer et al., 2020). To put this into practice, it is worth asking the question: does learner engagement influence the development of learning strategies in university students? Based on the assumption that students with high levels of learner engagement will be able to develop better study habits and task involvement, the following hypothesis is put forward:

Hypothesis 2 (H2): Higher levels of learner engagement will be related to the optimisation of better learning strategies and task control.

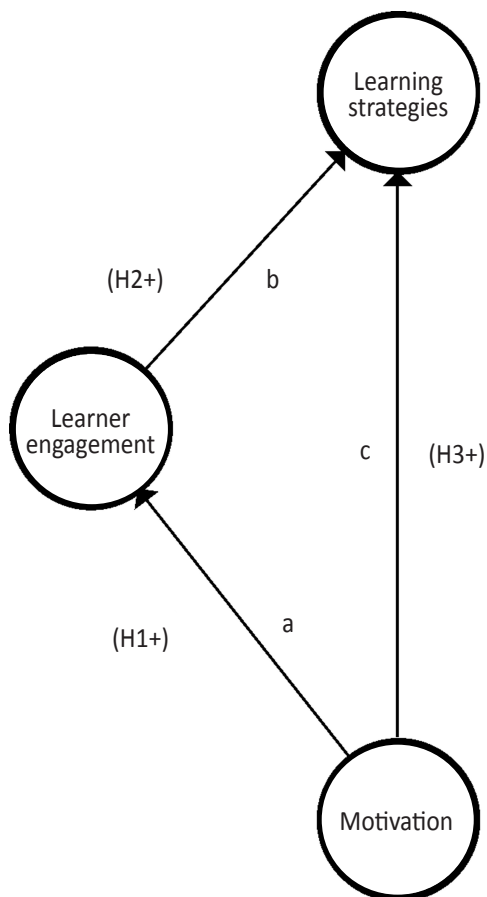
Academic motivation, learner engagement and learning strategies

Learner engagement has been related to contextual factors that can either promote or reduce the motivation level towards the task (Rigo & Amaya, 2020; Perkmann et al., 2021). This is especially true in the university context, affecting affective, behavioral and cognitive components (Larson et al., 2019). Related to the motivational components (interest shown by students) or commitment to the task, the positive relationship with learning strategies has been demonstrated (Smith et al., 2020). Therefore, the improvement of academic strategies and skills will be determined by greater learner engagement (Agger & Koenka, 2019).

Hypothesis 3 (H3): Academic motivation and learner engagement will promote the development of better learning strategies.

Figure 1

Proposed Theoretical Model



METHOD

Participants

The sample is made up of 648 university students from the Education Degrees, which belong to the Faculties of Humanities and Education Sciences in Andalusia (Spain). Of the distribution by sex in the education degrees, the majority are women, 417 (64.3%) and 231 (35.7%) are men, with an average age of 19.40 years (± 3.67). 62.5% belong to the University Degree in Primary Education and 37.5% to the degree in Early Childhood Education. Specifically, the number of predictors of learning strategies in our model is 2. The results of the statistical power analysis (Cohen, 1988) show a power of .923 above 80% and at 5% significance level to observe R² values of less than 10%. Therefore, no problems related to the adequacy of the sample size were found.

Instruments

Échelle de Motivation en Éducation (EME) of Vallerand et al. (1989), which was adapted in Spanish by Núñez et al. (2005). It consists of 28 items, distributed in seven subscales that correspond to the three degrees of autonomy on which behaviours are based according to Deci and Ryan's (1985) self-determination theory. Thus, motivation can be expressed from lack of control to self-determination, distributed in seven dimensions of four items each that assess the three types of MI (MI to knowledge, MI to achievement and MI to stimulating experiences), three types of ME (external regulation, introjected regulation and identified regulation) and amotivation. In our sample the reliability of the scale scores is Cronbach's $\alpha = .944$ and McDonald's $\omega = .947$.

Utrecht Work Engagement Scale (UWES) developed by Schaufeli and Bakker (2004). The Spanish version of the UWES-S scale for students (Belando et al., 2012) was used. It is a self-report questionnaire made up of 17 items that analyse the three dimensions that compose it: vigour, dedication and absorption. It has a Likert-type scale with seven response options. Schaufeli & Bakker (2004) reported that the UWES scale has an internal consistency reliability with Cronbach's alpha values ranging from .80 to .90. In our sample the reliability of the scale scores is Cronbach's $\alpha = .928$ and McDonald's $\omega = .932$.

Learning strategies scale (ACRA) developed by De la Fuente and Justicia, (2003). It used the version for university students of the scale designed by Román and Gallego (1994) that measures the use of strategies during the learning process. It is an inventory of 44 Likert-type items with 7 response options that assesses three

components of the strategies involved in learning according to the principles of information processing: cognitive and learning control strategies; learning support strategies; study habits. The internal consistency index for the total of 44 items is Cronbach's $\alpha = .92$ and McDonald's $\omega = .91$. In our sample the reliability of the scale scores is Cronbach's $\alpha = .944$ and McDonald's $\omega = .947$.

Procedure

The ethical guidelines promoted and encouraged by national and international regulations for the conduct of research involving human subjects were followed. All data were treated in accordance with EU Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016, both on Personal Data and Organic Law 3/2018 of 5 December on guaranteeing digital rights. Participants were assured that their responses would be kept anonymous and confidential, and that all information provided would be used for scientific purposes only. The instrument was administered individually through the platform Google[®] (Google forms), subject to the informed consent of each participant. The researchers explained to the participants the purpose of the research, as well as the guidelines for proper compliance and confidentiality of the data, requesting the voluntary collaboration of the students. Data were collected and quality checked, always ensuring that the process conformed to the ethical principles for research as defined in the Declaration of Helsinki (World Medical Association, 2013).

Data analysis

Descriptive statistics (means and standard deviations) were obtained. Previously, the Hot-Deck multiple-entry method was applied to reduce bias while preserving the joint and marginal distributions (Lorenzo-Seva & Van-Ginkel, 2016), by analysing a priori the validity, reliability (Cronbach's alpha and Omega coefficient) and internal consistency of each instrument, using Confirmatory Factor Analysis (CFA), to verify the psychometric properties of the questionnaire and obtain the factor loadings of each item. The normality analysis was carried out using multivariate hypothesis testing, resulting in a non-normal distribution. The analyses were carried out using the Amos programme (Version 25.0, IBM SPSS), the Jamovi software (The Jamovi Project, 2020) in its Version 1.2 and SmartPLS (version 3.3.6). The coefficients considered in this research were the χ^2/df ratio, the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the Tucker-Lewis index (TLI). The goodness of fit of the model was considered satisfactory when the TLI and CFI $\geq .95$, and the RMSEA was close to .07 (Kline, 2016). We used the Partial Least

Squares (PLS) technique for explanatory and predictive purposes for the dependent variables and types of relationships, direct and indirect. Statistical significance required a 95% confidence level (significance $p < .05$).

RESULTS

The assumptions of multicollinearity, homogeneity and homoscedasticity were analysed to verify that the resultant distribution met the criteria of dependence between variables. From the data obtained with each of the instruments (Table 1, 2 and 3), a Confirmatory Factor Analysis (CFA) was performed to verify the validity and internal structure of each item.

Table 1
Factor loadings of learning strategies

Latent factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
Cognitive strategies and learning control strategies	Item 1	.943	.946	.630	.0774	8.14	< .001	.530	.525	.922
	Item 2	.944	.946	.605	.0974	6.22	< .001	.418		
	Item 3	.943	.946	.585	.0729	8.02	< .001	.523		
	Item 4	.943	.946	.718	.0880	8.16	< .001	.531		
	Item 5	.943	.945	.601	.0703	8.55	< .001	.552		
	Item 6	.943	.945	.768	.0820	9.36	< .001	.595		
	Item 7	.943	.945	.627	.0726	8.64	< .001	.557		
	Item 8	.943	.945	.712	.0800	8.90	< .001	.571		
	Item 9	.943	.945	.752	.0857	8.77	< .001	.564		
	Item 10	.943	.946	.772	.0964	8.01	< .001	.523		
	Item 11	.942	.945	.718	.0704	10.19	< .001	.637		
	Item 12	.943	.945	.695	.0663	10.49	< .001	.652		
	Item 13	.942	.944	.836	.0692	12.08	< .001	.724		
	Item 14	.942	.944	.879	.0661	13.30	< .001	.775		
	Item 15	.943	.945	.677	.0759	8.92	< .001	.573		
	Item 16	.942	.945	.846	.0896	9.44	< .001	.599		
	Item 17	.943	.945	.677	.0768	8.83	< .001	.567		

Latent factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
	Item 18	.942	.945	.800	.0831	9.63	<.001	.609		
	Item 19	.943	.945	.634	.0729	8.70	<.001	.560		
	Item 20	.943	.946	.693	.0840	8.25	<.001	.536		
	Item 21	.943	.946	.566	.0810	6.98	<.001	.463		
	Item 22	.943	.945	.668	.0846	7.90	<.001	.517		
	Item 23	.943	.944	.468	.0681	6.87	<.001	.457		
	Item 24	.943	.946	.589	.0752	7.83	<.001	.512		
	Item 25	.943	.945	.565	.0618	9.13	<.001	.583		
Learning support strategies	Item 26	.943	.945	.778	.0866	8.99	<.001	.583	.555	.875
	Item 27	.942	.945	.806	.0731	11.03	<.001	.685		
	Item 28	.944	.946	.632	.0937	6.74	<.001	.456		
	Item 29	.943	.946	.650	.0905	7.18	<.001	.483		
	Item 31	.943	.946	.822	.0869	9.46	<.001	.611		
	Item 32	.944	.946	.784	.1004	7.81	<.001	.520		
	Item 33	.943	.946	.712	.0924	7.71	<.001	.513		
	Item 34	.942	.945	.833	.0677	12.30	<.001	.743		
	Item 35	.943	.945	.687	.0706	9.73	<.001	.623		
	Item 36	.943	.945	.658	.0615	10.70	<.001	.672		
	Item 37	.943	.945	.580	.0581	9.99	<.001	.636		
	Item 38	.943	.945	.792	.0915	8.66	<.001	.568		
	Item 39	.943	.945	.849	.0939	9.04	<.001	.590		
Study habits	Item 40	.943	.945	1.265	.0851	14.87	<.001	.862	.536	.774
	Item 41	.944	.946	1.180	.0803	14.69	<.001	.857		
	Item 42	.943	.946	.702	.0821	8.55	<.001	.572		
	Item 43	.944	.946	.466	.0992	4.70	<.001	.335		
	Item 44	.943	.945	.694	.0890	7.80	<.001	.529		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant $p < 0.05$ (2 tails).

The factor loadings for the items of the Learning Strategies Scale (ACRA) for university students (De la Fuente & Justicia, 2003), presented an adequate fit (Hair et al., 2021), $\chi^2/df = 2.334$, with CFI = .919, SRMR = .067, RMSEA = .077. The reliability of this scale was Cronbach's $\alpha = .944$ and McDonald's $\omega = .947$.

Table 2
Motivation factor loadings

Latent Factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
External regulation	Item 1	.907	.916	.820	.0795	10.31	< .001	.652	.591	.851
	Item 8	.904	.913	.963	.0696	13.83	< .001	.807		
	Item 15	.907	.916	1.095	.0738	14.84	< .001	.847		
	Item 22	.910	.919	.953	.0763	12.49	< .001	.755		
Injected regulation	Item 7	.908	.917	.985	.0916	10.75	< .001	.688	.608	.849
	Item 14	.907	.916	.785	.0886	8.87	< .001	.593		
	Item 21	.911	.919	1.094	.1118	9.79	< .001	.652		
	Item 28	.909	.918	1.286	.0856	15.03	< .001	.855		
Regulation identified	Item 3	.908	.916	.850	.0940	9.04	< .001	.601	.604	.818
	Item 10	.907	.915	1.125	.0921	12.22	< .001	.754		
	Item 17	.906	.915	1.324	.0887	14.94	< .001	.874		
	Item 24	.906	.915	.872	.0856	10.18	< .001	.663		
My to the knowledge	Item 2	.905	.914	.784	.0771	10.17	< .001	.662	.582	.887
	Item 9	.904	.913	.731	.0706	10.35	< .001	.671		
	Item 16	.916	.923	.896	.0857	10.46	< .001	.674		
	Item 23	.915	.922	.914	.0731	12.50	< .001	.766		
My to achievement	Item 6	.914	.922	1.171	.0985	11.88	< .001	.720	.636	.819
	Item 13	.915	.923	1.072	.1018	10.53	< .001	.657		
	Item 20	.906	.914	1.094	.0989	11.05	< .001	.687		
	Item 27	.906	.914	1.293	.0836	15.47	< .001	.870		
My to stimulating experiences	Item 4	.904	.913	1.163	.0735	15.83	< .001	.869	.751	.900
	Item 11	.904	.913	1.251	.0873	14.33	< .001	.816		
	Item 18	.907	.916	1.313	.0827	15.87	< .001	.871		

Latent Factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
	Item 25	.904	.913	1.362	.0797	17.08	< .001	.910		
Amotivation	Item 5	.907	.916	1.046	.0808	12.95	< .001	.772	.667	.839
	Item 12	.910	.919	.970	.0752	12.91	< .001	.776		
	Item 19	.908	.917	1.074	.0875	12.28	< .001	.740		
	Item 26	.907	.916	.976	.0976	11.80	< .001	.720		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant $p < 0.05$ (2 tails).

The factor loadings for the Échelle de Motivation en Éducation (EME) items presented an adequate fit (Hair et al., 2021), $\chi^2/df = 3.034$, with CFI = .908, SRMR = .053, RMSEA = .069. The reliability of this scale was Cronbach's $\alpha = .911$ and McDonald's $\omega = .919$.

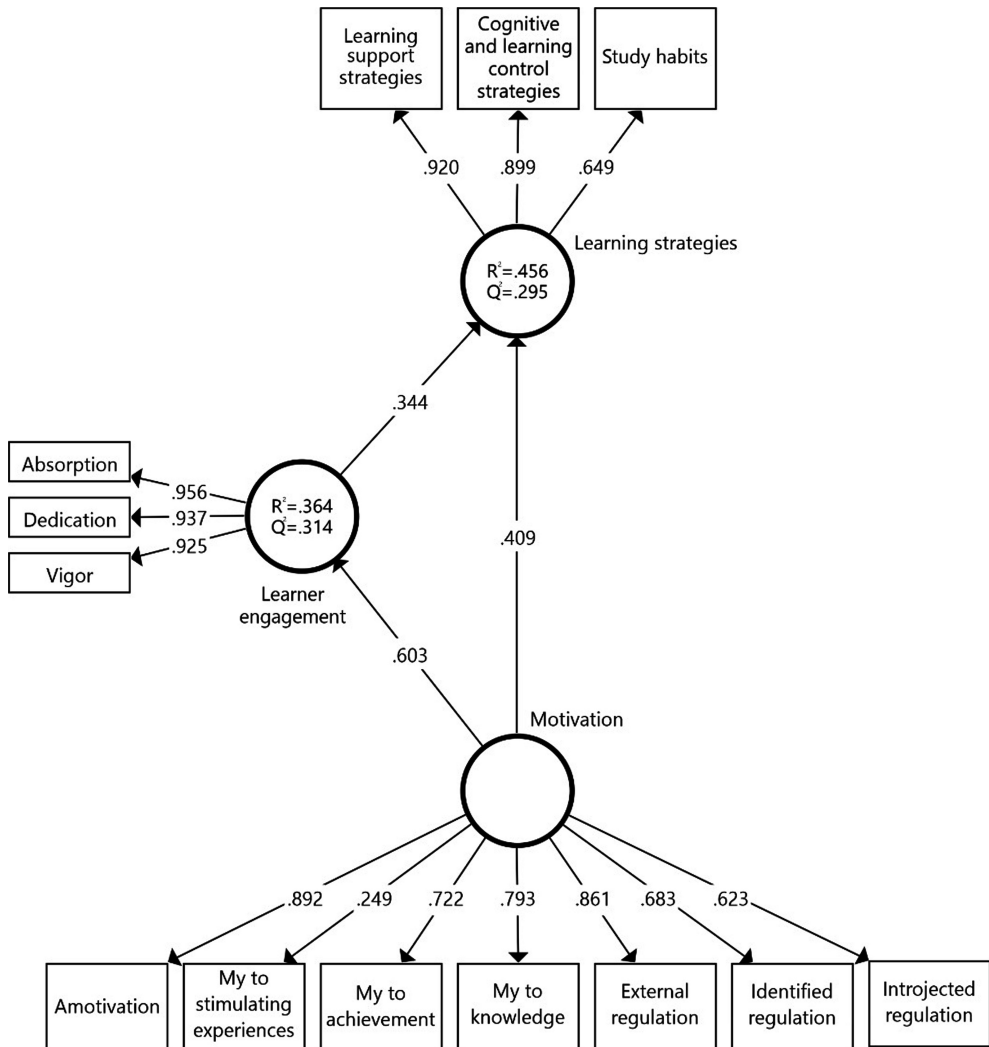
Table 3
Learner engagement factor loadings

Latent Factor	Indicator	α	ω	Estimation	SE	Z	p	β	AVE	CR
Vigor	Item 1	.926	.930	.616	.0666	9.25	< .001	.592	.643	.855
	Item 4	.924	.928	.775	.0680	11.40	< .001	.698		
	Item 8	.927	.930	.726	.0878	8.27	< .001	.541		
	Item 12	.928	.931	.705	.0940	7.50	< .001	.493		
	Item 15	.924	.928	.692	.0652	10.61	< .001	.657		
	Item 17	.927	.931	.647	.0840	7.70	< .001	.504		
Dedication	Item 2	.922	.926	.988	.0731	13.51	< .001	.781	.611	.837
	Item 5	.921	.924	.950	.0672	14.15	< .001	.809		
	Item 7	.925	.929	.799	.0809	9.87	< .001	.618		
	Item 10	.922	.925	.803	.0594	13.52	< .001	.780		
	Item 13	.926	.930	.684	.0793	8.61	< .001	.551		
Absorption	Item 3	.922	.925	.859	.0616	13.94	< .001	.792	.583	.846
	Item 6	.923	.927	.827	.0745	11.10	< .001	.672		
	Item 9	.921	.925	.882	.0660	13.37	< .001	.770		
	Item 11	.924	.927	.768	.0664	11.56	< .001	.690		
	Item 14	.922	.926	.848	.0697	12.18	< .001	.720		
	Item 16	.927	.931	.534	.0717	7.44	< .001	.480		

Note: CR: Composite reliability. AVE: Average variance extracted. *: Significant $p < 0.05$ (2 tails).

Factor loadings for the Utrecht Engagement Scale (UWES) items showed adequate fit (Hair et al., 2021), $\chi^2/df = 3.324$, with CFI = .963, SRMR = .058, RMSEA = .077. The reliability of this scale was Cronbach's $\alpha = .928$ and McDonald's $\omega = .932$.

Figure 2
Results of the structural model



Estructural Model

To assess the robustness of the factor loadings and the significance between variables, the Bootstrapping procedure was used with 2000 subsamples (Hair et al., 2021). This resulted in the structural model (Figure 2), where the variables considered in this study are reported. The predictive relevance and standardised regression coefficient or path coefficient of learning strategies [(Q2 = .295); ($R^2 = .456$)]]; learner engagement [(Q2 = .314); ($R^2 = .364$)], in the estimation of the measurement model, indicated a moderate model fit. In this regard, R^2 values above .67 indicate a substantial model fit and above .33 a moderate fit.

Table 4 presents Cronbach's alpha, Omega coefficient, external loadings and composite reliability index (CFI) scores. In relation to the convergent validity or degree of certainty that the proposed indicators measure the same latent variable or factor, through the estimation of the average variance extracted (AVE), the values must be greater than .5, according to the criteria of Becker et al. (2018). That is, a high value of (AVE) will have a better representation of the loading of the observable variable.

Table 4

Correlation weights, reliability estimates and convergent validity statistics

Variable	α	Composite reliability index (CFI)	Rho_A	Average variance extracted (AVE)
Learner engagement	.934	.958	.936	.883
Learning strategies	.776	.868	.863	.692
Motivation	.795	.846	.888	.515

Note: In accordance with recommendations made by Ghasemy, Teroovengadum, et al. (2020), one-tailed 95 % percentile confidence intervals [5 %, 95 %] of reliability and validity statistics were provided. CR = composite reliability; AVE = average variance extracted.

Discriminant validity (Table 5) shows the difference between the latent variable, to determine the statistical differentiation of each factor with respect to the others, indicating in bold the square root of the mean variance extracted (Martínez-Ávila & Fierro-Moreno, 2018).

Table 5
Measurement model. Discriminant validity

Fornell–Larcker Criteria	1	2	3
1. Learner engagement	.940		
2. Learning strategies	.591	.832	
3. Motivation	.603	.617	.718
Heterotrait–Monotrait ratio (HTMT)	1	2	3
1. Learner engagement			
2. Learning strategies	.655		
3. Motivation	.627	.712	

Note: Fornell-Larcker criteria: the diagonal elements (in bold) are the square root of the shared variance between the constructs and their measures (average variance extracted). The diagonal items are the correlations between constructs. For discriminant validity, the diagonal items must be larger than the off-diagonal items. n / a. not applicable.

Discriminant validity (Table 6) was analysed through the analysis of the cross-loadings of each of the latent variables and their respective observed variables, where the loadings were higher than the rest of the variables (Ramírez-Asís et al., 2020).

Table 6
Cross-loadings (latent and observable variables).

Variable	Learner engagement	Learning strategies	Motivation
Learner engagement			
Absorption	.956	.548	.603
Dedication	.937	.526	.531
Vigor	.925	.590	.564
Learning strategies			
Learning support strategies	.607	.920	.626
Cognitive strategies and learning management strategies	.532	.899	.513
Study habits	.254	.649	.352

Variable	Learner engagement	Learning strategies	Motivation
Motivation			
Amotivation	.510	.549	.892
External regulation	.629	.575	.861
Identified regulation	.475	.376	.683
Intrijected regulation	.148	.328	.623
My to achievement	.264	.283	.722
My to knowledge	.474	.573	.793
My to stimulating experiences	.238	.185	.249

Table 7 shows the results of the hypothesis testing, following the criteria of Hair et al. (2021), where the causal relationship with the latent variables can be observed. The t-test was obtained (values higher than 1.96 indicate the coherence of the reflective model. In this research, the results that showed a higher value were: learner engagement → learning strategies ($\beta = .344$, $t = 3.937$, $p < .001$); motivation → learner engagement ($\beta = .603$, $t = 8.311$, $p < .001$) and motivation → learning strategies ($\beta = .409$, $t = 4.388$, $p < .001$).

Table 7
Path coefficient (standardised regression coefficient)

Relationship between variables	Path coefficient (β)	Standard deviation (σ)	Statistic t	p
Learner engagement → Learning strategies	.344	.087	3.937	***
Motivation → Learner engagement	.603	.073	8.311	***
Motivation → Learning strategies	.409	.093	4.388	***

Note: *= $p < .05$; **= $p < .01$; ***= $p < .001$.

DISCUSSION AND CONCLUSIONS

This research has made it possible to analyse different cognitive and emotional aspects of university students enrolled in the Education Degrees, from the Faculties of Humanities and Education Sciences in Andalusia (Spain), on the relationship between learner engagement, motivation and the development of learning strategies in the educational processes. From this perspective, it relates the involvement and

control level of learning strategies, from a cognitive, behavioral and emotional level of the university student (Cobo-Rendón et al., 2022). In addition, this research confirms the potential level of motivation between learner engagement and learning strategies, which corroborates different studies that argue that the most motivated students, who have high levels of learner engagement, will be able to develop better study strategies and involvement in the task (Agger & Koenka, 2019; Ben-Eliyahu et al., 2018; Oriol-Granado et al., 2017; Werner & Milyavskaya, 2018).

According to the first hypothesis (H1), the results indicated that academic motivation and learner engagement were adequately related. These results are consistent with different research studies, which argue that students' adjustment processes are determined by greater or lesser motivation (Truta et al., 2018), which has a direct impact on the intensity and persistence of the effort an individual makes to achieve their goals (Werner & Milyavskaya, 2018). Other studies indicate that motivated students effectively use better learning strategies, optimise the task, regulate emotions and are more involved in the university structure (Ben-Eliyahu et al., 2018).

In relation to the second hypothesis (H2), the results indicate that learner engagement is related to the learning strategies and task control employed by the student. Different research corroborates this association in two directions; one more concrete, related to effort and involvement in a specific task (exam preparation); and the other, to enthusiasm and motivation to learn (Biggs, 1993). Both associations are explained through cognitive and emotional processes, allowing the establishment of different strategies to cope with the demands present in their activities, through control, level of involvement and motivation (Agger & Koenka, 2019).

Finally, the hypothesis (H3) confirms that academic motivation and learner engagement variables will enhance the development of better learning strategies. These results are in agreement with different research, indicating that the university student's predisposition, whether greater or lesser, to face new challenges, will be conditioned by their level of involvement, producing deeper learning experiences, better learning habits and strategies, a better adaptive process (Perkmann et al., 2021), persistence over time, obtaining better performance (Larson et al., 2019), in contrast to the less involved student, therefore, less motivated.

In general, our research findings corroborate that higher academic motivation will enhance the level of involvement or learner engagement, conditioning the way of learning and better strategies when facing the task in a more effective way (Sandoval et al., 2018). Considering the educational challenges and demands that shape adaptive processes, university students will maintain their level of involvement in the task, developing different learning strategies to achieve their goals (Truta et al., 2018). Therefore, it can be affirmed that high levels of motivation promote the level of involvement or learner engagement, which affects the development of

better learning strategies and academic results. Since this is a latent consequence in the university context, it is necessary to generate programmes that contribute to the development of deeper learning styles through active learning strategies capable of defining routes and solving problems.

In terms of limitations, it is important to point out that, as a cross-sectional design is used, cause-effect relationships cannot be established between the dimensions of the research, and therefore only statistical prediction is considered. On the other hand, in future publications, the mediating power of variables that may be determinant, such as gender or relationships between the factors of each of the constructs, could be analysed. Similarly, the results obtained cannot be extrapolated to university students, so it would be necessary to further analyse the association between motivation and academic involvement with larger samples in order to generalise the results. Also, the use of self-report and social desirability scales could condition the results.

Finally, it would be necessary to carry out longitudinal studies, in addition to using qualitative methods, to explore different academic pathways and contribute to the development of a motivational attitude, leading to the achievement of a better academic performance, increasing the expectations of success. Similarly, an understanding of the current state of university students' learning strategies and their relationship with academic motivation and learner engagement can facilitate the creation of training activities that foster awareness of the learning process and the acquisition of skills necessary for lifelong learning and professional development. Learner engagement, which acts as a mediating variable, redefines the ability to engage emotionally, cognitively and behaviourally in a task, activity or situation; and in the university context, it will be related to the active and positive involvement of students in their learning process, which translates into better academic performance, long-term knowledge retention and increased motivation.

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Barriers to personal creativity in Spanish and Portuguese university students

Barreras para la creatividad personal en estudiantes universitarios españoles y portugueses

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ABSTRACT

In the 21st century, the university should be an explicit space for developing students' creative skills. The literature on creativity in Higher Education is scarce, particularly on the students' perceptions. Thus, this study aims to analyze barriers perceived by Spanish university students compared to Portuguese students to better understand the obstacles found at this educational level. For this purpose, the Inventory of Barriers to Personal Creativity was adapted to Spanish university students. The adaptation process from the Portuguese to the Spanish version followed a forward-backward procedure, and cross-validation analysis was used to study the factor structure. The four-factor structure was maintained, but only 36 of the 44 items were retained in the Spanish version. All factors

showed good or very good reliability and explained an important amount of the variance. Some cultural differences between the Portuguese and Spanish versions appeared because Spanish university students perceived fewer barriers to develop creativity. In both cultures, gender and curricular areas' differences were found, but with some specificities. The study concluded that the instrument has an adequate structure and refers to a specific construct maintained in different cultures. Also, both versions could be applied for further broader and more representative cross-cultural studies, contributing to developing new studies on creativity in Higher Education.

Keywords: barriers, creativity, Higher Education, students, intercultural

RESUMEN

En el siglo XXI, la universidad debería ser un espacio explícito para el desarrollo de las habilidades creativas del estudiantado. La literatura sobre la creatividad en la Educación Superior es escasa, particularmente sobre las percepciones del estudiantado. Así, este estudio pretende analizar las barreras que percibe el estudiantado universitario español, en comparación con el portugués, para comprender mejor los obstáculos que se encuentran en este nivel educativo. Para ello, se ha adaptado el Inventario de Barreras para la Creatividad Personal a estudiantes universitarios españoles. El proceso de adaptación de la versión portuguesa a la española ha seguido un procedimiento *forward-backward* y se ha realizado un análisis de validación cruzada para estudiar la estructura factorial. Se ha mantenido la estructura de cuatro factores, pero en la versión española, solo se han retenido 36 de los 44 ítems. Todos los factores han mostrado una fiabilidad buena o muy buena y han explicado una parte importante de la varianza. Entre las versiones portuguesa y española han aparecido algunas diferencias culturales debidas a que las y los estudiantes universitarios españoles percibieron menos barreras para desarrollar la creatividad. En ambas culturas se han encontrado diferencias relacionadas con el género y las áreas curriculares, pero con algunas especificidades. El estudio ha concluido que el instrumento tiene una estructura adecuada y se refiere a un constructo específico, que se mantiene en las diferentes culturas. Además, ambas versiones podrían ser aplicadas para posteriores estudios transculturales más amplios y representativos, lo que contribuiría al desarrollo de nuevos estudios sobre la creatividad en la Educación Superior.

Palabras clave: barreras, creatividad, Educación Superior, estudiantes, intercultural

INTRODUCTION

Creativity is a 21st-century condition for personal and social success (Bracci, 2022). The depth of knowledge, expertise in a domain or task, and high effectiveness in algorithmic procedures—essentially logical or routinary—are no longer sufficient. Characteristics such as ambiguity, unpredictability, and an almost permanent adaptation to change are required to face daily challenges (Schwab & Davis, 2018). Skills for creative problem-solving are recognized as essential to the innovation needed and reclaimed at this turn of the century. Promoting individuals' creative potential in all contexts is imperative to manage both contemporaneity and the future (Nakano & Weschler, 2018).

The definition of creativity has not been simple for a century of research, as it is a complex and multifaceted concept (Kaufman & Glăveanu, 2019; Morais, 2013). However, a consensus on a standard definition, initially pointed out by Runco and Jaeger (2012), continues to be accepted by most authors (Romo, 2019). This consensus refers to the concurrency of two criteria: the originality and effectiveness of ideas or products. Originality, difference, and rarity imply creativity, but the reverse is not true; the difference must serve the meaning, usefulness, and adequacy of the idea or product created in each socio-historical moment. This is also true for the conceptualization of creativity assumed in this paper. On the other hand, creativity requires the confluence of cognitive, emotional, motivational, and social dimensions. Multiplicity and confluence are found in the integrative explanatory models of the concept according to Amabile (2018) or Sternberg and Lubart (1995). It is also known that creativity has emerged in research as modifiable and that individuals' creative potential can be promoted (Runco, 2014, 2018).

Higher Education emerges as a fundamental educational stage for the existence of future qualified professionals in all occupational contexts. For most students, this stage corresponds to the last formative level before facing the current world's challenges (Barnett, 2020). Higher Education must, therefore, be able to take advantage of the characteristics offered by Generation Z (individuals born in the 90s) that fill universities daily. The individuals of this generation are motivated to produce an impact, interested in the surrounding and current problems, and dedicated to creative tasks in their leisure time (Seemiller, 2017). The university should be an explicit space that develops and demands students' creative skills (Jahnke & Liebscher, 2020; Vilarinho-Pereira & Fleith, 2021).

A creative climate provides conditions that facilitate the expression of creativity (Craft, 2005). This climate must also be created and managed intentionally in universities so that future professionals learn to be innovative (Matraeva et al., 2020). How could a climate that facilitates creativity in the classroom be operationalized? Several authors have consensually reported a diversity of characteristics. Among

them are emphasized the importance of informative feedback offered to the students about their work, explicit appreciation of creativity, and the relationship between the contents taught and students' experiences and interests. The appeal to interdisciplinarity, reflection, criticism, and associations of inherent information with remote domains has also been underlined. The teacher, in turn, should cultivate student characteristics such as self-confidence, curiosity, persistence, sense of humor, responsibility, or autonomy. The teacher should also help students deconstruct emotional blocks, such as fear of making mistakes, being different, being criticized, or feeling inferior. Thus, the teacher should be more than a collector and transmitter of knowledge, guiding and encouraging students to rebuild their knowledge and generate creative resolutions to problems. Professional competence to manage a creative environment in the classroom should also be added to the diversity of techniques used, the activities and materials that encourage the multiplicity and flexibility of ideas, as well as a passion for what they do as teachers (Beghetto, 2019; Cropley & Cropley, 2009). However, there are still several obstacles in universities to operationalizing and applying creative tools in management tasks, teaching-learning processes, and assessment (Fleith, 2019). The university continues to reproduce traditional teaching models, in which creative problem-solving in everyday life and the perspective of the future are not sufficiently valued. Objectives and methodologies centered on teachers and convergent and immediate resolutions and responses remain predominant (Cropley & Cropley, 2009; Laguía et al., 2019). Also, innovation in pedagogical practices is not always well accepted, making it difficult for teachers to use alternatives that promote creativity. In the university context, there is a fear of being different, innovating, and not meeting traditional expectations (Egan et al., 2017).

Some research has been carried out on teachers and students to study perceptions about creativity in Higher Education. Particularly regarding students, research has been developed for over a decade, some organized in publications of volumes on creativity in higher education, as in the book edited by Jackson and colleagues in 2006. This book mainly addresses studies analyzing qualitative data (from interviews or questionnaires created for this purpose). It also presents students' conceptions, needs, or obstacles to teaching creative learning at the university. Other more recent studies related to university students' and professors' thoughts about Higher Education are emerging, sometimes considering only one course in Higher Education or analyzing various courses and/or curricular areas, as well as different cultures (e.g., Matos et al., 2018; Morais & Almeida, 2019; Pereira-Guizzo et al., 2021).

In these and other investigations, barriers to creativity perceived by students have been highlighted: specifically, traditional and rigid teaching and assessment methodologies; lack of time and opportunities; stress in the academic day-to-day;

conservatism and resistance to students' novelty and lack of motivation; social criticism related to authoritarianism, intolerance of error, undervaluing differences or fantasy; the scarcity of material resources; the high number of students in the classroom (Alencar & Fleith, 2010; Matos et al., 2018). A dichotomy has emerged from these data. On the one hand, more internal barriers to the individual are pointed out, such as shyness, low self-confidence, or difficulty taking risks; on the other hand, the social context is responsible for inhibitors to creative expression. These characteristics are often interdependent and interact across a life path that begins in childhood (Morais & Almeida, 2019).

The perception of barriers to creativity, also in the university, has shown differences related to gender and curriculum areas. Regarding gender, in Brazilian studies, girls claimed their creativity to be more conditioned by social repression (Alencar, 2001), and shyness was mentioned more often (Alencar et al., 2003) compared to boys. As for Brazilian boys, they indicated the lack of motivation as the most significant barrier to creative expression (Alencar, 2001). In Portugal, males also reported more substantial barriers associated with a lack of motivation (Morais & Almeida, 2019). However, contrary to Brazilian data, in this study, boys stated that they were more frequently targets of social repression than girls. It should be noted that these studies, in Portugal and Brazil, referred to the perceptions of obstacles to creativity through the scale that will be the subject of this study. In this same line, Pereira-Guizzo and colleagues (2021) found being female was a predictor of barriers linked to shyness in engineering courses. Also, in the study of Matos and colleagues (2018), girls appeared more sensitive to the quality of the learning climate to promote creativity.

In Spain, although it has been found that creativity correlates positively with academic university performance (Peña, 2019), the study of creativity in this educational stage has been minimal. There is evidence that teachers and students of different Degrees of public universities in Andalusia encountered barriers to promoting entrepreneurship, partly due to the lack of creativity (Ruiz-Ruano et al., 2019). In addition, the lack of development of creativity in the university has been shown to impact the assessment of professional creativity skills received by students participating in training practices in different entities outside the university (Mareque & De Prada, 2018). There is also evidence that students of the Pedagogy Degree perceive teaching practices and methods as unfavorable to developing creative competence in the university (Raso & Santana, 2019). However, due to the limitations of studies, there is no evidence in Spain of student-perceived barriers to developing creativity in different university Degrees. Concerning the curricular area, Cropley and Cropley (2009) found more openness to creativity in Art students. However, Morais and Almeida (2015) reported fewer barriers to creative expression in the Social Sciences/Humanities compared to Arts and Sciences and Technology,

coinciding with the study of Ribeiro and Fleith (2007). Joly and Guerra (2004) also identified differences between Higher Education Degrees, finding more barriers to creativity related to shyness in Psychology than in Administration and Pharmacy. In turn, compared to Computing, the lack of motivation was highlighted as the most significant barrier to creativity in Pharmacy.

However, the literature on creativity in Higher Education has been scarce for the last two decades, particularly on students' perceptions (Egan et al., 2017), indicating the need for more research on this subject. Consequently, there are still few validated instruments to assess the barriers perceived by university students (Alencar & Fleith, 2010; Morais & Almeida, 2019). In this sense, Alencar (1999) created the Inventory of Barriers to Personal Creativity in Brazil. This inventory used the stem phrase "I would be more creative if..." to be completed by university students, resulting in an inventory comprising 66 items structured in four factors: Inhibition and Shyness, Lack of Time and Opportunities, Lack of Motivation, and Social Repression. The instrument presented good psychometric characteristics. In Portugal, Morais and colleagues (2014) adapted the original inventory to Portuguese university students with a similar structure but a shorter version than the Brazilian version. The factors remained the same, but some items were eliminated, leading to a 44-item instrument. The psychometric characteristics were also good, with an adequate level of internal consistency and explained variance. Therefore, the research line on the Inventory of Barriers to Personal Creativity has led to several characterization and differentiating studies on the barriers perceived by university students. This study aims to study barriers to personal creativity in Spanish university students. For this purpose, the inventory had to be adapted to the Spanish population. Understanding Spanish students' opinions of the most favorable and unfavorable conditions for developing and expressing creativity in Higher Education could help reflect and operationalize the gaps and possibilities to promote creativity.

METHODS

Participants and procedure for the scale's adaptation

The adaptation process of the Spanish version of the Inventory of Barriers to Personal Creativity (Inventario de las Barreras para el Desarrollo de la Creatividad Personal – Versión Española, hereinafter IBCP-VE) followed a forward-backward procedure performed by two experts in the field of creativity, both with a background in Portuguese and Spanish languages. The process involved three phases. In the first phase, one expert translated the items from Portuguese to Spanish; in the second phase, the other expert (who was one of the authors of the original version of the scale) translated the items from Spanish to Portuguese; in the third phase, the two experts agreed on the Spanish version. Moreover, a fluent Portuguese/Spanish speaker was asked to compare the two versions to review whether items meant the same in the two scales. After following the experts' and fluent speakers' recommendations, the final version was defined for data collection. The original response format was maintained, so the scale comprised 44 items to be rated on a five-point Likert response format (ranging from 1 = *Totally disagree* to 5 = *Totally agree*). The instructions for participants were the same as for the Portuguese version.

Participants and procedure for the empirical validation of the instrument

The sample consisted of 719 students aged between 17 and 63 years ($M = 21.11$; $SD = 3.98$), of whom 484 were women, 226 were men, and 9 did not specify gender. The students were enrolled in various public ($n = 201$) and private ($n = 518$) universities of the Basque Country. The majority, 81.5% ($n = 586$), were studying Social Sciences, but students of Health Sciences ($n = 65$), Engineering and Architecture ($n = 30$), Arts and Humanities ($n = 26$), and Sciences and Technology ($n = 12$) also participated. Students were invited to participate in the study voluntarily and anonymously. The instrument was sent to them through mailing lists after obtaining institutional permissions. Previously, the research received the university's Ethical Committee's approval (M10_2021_226).

Instrument

The Portuguese version of the Inventory of Barriers to Personal Creativity (Morais et al., 2014) was adapted in this study. The Portuguese version is rated on a five-point Likert scale (1 = *Totally disagree*, 5 = *Totally agree*), composed of 44

items. The scale has a four-factor structure composed of items assessing barriers to developing creativity found by university students. The four factors are: Inhibition/Shyness ($\alpha = .91$), Lack of Motivation ($\alpha = .86$), Lack of Time/Opportunities ($\alpha = .83$), and Social Repression ($\alpha = .81$).

Data analysis

Firstly, we studied the factors' reliability and the explained variance. We calculated the ORION reliability estimates (Phi-information oblique EAP scores) and the rotated factors' explained variance for the four factors with the Factor Analysis program.

Secondly, we performed a cross-validation study to examine the instrument's factorial structure. The first step involved conducting an exploratory factor analysis (EFA) for categorical variables in a randomly selected subsample of 360 participants. We applied the four-factor model (following the Portuguese version) with the robust unweighted least squares (RULS) estimation method based on polychoric correlations (a technique for estimating the correlation between two hypothesized normally distributed continuous latent variables from two observed ordinal variables) and the robust promin rotation (a method for oblique factor rotation) to determine the factor structure. We used the Factor Analysis software to perform the EFA.

Thirdly, we conducted a confirmatory factor analysis (CFA) for categorical variables based on the polychoric correlation matrix in a subsample that included the remaining participants ($N = 359$). We used the MPlus v8 software for the CFA, as the previous program does not provide this option.

Finally, we compared Spanish and Portuguese versions of the scale by analyzing the items' means and standard deviations and the reliability estimates obtained in both versions. We also compared gender and cultural differences related to curricular areas for all factors. For the Spanish version, except for the reliability estimates, we calculated the statistics with IBM SPSS v26 (whereas for the Portuguese version, the IBM SPSS v22.0 was used).

RESULTS

Reliability and explained variance of factors

All factors showed a good or a very good reliability estimate. They all explained an important amount of the variance (see Table 1).

Table 1

Reliability of Phi-information oblique EAP scores (Orion) and explained variance of rotated factors (N = 719)

Estimate	Factor 1	Factor 2	Factor 3	Factor 4
ORION reliability	.95	.91	.92	.89
Eigenvalue	7.646	4.802	4.181	2.521
Percentage of explained variance	21.24	13.34	11.61	7.00
Factor Determinacy Index	.977	.956	.957	.943

Factor structure

Firstly, an EFA was applied to the first subsample. The first analysis revealed eight items with commonalities lower than .35 and/or with a complex structure (with loadings higher than .30 on two factors). Therefore, those items (7, 10, 13, 16, 29, 33, 36, and 37) were excluded, and the EFA was carried out again with 36 items (see Table 2). In this case, the factor analysis was considered adequate because the determinant of the matrix was lower than .0001, Bartlett's homoscedasticity statistic was significant ($\chi^2 = 3985.4$; $df = 630$; $p = .00001$), and the Kaiser-Meyer-Olkin sample adequacy test score was very good (KMO = .90601). The EFA yielded a four-factor structure with a very good fit (RMSEA = .03; CFI = .99).

The first factor, called Inhibition/Shyness (IS), included 14 items with barriers related to these personality variables (inhibition and shyness). The second factor, Lack of Motivation (LM), included 10 items and referred to motivational variables. The third factor, Lack of Time/Opportunities (LTO), was related to eight items involving environmental variables that hinder developing creativity in practice due to a lack of time or opportunities. The fourth factor, called Social Repression (SR), was composed of four items including the environmental barriers related to social situations that restrict the development of creativity. All the factors explained an important amount of the variance, and all their items presented loadings higher than .30 on a single factor (see Table 2).

Table 2*Exploratory Factor Analysis. Rotated factor structure of the IBCP-VE (N = 360)*

	Item	Factor Loadings			
		F1 - IS	F2 – LM	F3 –LTO	F4 – SR
1	I would believe more in myself	.462	.034	.226	-.038
2	I would be less shy about putting forward my ideas	.684	-.057	.023	-.132
3	I would be more spontaneous	.609	.052	-.011	-.037
4	I would not be so insecure	.869	-.038	-.010	-.129
5	I would be prepared to take more risks	.548	.152	.067	-.096
6	I would not be afraid of contradicting people	.789	.042	-.167	.036
8	I would not be so lazy	-.118	.747	-.210	.037
9	I would have more motivation to create	-.018	.573	.072	.026
11	I would not be afraid of confronting the unknown	.624	.081	-.030	.072
12	I would recognize my creative work more	-.029	.045	.619	.019
14	I would not be afraid of facing criticism	.833	-.029	-.021	-.024
15	I would not be afraid to express what I think	.866	.016	-.103	.112
17	I would not be afraid to carry out my ideas	.732	.004	.058	.114
18	I would be more extrovert	.686	.008	.078	-.086
19	I would not feel inferior to others	.792	-.101	.018	.055
20	I would not be afraid of being misunderstood	.745	-.078	.080	.093
21	I would have more time to develop my ideas	-.070	.119	.556	.070
22	I would not be limited by my family	.091	.182	-.191	.633
23	I would have more opportunities to put my ideas into practice	-.074	.083	.515	.252
24	I would not be afraid of what others will think of me	.856	-.037	-.022	.004

	Item	Factor Loadings			
		F1 - IS	F2 – LM	F3 –LTO	F4 – SR
25	I would have more opportunities to explore my potential	.115	.086	.528	.123
26	I would not have received such a strict education	-.017	-.061	.017	.833
27	I would not have been limited by my professors	-.101	-.141	.117	.899
28	I would have had more opportunities to be wrong without being considered stupid or an idiot	.162	.010	.217	.442
30	I would be more persistent	-.068	.687	-.020	.120
31	My ideas would be valued more	.091	.145	.419	.149
32	There would be more cooperation between people	.034	.049	.649	-.039
34	People would value my new ideas more	.006	-.169	.935	-.002
35	There would be more respect for the differences between people	-.078	-.069	.872	-.063
38	I would be more dedicated to what I do	-.078	.756	-.005	.001
39	I would have more energy	.099	.551	-.058	.077
40	I would be richer in ideas	.137	.539	.142	-.118
41	I would concentrate more on what I do	-.118	.901	-.036	-.008
42	I would be more curious	.022	.780	.016	-.016
43	I would be more enthusiastic	-.016	.768	.063	-.039
44	I would have more knowledge	.085	.492	.241	-.182
	Eigenvalue	7.615	4.931	4.021	2.487
	Percentage of explained variance	21.15	13.70	11.17	6.91
	ORION reliability estimate	.95	.92	.91	.88

Comparison with the Portuguese version

Reliability estimates were similar to or better than in the Portuguese version. However, it should be mentioned that robust estimates were used with the Factor Analysis program for the Spanish version. In general, items' means and standard deviations were lower in the Spanish version compared to the Portuguese one. Therefore, Spanish university students perceive fewer barriers than Portuguese university students (see Table 3).

As for the items excluded from the Spanish version, two items were related to a lack of initiative (Items 7 and 13) and did not correlate sufficiently to the LM factor. Another two items were related to a lack of time (Item 10) and the role of professors (Item 16). Neither of them loaded well on the LTO factor. Moreover, the SR factor in IBCP-VE lost 4 items from the Portuguese version related to criticism (Items 29 and 37), acceptance of fantasy (Item 33), and authority (Item 36). Thus, in the Spanish version, the SR factor is more related to external limits (Items 22, 26, and 27) and tolerance of errors (Item 28) and it seems to be more sensitive to cultural differences. Finally, whereas the Portuguese version comprises 44 items, the Spanish one presents 36 items (see Table 3).

Table 3
Compared items' means and standard deviations, and factors' reliability estimates of Portuguese (Morais et al., 2014) and Spanish versions of the IBCP instrument

Item	Portuguese version (N = 582)			Spanish version (N = 719)		
	M	SD	Alpha	M	SD	Orion
			.91			.95
Inhibition/Shyness						
1	I would believed more in myself	3.61	1.27	3.02	1.08	
2	I would be less timid in putting forward my ideas	3.61	1.32	2.74	1.27	
3	I would be more spontaneous	3.43	1.25	2.52	1.19	
4	I would not be so insecure	3.46	1.32	2.83	1.25	
5	I would be prepared to take more risks	3.71	1.16	2.76	1.10	
6	I would not be afraid of contradicting people	2.86	1.34	2.29	1.32	
11	I would not be afraid of confronting the unknown	3.11	1.28	2.60	1.23	
14	I would not be afraid of facing up to criticism	3.16	1.29	2.66	1.29	
15	I was not afraid to express what I think	3.18	1.29	2.61	1.33	
17	I would not be afraid of carrying out my ideas	3.28	1.21	2.59	1.22	
18	I would be more extroverted	2.92	1.31	2.34	1.26	
19	I would not feel inferior to others	2.56	1.36	2.10	1.42	
20	I would not be afraid of being misunderstood	2.95	1.23	2.15	1.38	
24	I would not be afraid of what others will think about me	2.89	1.33	2.44	1.35	
Lack of Motivation						
7	(I would not be so accommodating)	(3.01)	(1.35)	---	---	.91

Item	Portuguese version (N = 582)			Spanish version (N = 719)		
	M	SD	Alpha	M	SD	Orion
8 I would be less lazy	3.04	1.46		2.64	1.30	
9 I would had more motivation to create	3.46	1.24		3.08	1.03	
13 (I would practice the habit of looking for new ideas more)	(3.64)	(1.12)		---	---	
30 I would be more persistent	3.48	1.17		2.59	1.17	
38 I would be more dedicated in what I do	3.28	2.18		2.59	1.14	
39 I would had more energy	3.30	1.32		2.49	1.24	
40 I would be richer in ideas	3.23	1.29		2.60	1.20	
41 I would be more concentrated on what I do	3.35	1.27		2.80	1.10	
42 I would be more curious	3.16	1.33		2.49	1.28	
43 I would be more enthusiastic	3.27	1.30		2.74	1.13	
44 I would had more knowledge	3.36	1.30		2.71	1.21	
Lack of Time/Opportunities			.83			.92
10 (I would have more time)	(3.87)	(1.24)		---	---	
12 I would had greater recognition of my creative work	3.55	1.17		2.84	1.14	
16 (I would have been more stimulated by my professors)	(3.45)	(1.22)		---	---	
21 I would had more time to develop my ideas	3.70	1.17		2.72	1.13	
23 I would had more opportunity of putting my ideas into practice	3.48	1.15		2.72	1.10	

Item	Portuguese version (N = 582)			Spanish version (N = 719)		
	M	SD	Alpha	M	SD	Orion
25 I would had more opportunity to explore my potential	3.55	1.09		2.96	1.04	
31 My ideas would be valued more	3.39	1.09		2.64	1.12	
32 There would be more co-operation between people	3.60	1.10		2.86	1.09	
34 People would valued my new ideas more	3.65	1.13		2.92	1.06	
35 There would be more respect of the differences between people	---	---		3.11	1.03	
Social Repression			.81			.89
22 I would had not been limited by my family	1.99	1.20		1.32	1.41	
26 I would not had received such a strict education	1.88	1.13		2.14	1.45	
27 I would not had been limited by my professors	2.36	1.22		2.26	1.38	
28 I would had had more opportunities to be wrong without being considered stupid or an idiot	2.83	1.38		2.75	1.27	
29 (I would be less criticized)	(2.47)	(1.19)		---	---	
33 (I would have had greater acceptance of the fantasy in the way that I live)	(3.08)	(1.27)		---	---	
36 (I would be less authoritarian)	(2.07)	(1.07)		---	---	
37 (I would not be so critical about the ideas of others)	(2.47)	(1.14)		---	---	

Table 4
Means and standard deviations of factors as a function of gender in the Portuguese (Morais & Almeida, 2019) and Spanish versions of the IBCP

Factors	Portuguese version (N = 582)						Spanish version (N = 719)								
	Male			Female			Male			Female			Unspecified		
	M	SD		M	SD		M	SD		M	SD		M	SD	
F1-IS (n = 14)	42.83	11.89		46.02	12.05		F1-IS (n = 14)	33.12	13.39		36.89	12.12	33.78	15.34	
F2-LM (n = 12)	40.79	9.95		38.75	1.79		F2-LM (n = 10)	26.82	7.76		26.65	8.00	28.44	7.07	
F3-LTO (n = 10)	34.87	7.23		35.97	7.04		F3-LTO (n = 8)	23.87	7.13		25.94	6.88	26.67	2.69	
F4-SR (n = 8)	19.97	6.05		18.60	6.38		F4-SR (n = 4)	9.54	3.90		10.03	3.96	10.11	4.01	

Levene's Statistics revealed that the sample was homogeneous ($p > .05$) in all factors. The ANOVA test yielded statistically significant gender differences (between male and female) in Inhibition/Shyness ($F(2, 718) = 7.05; p = .001$) and Lack of Time/Opportunities ($F(2, 718) = 7.02; p = .001$), as revealed by post hoc tests. The effect sizes were medium for both factors, IS (Hedges' $g = 0.301$) and LTM (Hedges' $g = 0.297$). Therefore, women perceive more barriers due to personal variables related to inhibition and shyness than men (see Table 4), coinciding with the instrument's Portuguese version (Morais & Almeida, 2019). Also, coinciding with the data of the Portuguese students, in the Spanish version, women perceive more barriers than men for the LTO factor. Finally, results revealed non-significant gender differences in the LM and SR factors in the Spanish version, in contrast to the Portuguese version. Portugal's version shows that men are more "accommodated," "lazier," and less "dedicated to what they do." On the other hand, women have fewer "habits of searching for new ideas" (LM). In Portugal, men refer more significantly to a "rigid education" and higher self-evaluation about being "authoritarian" (SR) (Morais & Almeida, 2019).

Table 5

Means and standard deviations of factors as a function of curricular areas in the Portuguese (Morais & Almeida, 2015) and Spanish versions of the IBCP

Portuguese version (N = 582)										
Factors	AH		ST		SS		HS		EA	
	M	SD	M	SD	M	SD	M	SD	M	SD
IS	46.02	11.92	44.82	11.15	43.71	12.99	---	---	---	---
LM	39.88	11.04	40.68	9.05	38.26	11.29	---	---	---	---
LTO	36.13	7.51	35.49	6.34	35.13	7.57	---	---	---	---
SR	19.95	6.36	19.38	5.67	18.32	6.72	---	---	---	---
Spanish version (N = 719)										
Factors	AH		ST		SS		HS		EA	
	M	SD	M	SD	M	SD	M	SD	M	SD
IS	37.12	11.98	32.67	15.25	35.64	12.59	37.31	12.65	32.67	13.90
LM	27.38	8.99	26.08	5.52	26.89	7.71	25.66	8.71	25.47	9.74
LTO	25.08	7.99	23.92	6.91	25.45	6.89	24.85	7.48	24.00	7.11
SR	10.42	4.02	8.50	3.56	9.84	3.95	10.09	4.19	10.17	3.46

Concerning cultural differences related to curricular areas, the ANOVA test did not reveal statistically significant differences between the five studied areas (Social Sciences or SS, Health Sciences or HS, Engineering and Architecture or EA, Arts and Humanities or AH, and Sciences and Technology or ST). This result differs from that found in Portugal, where students of Arts and Humanities perceived more barriers related to Social Repression and Lack of Opportunities and Time to develop creativity than students of Human and Social Sciences. Students of Sciences and Technology found more barriers than students of Human and Social Sciences (Morais & Almeida, 2015). Regarding the means and standard deviations of the two versions, the Portuguese version obtained higher values than the Spanish version (see Table 5).

DISCUSSION AND CONCLUSIONS

This study aimed to analyze barriers to personal creativity among Spanish university students compared to Portuguese students. For this purpose, the Portuguese version of the IBCP was adapted to the Spanish population. The original four-factor structure of the instrument was maintained and validated. Considering the original Brazilian version (Alencar, 1999), the four factors continued to emerge, although the number of items was reduced from 66 to 36 in the Spanish version. Thus, the same structure of the construct remains intact in different cultures.

Nevertheless, some cultural differences between the Portuguese and the Spanish versions appeared. On the one hand, Spanish university students generally perceived fewer barriers to developing creativity. On the other hand, eight items did not seem adequate in the Spanish version. They were part of the factors LM (Items 7 and 13), LTO (Items 10 and 16), and mainly SR (Items 29, 33, 36, and 37). This was explicitly observed in the factors where gender differences appeared to be culturally different. Thus, regarding the factor Inhibition/Shyness, women in both countries showed higher inhibition, lower self-esteem and self-confidence, less fear of taking risks, and less initiative. Also, in both countries, women have consistently indicated more barriers related to Lack of Opportunity and Time. These results are in accordance with the literature. Since childhood, individuals of both genders shape behaviors and expectations that will produce a greater lack of internal and external opportunities in girls (Alencar & Sobrinho, 2017). There were no significant differences in Lack of Motivation and Social Repression in Spain, although, in Portugal, men expressed more barriers in these two factors. Perhaps in Portugal, the education standards for males are more inflexible, which conditions creative expression. Specifically, Portuguese students reported more barriers when admitting a “rigid education,” and they probably internalized more “authoritarian” behaviors (SR). These students also admitted being more “accommodated,” “lazier,”

and less “dedicated to what they must do” (Morais & Almeida, 2015). These results may be positive for education in Spain (compared to Portugal), although, in both countries, there are still warnings about the need for more incentives for women’s self-confidence, initiative, and active participation. Higher Education should be particularly sensitive to this gap and not reinforce possible discriminatory gender patterns acquired in other life contexts. Higher Education can have a very positive influence not only on citizens’ professional development but also on their personal and social development.

Concerning students’ curricular area, the evidence has shown some courses or domains to be more and less favorable to their creativity development (Cropley & Cropley, 2009; Ribeiro & Fleith, 2007). Specifically in Portugal, country of comparison for the study carried out here students of Humanities and Social Sciences may deal more frequently than their classmates from other areas with aspects such as divergence of opinions, criticism, or perspectives beyond reality and are more involved in reflection and imagination in their academic daily life. Thus, compared to Science and Technology, these dimensions will be more operationalized in work proposals such as essays, debates, theatricalization, or interviews. For their part, Science and Technology students may be more focused on convergent thinking and the need for a single and verifiable response. Surprisingly, in the Portuguese study, there were more barriers in the Arts and Humanities area than in the area of Social and Human Sciences, but the former students may demand more expression of creativity and, thus, point out more obstacles (Morais & Almeida, 2015).

The absence of significant differences in the perception of barriers to creativity in university students found in this validation study may be a positive point for Higher Education in Spain. The average values of the barriers to creativity in Spain may be another positive sign, as Spanish values were almost always lower in all factors than those observed in Portugal with the same instrument. Portugal may have stricter cultural standards for boys (Morais & Almeida, 2019) and in general.

These differences reinforce the need for increasing the cross-cultural focus in research, namely comparative research (Moula, 2021). Specifically, there are cultural influences in creativity (Glaveanu, 2020). According to Shao et al. (2019), the impact of culture on creativity manifests in three ways: through the different conceptions (implicit and/or explicit) of creativity, the use of different creative processes (especially among individualist and collectivist cultures), and the use of different assessment instruments based on culture-related contents.

It should be mentioned that this study has some limitations. On the one hand, reliability estimates used in the two versions were different (Alpha and Orion). However, this should not be considered a substantial limitation because both versions’ estimates seemed good or very good. On the other hand, the sample was not equally distributed according to gender, curricular areas, and the type of

university (public or private). This may have affected some results, mainly in which gender and curricular area differences were manifest. Therefore, a larger and more structured sample could improve these aspects of the study. Research should also consider collecting further data to obtain more validity evidence (i.e., external validity). Future research in Spain on the IBCP-VE with a more balanced sample should consider comparing genders and students of different curricular areas, private and public education students, students who start and finish Degree studies, and even undergraduate and graduate students. This instrument may also help to understand barriers to creativity in specific populations such as, for example, migrant students in Spain or people with special educational needs. Furthermore, this research line could help to study the integration or absence of creativity in the curricula of the different Degree studies in Spain. On a more international level, adapting the IBCP-VE to other languages and cultures would help develop intercultural and even cross-cultural research to study barriers to creativity in different educational systems and countries. Such studies would facilitate understanding the main obstacles that prevent university students from developing their creativity worldwide. Fostering creativity among future professionals should be a priority in this world, and understanding these barriers could help overcome this deficit.

Notwithstanding these limitations, the study concludes that the IBCP-VE is an adequate inventory and refers to a specific construct: the barriers university students perceive to developing their creativity. Another conclusion is that, despite some gender and curricular area differences, both the Portuguese and Spanish versions assess the same construct. Therefore, both versions could be applied in further cross-cultural studies. We trust that this research will contribute to curiosity and the development of new studies on creativity in Higher Education.

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How to survive the doctorate? A meta-analysis of succes in PhD Candidates

¿Cómo sobrevivir al doctorado? Un meta-análisis del éxito en doctorandos

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ABSTRACT

Doctorates are the key for new researchers to begin their scientific activity. This process has traditionally implied a profound loneliness and the development of issues that affect the health of PhD students. The objective of the research was to conduct a meta-analysis to examine the influence of certain sociodemographic and personal variables on doctoral dropout. Following a review of existing literature and based on inclusion and exclusion criteria, the total sample consisted of 9 articles, which included a total of 53 samples and 32760 doctoral students with an average age of 29.80 years. The main results indicate that the permanence in the doctoral program depends on gender, age, and personal variables, with social support (family support, institutional support, and self-esteem) explaining 11% of the persistence in the doctoral program, followed by self-esteem. Burnout, on the other hand, explains a very small percentage of success ($\text{Tau}^2 = 0.40$; $I^2 = 99.48$; $R^2 = .03$; $p = .001$). The model that best explains permanence in doctorate studies is social support.

Doctorate students demand support from their peers, families and institutions to which they are giving their work, so our results can be explained by the relevant role of social support as a mediator in the consequences of stress. In view of the obtained results, it is concluded that the existence of a series of factors such as age, gender, support from the closest environment and a democratic and ethical leadership style by the institutions, along with the social actions of communicating and generating synergies, favours success in the attainment of a doctorate degree. To sum up, the results of this study suggest the convenience of carrying out prosocial actions aimed at finishing the PhD stage successfully.

Keywords: burnout, doctoral program, doctoral students, social support groups, success, universities

RESUMEN

El doctorado es la llave para que los nuevos investigadores inicien su actividad científica. Este proceso ha implicado tradicionalmente una profunda soledad y el desarrollo de problemas que afectan a la salud de los doctorandos. El objetivo de la investigación fue realizar un meta-análisis para comprobar la influencia de determinadas variables sociodemográficas y personales en el abandono de estudios de doctorado. Tras una revisión de la literatura existente y de acuerdo con los criterios de inclusión y exclusión, la muestra total fue de 9 artículos, que contenían un total de 53 muestras y 32760 estudiantes de doctorado con una edad media de 29.80 años. Los principales resultados muestran que la permanencia en el programa de doctorado depende del género, la edad y de variables personales, siendo el apoyo social (apoyo familiar, apoyo institucional y autoestima) el que explica el 11% de la permanencia en el programa de doctorado, seguido de la autoestima, mientras que el *burnout* explica un porcentaje muy bajo del éxito ($\text{Tau}^2 = 0.40$; $I^2 = 99.48$; $R^2 = .03$; $p = .001$). El modelo que mejor explica la permanencia en el doctorado parte del apoyo social. De esta forma, los estudiantes de doctorado demandan el apoyo de sus iguales, familia e institución, pudiendo ser nuestros resultados explicados por el rol tan importante que tiene el apoyo social como mediador de las consecuencias del estrés. Del mismo modo, el papel de la familia y el entorno más cercano no son los únicos elementos relevantes; las universidades, como organizaciones, también pueden favorecer un entorno adecuado, agradable y motivador a través de estilos de liderazgo democráticos y al promover actividades sociales que permitan a los estudiantes de doctorado establecer relaciones socioafectivas que les proporcionen bienestar emocional, una red de aprendizaje y sinergias.

Palabras clave: *burnout*, doctorado, estudiantes de doctorado, grupos de apoyo social, éxito, universidades

INTRODUCTION

In the university scope, the research and teaching career can only be accessed by attaining the title of Doctor. Despite being considered the last step in the educational stage, the doctorate is a job; given the tasks to be performed, the work of a PhD student can be understood as a service profession in three scopes: teacher, student and researcher (Sorrel et al. 2020). Firstly, PhD students take on a teaching role by sharing their knowledge and expertise with other students. This aspect of doctoral work entails the responsibility of transmitting knowledge and guiding others in their learning process. Secondly, PhD students continue to be learners throughout their doctoral program. They participate in courses, workshops, and conferences to expand their knowledge in their specific field of study. Additionally, they must stay updated on the latest advancements in their research area and constantly update their skills and competencies. Lastly, PhD students are researchers in their own field of study. They dedicate a significant amount of time and effort to original research, contributing to the existing knowledge in their field. Their research work is crucial for advancing the understanding and development of new ideas, theories, and practices in their discipline. In addition, getting a Phd is a process that is associated with high pressure, levels of stress and loneliness (Mattijssen et al., 2020). For that reason, success in the doctorate depends on different variables.

Firstly, regarding the socio-demographic variables, previous studies such as those of Castello et al. (2017) and Sverdlik et al. (2018) show that age and gender affect the success and well-being of PhD students (Schmidt & Hansson, 2018). In this way, not only inter- and intra-personal factors or personal goals (Devos et al., 2017; Sverdlik et al., 2018) affect this process, but gender and age also play a relevant role in it (Devos et al., 2017; Ivankova & Stick, 2007; Leonard et al., 2005; O'Meara et al., 2013; Sverdlik et al., 2018). Regarding gender, it has been found that women present greater emotional exhaustion and intentions to drop out of the academic career (Hunter & Devine, 2016). Moreover, it is important to highlight that the academic career is perceived as hierarchical, making it difficult for women to access them (Eslen-Ziya & Murat, 2022).

Age, on its part, is a significant variable in terms of doctorate dropout, in a way that, the greater the age of the PhD student and the lower the social support, the greater the probability of dropping out of the doctorate programme (González-Betancor & Dorta-González, 2020; Hunter & Devine, 2016).

Another variable that impacts the completion or abandonment of the doctorate programme is stress, specifically burnout. This term refers to a chronic response to workplace stress, which leads to a physical, mentally and emotional state of exhaustion (Maresca et al., 2022). In this sense, it has been demonstrated that PhD students with a work overload derived from the prolonged exposure to stressful

factors can develop other types of disorders, such as depression or anxiety (Kusurkar et al., 2021). The prevalence of students with burnout who will develop other mental diseases is very alarming, posing, in this case, one of the most important variables that influence the abandonment of the doctorate programme (Sorrel et al., 2020). Some variables related to burnout in doctorate students are: studying the PhD in one's home city, having a pre-doctoral contract whose aim is the realisation of the doctoral thesis, and having current or past psychological treatments for disorders such as anxiety or depression (Sorrel et al., 2020).

Moreover, personal variables such as resilience and emotional intelligence are usually considered personal factors that influence the way in which stress and burnout are managed (Blanco-Donoso et al., 2015; García-Izquierdo et al., 2018). In this regard, there are specific populations where it has been demonstrated that resilience could reduce burnout syndrome (Healy et al., 2022; Montgomery & Patrician, 2022). As for emotional intelligence, it seems to be mediating career flexibility, coping attitudes as well as self-control, all of them related to burnout (Ahmed et al., 2022; Jahanzeb et al., 2023).

Lastly, social support has been one of the most studied variables in its association with stress. In the academic scope, it has been demonstrated that, when support comes from the family, it is related to greater levels of academic success than when it comes from the thesis director (Song et al., 2015). In this sense, anyone who intends to attain a PhD, with the aim of culminating the educational stage, requires support, aspirations, capacities and skills for research and teaching (Kim et al., 2018). In this way, it has been identified that the lack of perceived social support is related to a lower well-being in the doctorate student and to a greater probability of developing mental disorders (Levecque et al., 2017; Sverdlik et al., 2018). Thus, social support is demanded by PhD students as an important need; they need to feel supported and have someone to talk to (Lech et al., 2018). Moreover, social support is strongly and positively related to self-esteem (Li et al., 2018) and both factors are related to academic success, with a greater probability of adapting to the chosen career when self-esteem and perceived social support are higher (Ataç et al., 2018).

In the light of the above, some authors have proposed some strategies to prevent and mitigate the effect of burnout. As an example, institutional measures should prioritise the establishment of more conducive work environments that mitigate factors leading to burnout and assist students in managing the interplay between their personal and academic lives, which can contribute to feelings of exhaustion (McAlpine et al., 2020). Finally, it is also important to promote team meetings so this measure could increase the perception of social support among peers and supervisors (Gorbenko et al., 2019).

For the above reasons, the main aim of this study was to perform a review of the scientific evidence, through a meta-analysis, to verify which variables are more strongly related to the rate of dropout from PhD studies. In that sense, variables included in this study were socio-demographic variables (age, gender and geographical area) and personal variables (social support, personality factors and burnout).

METHOD

The research record complied with the principles established by Cochrane in Higgins and Green (2011) and PRISMA (2020). Similarly, the inclusion criteria and exclusion criteria responded to the parameters established by Botella and Sánchez (2015) and Moreau and Gamble (2020) (Table 1):

Table 1

Inclusion and exclusion criteria

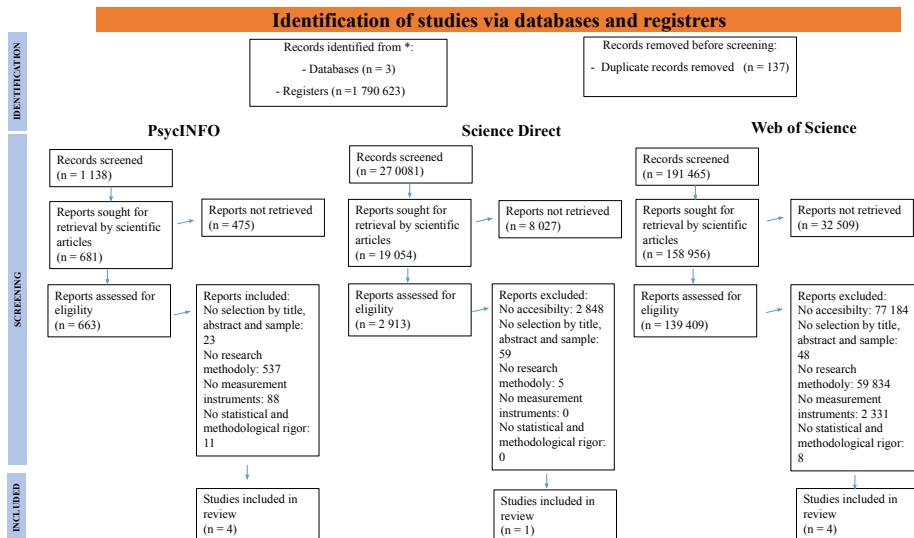
Inclusion criteria
Sample: doctorate students, with or without contracts that bind them to a university or research centre (Izquierdo-Martínez, 2007).
Research methodology: experimental, clinical, correlational and quantitative (Friese & Frankenbach, 2020).
Publication date: 2016 - 2021 (Bashir, et al., 2018). The purpose of this time frame is to carry out an updated study.
Methodological rigour: studies with recognised prestige, published in Q1 indexed journals (Scimago Journal & Country Rank).
Measurement instruments: psychometric tests evaluated in academic publications to measure the psychological variables (Hunter & Schmidt, 2004; Friese & Frankenbach, 2020).
Exclusion criteria
Adult population with previous disorders or pathologies. However, we included those studies in which there were control groups without pathologies, i.e., normally developing populations.
Statistical and methodological rigour: the existence of ambiguous data, the absence of data treatment, or evaluations that did not comply with the principles of psychometry, as well as measurement errors, attending to the guidelines established by Hunter and Schmidt (2004) and Friese and Frankenbach (2020).

The search strategy complied with the criteria established by Botella and Gambara (2002), Botella and Sánchez (2015) and PRISMA (2020). The search was conducted in the following databases: WOS, PsycInfo and Science Direct, during March 2021. It is important to clarify the accessibility criterion. This decision responds to the need for transparency and reproducibility of the research, detailed by Lopez-Nicolas et al. (2022). Also, this is a recommendation of the Open Science Collaboration (2015). The results of the Boolean action are graphically represented in a flowchart (Figure 1) and Boolean action can be consulted in Table 2.

Table 2
The Boolean action

Boolean action
[doctoral student OR PhD student OR PhD candidate] AND [burnout OR stress OR occupational stress] AND [emotional affect OR emotion regulation, mood regulation] AND [mental health OR anxiety OR depression OR sleep problem]
Filters
Time: 2016-2021
Document type: scientific article
Accessibility: access to full text

Figure 1
Flowchart of the search strategy



The study selection was carried out according to the eligibility criteria established by Cochrane in Higgins and Green (2011) and PRISMA (2020). Thus, the initial sample consisted of $n= 1790623$ studies, of which 137 were duplicates. To manage this data, the results from each database were downloaded in csv format and unified, specifying the database to which they belonged, the title, the journal, and the abstract. In addition, it is necessary to mark by means of filters those sources that are scientific, such as scientific journals, omitting other sources such as newspapers. Thus, firstly, it was necessary to review systematically and manually each of the studies, paying attention to the information presented in the abstract and in the title. Inclusion and exclusion criteria were then applied, in the flowchart (see Figure 1). During this screening phase, most of the results were omitted for not responding to the study object in a clear or precise manner. In other words, although they talked about the doctorate, they did not offer information on how this process was carried out, nor what variables were relevant. In this sense, many studies spoke of the importance of the doctorate as a generator of science and innovation. The criterion of statistical and methodological rigour led to the rejection of a considerable part of the sample, since, in most of them, the statistical data did not provide a coherent response to the evaluation manuals employed. In addition, much of the research was carried out using qualitative methodology, especially semi-structured interviews, making it impossible to extract statistical data. Moreover, there were no extreme data or data of higher or lower limits that would not correspond to a normal distribution. Finally, it is noteworthy that many studies could not be analysed because they were not open access. This is a difficulty, since for the internal reliability of the systematic review process, it is necessary for any researcher to be able to replicate this process.

The execution of the conversions of statistical values to Fisher's Z scores was operationalised using CMA software. This decision corresponds to the criteria established by Martin-Andrés and Luna del Castillo (2004) on the importance of selecting a unit of measurement that reduces statistical distortion. The CMA statistical software was used to graphically represent the data through the figures of Forest Plot and Funnel Plot, to calculate the absence of publication bias through Egger's test and to carry out the statistical analyses of heterogeneity, model comparison and meta-regression on the moderating variables. Regarding the latter, we analysed gender (men and women), age, geographic area, and personal variables (social support, personality variables and burnout).

RESULTS

Socio-demographic results of the sample

The sample of our study was constituted by 9 papers, with a total of $K=53$ samples and a total of 32670 doctorate students (Table 3). The mean age of the participants is 29.80 years. The predominating nationality is European (50%), followed by the American nationality (20%). There was no coincidence of countries, except for the USA, where two of the analysed studies were conducted. The rest of the countries are: Sweden, Nigeria, France, Denmark, Netherlands, China and Spain, which shows the diversity of countries in the present study. Lastly, the largest sample was that of Hermann and Wichmann (2017), with 2244, whereas the smallest sample corresponds to Hunter and Devine (2016), with 186 students. It is important to mention that the sample size, $K=53$, exceeds the minimum value established to prevent the distortion of the upper limit of confidence (Bonnet & Price, 2014).

Table 3
Socio-demographic information

Authors	Sample	N samples*	Age	Geographical area	Country	Distribution of participants
Corner et al., (2017)	248	20	No report	Europe	Sweden	PhD Students from three universities representing social sciences, arts and humanities, and natural sciences
Haag et al., (2018)	1923	4	28.04	Europe	France	PhD Students
Hermann and Wichmann (2017)	2244	6	31.8	Europe	Denmark	PhD Students

Authors	Sample	N samples*	Age	Geographical area	Country	Distribution of participants
Hunter & Devine, (2016)	186	6	32.8	International	North America, UK/ Europe, NZ/ Australia/ Africa	PhD Students from nine countries: Canada (63.5%), United States (28.2%), United Kingdom (4.9%), Australia / New Zealand (2.4%), Norway (2.4%), France (0.5%), and South Africa (0.5%).
Kusurkar et al., (2020)	464	1	29.5	Europe	Holland	PhD Students in Medicine
Liu et al., (2019)	325	3	31.11	Asia	China	PhD Students in Medicine
Sorrel et al., (2020)	305	5	30	Europe	Spain	PhD Students
Tompkins et al., (2016)	228	3	27.16	America	USA	PhD Students
Zahniser et al., (2017)	358	5	28	America	USA	PhD Students in Clinical Psychology

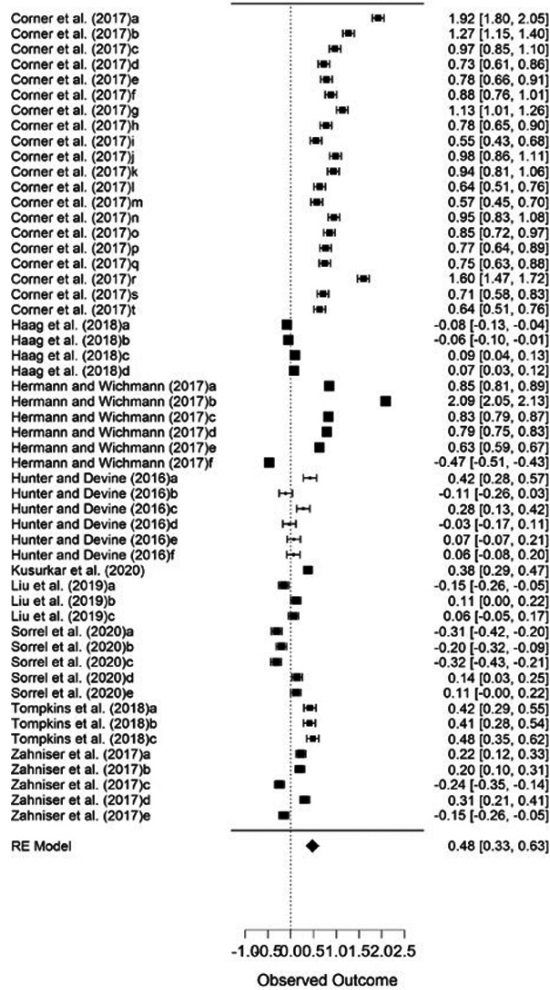
*The studies that comprised the meta-sample are mostly longitudinal studies with several waves. To calculate the total sample, it is necessary to calculate the number of samples by the number of N samples (coinciding with the number of waves of the studies).

Statistical analyses: effect size, heterogeneity and Egger’s test

The aim of this study was to explore the association of the variables of remaining in the doctorate programme and the socio-demographic variables (age, gender and geographical area) with personal variables (social support, personality factors and burnout).

Once the sample of coefficients of correlation was obtained, the values were converted to Fisher’s Z scores (Martin-Andrés & Luna-del-Castillo, 2004). According to the Forest plot graph (see Figure 2), there was an effect size of $r = .48$, with a lower limit of 0.32 and an upper limit of 0.64, and a statistical significance of $p < .0001$. Likewise, a standard error of 0.084 was obtained, with a Z value of 5.704. The effect size according to Cohen (1988) was moderate.

Figure 2
Forest plot

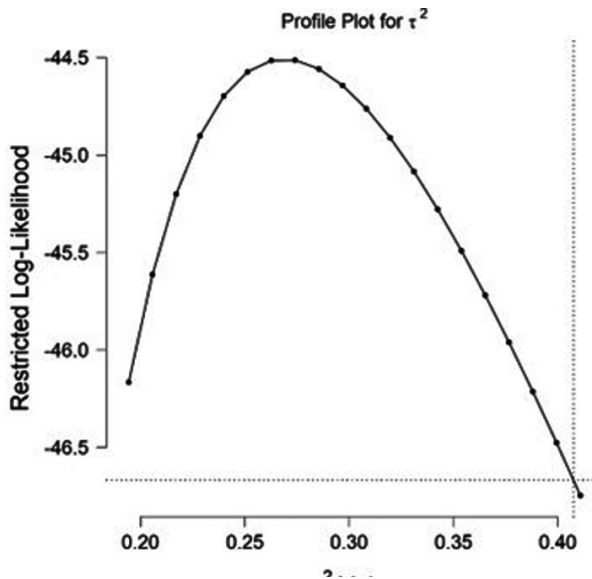


Regarding the factors of heterogeneity, the Q value of Der Simonian and Laird (1986) showed a very high variability, which allows rejecting the hypothesis of homogeneity ($Q = 13403.910$; $df = 57$; $p < .001$). Moreover, it is worth highlighting the value of I^2 , which shows that 99% of the variability is explained by the methodological and sample heterogeneity of the studies ($I^2 = 99.575$) and not by chance (Higgins & Thompson, 2002). These data are in line with the heterogeneity test, which provides a value of $H^2 = 235.156$, supporting the existence of high diversity (Higgins & Thompson, 2002). With respect to the estimation of the meta-

analytic effect by weighting, we obtained $\tau^2 = 0.408$ ($p > .001$), which confirms the previous methodological decision to apply the random effects model (Gualo & Varin, 2012) (Figure 3). To sum up, the heterogeneity analysis shows that the variables of remaining in the doctorate programme are significant. Analogously, it was observed that the sample of the study was very diverse.

Figure 3

Log-likelihood for τ^2 .



The Omnibus test of model coefficients presented a reliable value of $Q = 32.531$ ($p < .001$) (Aguinis & Edwards, 2014). To sum up, high heterogeneity was confirmed, thus confirming the suitability of working with the random effects model (Bonett & Price, 2015; Martín-Andrés & Luna del Castillo, 2004).

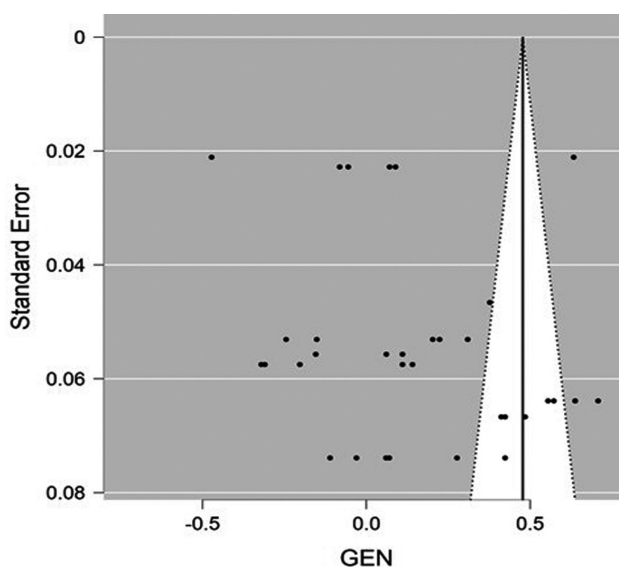
It is important to verify the absence of bias effect (Botella & Sánchez, 2015; Botella & Gambará 2002). To this end, Egger's test was conducted, with 99% reliability. The data confirm the absence of publication bias, showing the following values: $z = 0.380$, $p = .704$ (DerSimoian & Laird, 2015). Moreover, the standard error was not high ($SE = 3.20$), indicating the proximity to the regression line, with this being related to the absence of publication bias (Martín-Andrés & Luna del Castillo, 2004). The rank correlation test for funnel plot asymmetry presents a non-significant Kendall value of $\tau = 0.123$ ($p = .198$), indicating the absence of publication bias.

Furthermore, the funnel graph (Figure 4) reflects the variability that was previously found, corroborating that the source of this variability was the diverse

nature of the studies (Sterne et al., 2011), as was indicated by the heterogeneity indices. After analysing Figure 4, we can state that heterogeneity is high, since there are values scattered from the average. That is, most of the studies of the sample are clearly separated from the figure. These studies present more extreme data, although, during the conversion of a normal curve to a Fisher curve, the values above 0.5 suffered a certain deformation and were even farther from the average. Consequently, it was necessary to carry out a model comparison and a meta-regression that allowed studying these aspects.

Figure 4

Funnel plot



Moderating variables and meta-regression analysis

The review of the scientific evidence showed that there are moderating variables which demand the realisation of comparative models (Botella & Sánchez, 2015) and meta-regression. In this case, the common moderating variables in all the analysed articles are: model 1 – masculine gender; model 2 – feminine gender; model 3 – age; model 4 – geographical area; and model 5 – personal variables (Table 4).

We found that models 2 (feminine gender) and 4 (geographical area) do not explain, at any percentage, the variance of remaining in the doctorate programme. However, model 1 reveals that undertaking a doctorate programme and remaining

in it is explained at 4% by the fact of being a man, with 99% significance. Secondly, with model 3, age explains 17% of remaining in the doctorate programme, with 99% significance, and, with model 5, the personal variables explain 11%, with 99% significance.

Table 4
Model comparison

Model name	TauSq	R²	Q	df	P-Value
<i>Model 1 masculine</i>	0.42	0.04	140004.56	68	<.00
<i>Model 2 feminine</i>	0.42	0.00	140004.56	68	<.00
<i>Model 3 age</i>	0.45	0.17	12213.10	45	<.00
<i>Model 4 geographical area</i>	0.40	0.00	14009.11	73	<.00
<i>Model 5 personal variables</i>	0.36	0.11	10816.78	64	<.00

After analysing the model comparison, the meta-regressions (Table 5) of the statistically significant variables were conducted, corroborating the value of being a man and the value of age, with the evolutionary development and older age being protective factors to remain in the doctorate programme (coefficient = 0.08; SE = 0.06; 95% lower = -0.03; 95% upper = 0.20; z = 1.35; p = .17). Regarding the personal variables, three regression models were established: a) social support, b) personality variables and c) burnout. With respect to social support (family, institution, and self-esteem), we found that family support along with institutional support and self-esteem explain 11% of remaining in the doctorate programme (98% significance), with self-esteem being the most relevant variable, as is observed in Table 5. Regarding personal variables (self-esteem, emotional intelligence, open-mindedness and responsibility), it was found that self-esteem was the most relevant variable, explaining 6% with p = .000. Lastly, burnout explains only 3%, with p = .000. It is thus concluded that the most solid explanatory model is social support.

Table 5
Multi-Meta-regression according to personal variables

	Covariate	Tau²	I²	R²	p
a) Social support*	Intercept	0.1	99.48	<.00	.99
	Family support	0.4	99.48	<.00	<.00
	Family support x Institutional support	0.4	99.48	0.01	<.00
	Family support x Institutional support x Self-esteem	0.35	99.39	0.11	0.02
b) Personality variables **	Intercept	0.4	99.48	0.03	<.00
	Self-esteem	0.4	99.48	0.06	<.00
	Self-esteem x Emotional intelligence	0.4	99.48	<.00	<.00
	Self-esteem x Emotional intelligence x Open-mindedness	0.4	99.48	0.01	<.00
	Self-esteem x Emotional intelligence x Open-mindedness x Responsibility	0.4	99.48	<.00	<.00
c) Burnout***	Intercept	0.07	99.48	<.00	.99
	Burnout	0.4	99.48	<.00	<.00
	Stress	0.4	99.48	0.01	<.00
	Stress x Cynicism	0.4	99.48	0.03	<.00
	Stress x Cynicism x Avoidance	0.4	99.48	0.02	<.00

*We considered those elements related to social support that appeared in the studies: self-esteem, family support (parents, siblings and partners) and institutional support (university management actions, accompaniment of the institution and support from directors or research colleagues).

**We considered those elements of the most relevant theories related to the psychology of personality that appeared in the studies: self-esteem, emotional intelligence, open-mindedness and responsibility.

***We considered those elements related to burnout that appeared in the studies, a total score of: burnout, stress, cynicism and avoidance behaviours.

DISCUSSION AND CONCLUSION

The aim of this study was to explore the association of the variables of remaining in the doctorate programme and the socio-demographic variables (age, gender and geographical area) with personal variables (social support, personality factors and burnout). The statistical results and those of the systematic review show that remaining in the doctorate programme is favoured by being an older man, and that social support (i.e., family support, institutional support and self-esteem) is the model that better explains permanence in the PhD.

Firstly, it is necessary to describe the relevance of gender. A stronger relationship was found between being a man and remaining in the doctorate programme. There are differences in the professional expectations in terms of gender, thus, even though women show a greater desire to enter the academic world of teaching in higher education, they show a low tendency to access research and integrate into the academic world (Guo et al., 2018). In fact, women claim to be more afraid of being discriminated against when looking for a job compared to their male equivalents (Branigan, 2014; Wang, 2018; Wang et al., 2019). Moreover, some authors have also found that women present greater emotional exhaustion and intentions to abandon their academic career (Hunter & Devine, 2016).

Regarding age, it proved to be a very influential variable in PhD dropouts. However, previous research has stated that the older the age of the doctorate student and the lower the social support received, the greater the probability of abandoning the thesis (González-Betancor & Dorta-González, 2020; Hunter & Devine, 2016). Similarly, in a problematic situation, age was the variable that encouraged the doctorate student to request a change of thesis director (González-Betancor & Dorta-González, 2020). Likewise, emotional exhaustion was also a variable that influenced doctorate dropout, increasing with age (Cornér et al., 2017; Hunter & Devine, 2016). According to our results, we hypothesised that age could be mediating more psychological variables, such as resilience. In that sense, the older a person is, the more resilient (Mauno et al., 2012), buffering the impact of stress and increasing the likelihood of remaining in the doctorate.

Although not all the variables corresponded to the individual differences, the environment in which a human being develops plays a key role in any social process. In this sense, it is necessary to work from three models: a) social support (family, institution and self-esteem), b) personality variables (self-esteem) and c) burnout, which explains the problem very poorly.

According to our results, the model that best explains permanence in doctorate studies is social support. This has been one of the most studied variables in its relationship with stress. As was stated by other authors, doctorate students demand support from their peers, families and institutions to which they are

giving their work (Lech et al., 2018; Song et al., 2015; Tompkins et al., 2018). In this sense, our results can be explained by the relevant role of social support as a mediator in the consequences of stress, and this relationship has been widely demonstrated (Levecque et al., 2017; Sverdlik et al., 2018; Tompkins et al., 2018). Moreover, institutional support is of great importance in the case of doctorate studies, as is shown. Positive supervision and support from the thesis directors is positively associated with productivity (Dysthe et al., 2006, Pyhältö et al., 2015), and the latter, in turn, is related to satisfaction and workplace well-being (Hermann & Wichmann, 2017; Miragaia & Aleixo, 2021). In this sense, the feeling of belonging to the scientific community reduces the feelings of loneliness and dissatisfaction (Corner et al., 2017; Hermann & Wichmann, 2017). Similarly, the perception of abusive practices from the institution is considered a discouraging element (Edward et al., 2015). Analogously, it is important to highlight that those students who feel supported by their thesis directors perceive lower levels of stress (Haag, et al. 2018). In this sense, Corner et al. (2017) specified that the empathetic support of the thesis director is essential, with the provision of feedback being a highly valued element. Social support is strongly related to self-esteem, which largely depends on the supported received from the institution (Liu, et al., 2019; Overall et al. 2011) and the social context in which it takes place (Satuf et al., 2018).

The results showed that, indeed, another variable that influences the permanence in doctorate studies is self-esteem. Authors such as Liu et al. (2019) state that self-esteem and self-management are determinant for scientific performance and production within the doctorate programme. Their importance is such that authors like Zahniser et al. (2017) pointed out the need to generate measures that promote self-management and improve self-esteem from doctorate programmes. In this way, the personal variables (or personality variables), with self-esteem as the predominating variable, could be the most influential ones in the abandonment of or permanence in doctorate studies. On its part, the loneliness that doctorate students experience and a highly competitive environment are variables that seem to be mediated by personal and individual traits. In this sense, the social skills of doctorate students, along with their capacity to socialise, constitute a process by which academic skills and competencies are acquired (Hermann & Wichmann, 2017). According to Voitenko et al. (2020), emotional intelligence skills help to manage oneself in a social and working environment. This view points out that high-quality research is not the result of individual discoveries, but synergies (Hermann & Wichmann, 2017). This perspective is in line with previous studies, such as those of Boud and Lee (2005), although it is presented as a minority position against the traditional view of the importance of individualism (Bastalich, 2017; Jara, 2020). That is, it is necessary to recognise the holistic and voluntary practices (Bastalich, 2017; Corner et al., 2017). Furthermore, the frustration that results

from the basic psychological needs pushes doctorate students toward unrest and burnout (Kusurkar et al., 2020). Moreover, the authors of the mentioned study state that the perception of low autonomy and self-esteem seems to be mediated by external variables, which poses a challenge to academic institutions (Kusurkar et al., 2020). In this sense, the behaviour of doctorate students seems to be influenced by the leadership style of the university centre, in a way that a leadership based on integrity and ethics increases the confidence of the researchers (Edward et al., 2020). Thus, responsibility, motivation, the feeling of growth, creativity and productivity are positively correlated with the policies of proactive leadership of the university (Edward et al., 2020). On their part, Voitenko et al. (2020) described the importance of not only self-esteem, but also coping strategies, self-realisation and responsibility (Voitenko et al., 2020). In this sense, it was found that coping strategies varied under emotional stress and exhaustion, as well as due to the desire of satisfying the needs of self-realisation (Voitenko et al., 2020). In this respect, Corner et al. (2017) claimed that the experiences of exhaustion are related to the intention of dropping out. Thus, coping strategies can reduce the stress derived from self-realisation, which is adjusted with time and age (Voitenko et al., 2020).

Lastly, burnout was found to be related to PhD dropout. Other authors had already reported this association, highlighting burnout as one of the main difficulties in the realisation of a doctorate (Kusurkar et al., 2020; Liu et al., 2019; Sorrel et al. 2020; Zahniser et al., 2017). As was previously mentioned, a PhD can be understood as a job (Sorrel et al., 2020), which would explain the appearance of high levels of burnout. Moreover, the diversity of roles can cause a conflict of ambiguity, thus generating a source of additional stress (Zahniser et al., 2017). Likewise, burnout was related to other variables that appeared throughout the course of the study, such as self-esteem and social support, finding that a lack of the latter two would increase the risk of suffering from burnout during a doctorate programme (Blanco-Donoso et al., 2019; Hobfoll & Shirom, 2000). This strong relationship can be explained by the possibility that the main stressors of workers would be those aspects that prevent them from attaining their goals and which generate a lack of existential significance. These aspects affect exhaustion and commitment directly, although they also have an indirect effect through certain personal resources (Hermann & Wichmann, 2017).

The present study has a series of limitations that must be pointed out. Firstly, there is an alarming absence of studies conducted in developing countries, except for Nigeria. Analogously, there is a lack of data on Latin America, Southeastern Asia, Middle East and Oceania. Doctorate studies take place in all nations, and it is the beginning of the scientific and academic career, being an essential part of quality science and higher education. On the other hand, the limited information regarding areas of specialisation, average duration of doctoral studies, economic

compensation, traditional or compilation-based research models, internationally recognized doctorate programs, affiliation with a funded research group, the availability of continuous education provided by the University or Research Centre, as well as the ownership of the centres, presents social limitations that should be analysed in future research.

Further research should include a correlational and longitudinal study with doctorate students and other types of variables, such as the existence or absence of a working contract, attending to the personal variables presented in this study, although also addressing mental health.

As is demonstrated, doctorate studies have a very specific particularity, which is the fact that, in addition to being considered studies of a higher order, they are also understood as work practice. Thus, variables such as being a man, greater self-esteem and greater social support were related to permanence in PhD studies. Moreover, burnout plays a crucial role, fostering doctorate dropout and being strongly related to the previously mentioned variables. Similarly, the role of the family and the closest environment are not the only relevant elements; universities, as organisations, can also favour a suitable, pleasant and motivating environment through democratic leadership styles and by favouring social activities that allow doctorate students to weave socio-affective relationships that provide them with emotional well-being, a learning network and synergies.

It becomes fundamental to promote support to doctorate students in the universities and institutions in which they carry out these studies, favouring a working environment that enables job satisfaction and the increase of self-esteem. This would contribute to improving the mental health of PhD students, reducing the levels of burnout and advancing toward the creation of quality researchers and faculty members.

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Decent work in career development: A comparative analysis of Italian and Spanish university students' perceptions

El trabajo decente en el desarrollo de la carrera: Un análisis comparativo de las percepciones de estudiantes universitarios italianos y españoles

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ABSTRACT

Employment and decent work for young people is one of the most urgent challenges in European policies, especially in those countries where youth unemployment rates are higher than the EU average, such as Spain and Italy. The scientific literature has shown how people's conception of work affects their employment trajectory. This study aims, on the one hand, to describe the conception of work and decent work held by Spanish and Italian university students, and on the other hand, to identify the existence of possible differences in their conceptions. For this purpose, a mixed methods design ("QUAL + QUAN") was chosen. The

final sample consisted of 128 university students of Psychology and/or Pedagogy between 18 and 30 years of age. The results show that Italian and Spanish students have a reductionist view of the concept of work, mainly related to the economic aspect (salary/money/salary). Along the same lines, it was found that the concept of decent work is identified only with good economic remuneration, well-being and personal growth, and respect for minimum rights. On the other hand, aspects such as security, fairness and reconciliation of work and family life are secondary. The results also show a more optimistic view of Spanish students in relation to the possibility of finding a job and/or decent work in their own region, while Italian students show greater willingness to move, considering that for them it is easier to find a job abroad. In conclusion, the analysis of this study reflects the need for dialogic interventions and reflective thinking about work and decent work with university students. Addressing sustainable employability and decent work in career development processes becomes a valuable tool for the promotion of an optimal and rewarding working life as future workers.

Keywords: decent work, sustainable employability, mixed methods, comparative analysis, university students

RESUMEN

El empleo y el trabajo decente de las personas jóvenes constituyen uno de los desafíos más urgentes en las políticas europeas, en especial, en aquellos países donde los índices de tasa de desempleo juvenil superan la media de la UE como son España e Italia. La literatura científica ha demostrado cómo la concepción que tienen las personas sobre el trabajo afecta a su trayectoria laboral. Este estudio pretende, de una parte, describir la concepción de trabajo y trabajo decente que tienen estudiantes universitarios españoles e italianos, y de otra, identificar la existencia de posibles diferencias en sus concepciones. Para ello, se ha optado por un diseño de métodos mixtos («QUAL + QUAN»). La muestra final estuvo compuesta por 128 estudiantes del Grado de Psicología y/o Pedagogía de entre 18 y 30 años. Los resultados muestran cómo los estudiantes italianos y españoles tienen una visión reduccionista del concepto de trabajo, principalmente relacionada con el aspecto económico (salario/dinero/sueldo). En esta misma línea se constató que el concepto de trabajo decente lo identifican únicamente con una buena remuneración económica, bienestar y crecimiento personal, y respeto de unos derechos mínimos. En cambio, aspectos como la seguridad, la equidad o la conciliación de la vida familiar y laboral quedan en un segundo plano. Los resultados también aportan una visión más optimista de los españoles en relación con la posibilidad de encontrar un trabajo y/o trabajo decente en su propia región, mientras que los italianos muestran un perfil más disponible para la movilidad, considerando que es más fácil encontrar trabajo fuera. En conclusión, el análisis de este estudio refleja la necesidad de intervenciones dialógicas y de pensamiento reflexivo sobre el trabajo y el trabajo decente con estudiantes universitarios. El abordaje de la empleabilidad sostenible y el trabajo decente en los procesos de desarrollo de la carrera se convierte en una herramienta valiosa para el fomento de una vida laboral óptima y provechosa como futuros trabajadores.

Palabras clave: trabajo decente, empleabilidad sostenible, métodos mixtos, análisis comparativo, estudiantes universitarios

INTRODUCTION

Employment and decent work for young people is one of the most urgent challenges in European policies, especially in those countries where youth unemployment rates exceed the European Union (EU) average, such as Spain (32.3%) and Italy (23%) (Eurostat, 2022). The latest report published by the International Labor Organization (ILO, 2022) points out that young university students who lose their jobs or fail to get one are at risk of experiencing the phenomenon of “scarring” that leads them to accept jobs for which they are overqualified, thus running the risk of experiencing a career path with irregularities and low wages. In this context, the transition process to work of young people who have recently graduated from higher education is very different in each EU country. According to 2021 data from Eurostat’s Labour Force Survey, the employment rate of recent graduates in Spain is 72.8% and 57.9% in Italy. These figures are considerably lower, at 34.5% in the case of the Sicilian region and 63.3% in Andalusia.

The development of young people’s employment trajectories in the current socio-occupational context of uncertainty, dynamism, flexibility, or instability requires a series of key individual resources, such as employability, which helps people to manage both their labour market insertion process and the development of their careers efficiently, proactively, and sustainably (Di Fabio, 2017; Romero-Rodríguez et al., 2019). Literature suggests that a person has a higher or lower degree of employability depending on intrapersonal factors (e.g. personal characteristics, level of education or value of the job) and external or contextual factors of the social and labour environment (e.g. economic conditions, labour market opportunities) as well as both factors interacting with each other (Fleuren et al., 2020). According to these factors, employability, as a psychosocial construct, has been directly related to the individual’s perception of opportunities to find and keep a decent job (ILO, 2004) or to find a new one in a particular socio-economic context (Rothwel et al., 2008). In this study, we aim to approach this relationship from the conception that Spanish and Italian university students have about their employability and decent work and the possible differences between students from both countries.

Work and decent work

Work is a multidimensional construct through which people can satisfy three needs: survival, social relations, and self-determination (Blustein, 2008). To respond to this objective, in 1999 the ILO introduced the concept of decent work, understanding that.

It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for all, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men. (<https://www.ilo.org/global/topics/decent-work/lang-es/index.htm>)

Since 2015, the attainment of decent work for all people has been part of the 2030 Agenda for Sustainable Development, although it is still a pending issue, especially in the case of young people, according to the United Nations (UN, 2019). The commitment assumed by universities at the international level to contribute to the achievement of the Sustainable Development Goals implies the consideration, among others, of actions that promote student awareness of the meaning of decent work, according to the Sustainable Development Solutions Network (SDSN Australia/Pacific, 2017).

Decent work promotes personal satisfaction and well-being (Blustein et al., 2016), empowerment (Blustein et al., 2017) and society's growth (Blustein, 2019). Traditionally, however, decent work has been addressed more from a macroeconomic approach (Ribeiro et al., 2020) than at the level of the individual, although this approach has been increasingly taking hold (Blustein et al., 2016, 2019; Duffy et al., 2017; Pouyaud, 2016). This perspective has been developed especially through the Psychology of Working Theory (PWT), from which a conceptual bridge is established between decent work and meaningful work for the individual (Blustein et al., 2020, 2022; Duffy et al., 2016). From a socio-constructionist approach (Ribeiro et al., 2016) it is suggested that the conception of work is configured through the discourse and narratives that people create in their relationships, so these perceptions should be the object of study.

Although the concept of decent work is discussed in other fields (e.g. labour policies, labour management or social welfare), career development counsellors have also been interested in this construct. Work representations contribute to structuring the construction of people's careers and identities (Guichard and Pouyaud, 2014); therefore, some authors (Di Fabio and Maree, 2016) have emphasised the possibility of approaching this concept from career development disciplines.

Despite its importance, however, the inclusion of decent work as an object of research is still recent (Pereira et al., 2019) and is “under construction” (Ribeiro, 2020, p. 1120). However, significant progress has been made in the analysis of the factors that predict decent work. Thus, the influence of structural determinants, such as economic constraints and marginalization (Blustein and Duffy, 2020); generational aspects (Kalleberg, 2018) or educational level (Blustein et al., 2020) have been studied. The analysis of people’s subjective perceptions of different aspects of work as a predictor of aspiring to and obtaining a decent job has been a major focus of attention. The studies that have focused on the influence of the perception of job insecurity among young people (Allan et al., 2021; Blustein et al., 2020; Purcell and García, 2021), or those that have focused on work volition, defined as “a subjective perception that one has the power to make career choices despite constraints” (Duffy et al., 2015, p. 128). This latter factor has been shown to be highly predictive (Blustein et al., 2020; Blustein and Duffy, 2020; Smith et al., 2020) of decent work aspiration, while it is strongly influenced by economic and social structural determinants (Duffy et al., 2019), limiting it in the most unfavourable situations. Cross-cultural studies (Blustein et al., 2022; Duffy et al., 2020) have highlighted the situated nature of people’s perceptions of decent work and the need to research common and differential elements to contextualise the concept (Ribeiro, 2020).

Sustainable employability as a guarantee of decent work

The concept of employability has evolved over the last decades largely depending on labour market conditions, as well as on national and international social, educational, and employment policies. In the current context of technological innovation, the emergence of new occupations, or labour relations, there is a commitment to improving the employability of workers as a key element of social and personal well-being. The Organisation for Economic Co-operation and Development (OECD) and the ILO (OECD/ILO, 2016) propose this improvement based on the commitment to guarantee full respect for fundamental principles and rights at work to promote decent and sustainable employment for all. This new challenge has led to a reconceptualization of employability, with the term sustainable employability (SE) being coined. This new concept illustrates the process by which the individual reviews his or her personal values, the meaning of work, as well as the level of personal and social well-being and, from there, contrasts them with the external and internal factors operating in the labour market (van der Klink et al., 2016). Thus, employability is defined because of how people are employed or aspire to be employed and their ability to function at work and in the labour market (Fleuren et al., 2016, 2020). According to Fleuren et al. (2020) and Hazelzet

et al. (2019), this ability can be positively or negatively affected by intrinsic job characteristics by directly interacting with the intrapersonal indicators from which sustainable employability is operationalised: health domain; well-being and work value; productivity and long-term perspective. According to these components, we can affirm that the SE contributes to the achievement of decent work given that it seeks above all to enable the person to have a meaningful and valuable working life that has a positive impact on their quality of life, happiness, and personal and social well-being.

Recent research on SE has mainly been linked to employees and has focused on the analysis of the indicators that shape it (Neupane et al., 2022; Picco et al., 2022), the factors that promote it within organisations (Gürbuz et al., 2022) or the interventions that can be carried out by companies and workplaces themselves to improve it (Hazelzet al., 2019). Nonetheless, we believe that identifying SE as a capability that only affects workers with a consolidated career path is a far cry from the richness of its contribution to the career development process. As Lo Presti and Fluviano (2016) point out employability is

A personal resource that individuals develop across their working lives aimed at increasing one's own career success, both attaching importance to (i.e., employability orientation) and committing to (i.e., employability activities) making sense of past work experiences and envisioning one's own professional future, acquiring valuable competencies and skills, improving their formal and informal career-related networks, exploring their social environment in search of opportunities and constraints to their own career pathway. (p.196).

In this sense, SE is a concept that is built over time and involves the development of different activities and behaviours that enable the enhancement of its different dimensions. By extension, the concept of SE can be applied to any stage of a career (Fleuren et al., 2020; van der Klink et al., 2016). Ultimately, the literature shows that people's representations of work, and thus of decent work, influence the way they construct their careers. Therefore, the need to investigate the perceptions of university students, who are in the process of preparing for work, is justified to be able to provide guidance interventions that favour their transition to decent work.

Taking this background into account, we set out the following research objectives:

1. To describe the conception of work and decent work held by Spanish and Italian university students.
2. To identify the existence of statistically significant differences in the conceptions of Italian and Spanish students in relation to work and decent work.

METHOD

To address these research objectives, we chose a mixed-methods design. Thus, we identified two data components, one qualitative and one quantitative in nature. The use of the mixed method has allowed us to integrate and diffract the responses provided by Spanish and Italian students through the decomposition of the different units of analysis (Uprichard and Dawney, 2019). The design follows the “QUAL + QUAN” model according to Creswell and Plano Clark (2011). The QUAL component has been approached according to grounded theory (Strauss and Corbin, 1998). This type of analysis allowed us to use a data-driven inductive approach (Hsieh and Shannon, 2005). For the QUANT component, hypotheses were proposed with the aim of being tested (Chigbu, 2019), given that the research was conducted in two contexts that have similarities, we assumed that we would not find any significant differences between the two groups.

Participants

The initial sample consisted of 204 Italian students (56 men and 148 women) and 190 Spanish students (40 men and 150 women) enrolled in the 1st to 3rd years of the Pedagogy or Psychology Degrees at the University of Seville (Spain) and the University of Catania (Italy). Participants were selected by non-probability and incidental sampling based on accessibility to the students involved in both countries. All students filled in the research protocol. However, the following inclusion criteria were considered for the subsequent analysis: not to be in employment and not to be older than 30 years. After eliminating incomplete protocols and those that did not meet at least one of the inclusion criteria, it was decided to equalise the samples. Accordingly, 128 students participated, 64 Italian and 64 Spanish. In each country, 50% of the sample were male (32 students) and 50% female (32 students). The age of the participants ranged from 18 to 30 years old ($M=21.96$, $SD= 2.92$).

Data collection

Data was collected during teaching hours at each of the universities. The completion of the research protocol was divided into two parts. The first part included:

- Biographical data (sex and age).
- The decent work/work idea: “What is your definition of work and decent work?”

This qualitative survey methodology has been used in previous studies (Ferrari et al., 2009; Zammitti et al., 2021), and allows an adequate approximation of people's perception of the concepts of work and decent work. We decided to use a single-item assessment, as there are no validated and standardised instruments in the literature that assess the dimensions under analysis. This methodology has advantages: it allows for less time-consuming research protocols and is more satisfactory for respondents (Allen et al., 2022). In addition, single-item measures may be acceptable when the construct to be assessed is unidimensional and clearly defined (Fuchs and Diamantopoulos, 2009), as in our case. For this reason, such measures are as valid and reliable as their multi-thematic counterparts (Ahmad et al., 2014; Ang and Eisend, 2018).

In the second part of the protocol, a series of questions were asked and organised on a Likert-type scale (1 [not at all likely]-6 [very likely]).

- Perception of how easy it is to find a decent job in your own region or outside your region: "After reading the definition of decent work, how likely do you think you are to find a decent job in your region? And outside your region?"
- Intention to relocate to find a decent job: "Do you think you will relocate to find a decent job in the future?"

The collection of information respected all the indications present in the deontological code of the Italian Association of Psychology (AIP, 2015) and those established in the internal regulation in Social Sciences by the Research Ethics Committee of the University of Seville.

Data analysis

The QUAL and QUANT components were analysed separately, and subsequently integrated into the results discourse (Creswell and Plano Clark, 2017). Before proceeding with the analysis of the QUAL component, the data were subjected to a double-checking process by two researchers. During this phase, some grammatical errors were corrected, and some dialect words were translated. The data were analysed using NVivo 12.0 software. First, the words most frequently used by participants to describe the concept of work and decent work were identified. Through a word frequency analysis, the most relevant themes were identified, and nodes were defined (QSR International, 2014). Subsequently, the most frequently used words consisting of four or more letters and repeated at least four times were identified. All articles and adverbs, incorporated in the list of non-significant words, were excluded, as well as the word "work" itself since it was the concept being defined. Following completion of the process, tables 2 and 4 illustrate the nodes utilized by the university students to depict work and decent work. Subsequently, we conducted a textual and discourse analysis of the fragments comprising these

nodes, combined with a chi-square test correspondence analysis to evaluate the quantity of classifiable responses for each node and case. For the QUANT component of the protocol's second part, we conduct a descriptive analysis using measures of central tendency such as mean and standard deviation. Following this, we calculate the discrepancies between the two samples (Italy-Spain) by employing Student's t-test.

To check the sample size adequacy and statistical power we used the G*Power software version 3.1.9.7 (Faul et al., 2007; Faul et al., 2009). Statistical power is considered good when it is equal to or greater than 0.80. As an additional metric of effect size, *Cohen's d* was calculated. The following guidelines were used for the interpretation of *Cohen's d*: small if > 0.2 , median if > 0.5 , and large if > 0.8 (Cohen, 2013). The input parameters were as follows: statistical test = t-test: difference between two dependent means (two groups); effect size = 0.5; α err prob = 0.05; sample size group 1 ($n = 64$); sample size group 2 ($n = 64$); mean group 1; mean group 2; standard deviation group 1; standard deviation group 2.

Italian Students



Spanish Students



Word	Count	Word	Count
Commitment	7	Service	10
Respect	7	Area	9
Growth	6	Benefit	8
Rights	6	Modality	8
Security	6	Task	8
Needs	5	Time	8
Skills	5	Contract	7
Community	4	Security	7
Gratification	4	Quality	6
Interests	4	Development	6
Part (of life)	4	Skills	5
Purpose	4	Allow	5
		Well-being	4
		Reach	4

The word frequency analysis made it possible to better identify the nodes that students used to describe the concept of work. The first node was called *Economic aspects* and refers to the idea of work as something that serves to get money. This node includes words such as money, sustenance, and contract. Some of the definitions given are: “an activity that leads to financial gain” (IT-19) or “a means of earning money” (ES-96).

The second node was named *Well-being and Self-fulfilment* and includes words such as well-being, fulfilment, and gratification. Some examples are: “a way to feel fulfilled” (IT-21) or “work is about doing what makes everyone happy” (ES-108).

Within the third node, called *Social utility*, we find words such as service, community and social. These words indicate that the definition of work is linked to the possibility of providing a service and contributing to the growth of society. For example: “an activity that allows [...] to contribute at a social level” (IT-12); “any action in which a service is rendered to society” (ES-105).

The fourth node is called *Personal development* and includes words such as growth, skills, and purpose. This node refers to an idea of work associated with the possibility of achieving growth goals in one’s future (independence, skills development, or identity construction). For example: “something that allows you to structure your identity” (IT-5); “it is something that allows you to develop skills” (ES-116).

The fifth node was labelled *Effort and time*. It contains responses that refer to work as something that requires effort and commitment from people and takes up a good part of their lives. For example: “an [...] activity that is carried out continuously for a good part of the individual’s life” (IT-6); “work is an activity [...] that is carried out throughout a person’s working life” (ES-76).

Another node, the sixth, was called *Rights*. This node includes words such as respect, rights, dignity, among others. These answers underline the existence of fundamental rights that allow them to live a dignified life. For example: “the only way [...] to live in dignity” (IT-15), while ES-124 stated that work is “an activity that is carried out legally”. Some participants gave answers that could not be classified in the nodes described above. These responses were placed in a new node called *Not applicable*. Finally, participants who did not give an answer contributed to an additional node called *No response*. Table 2 summarises the quantified results described in this section:

Table 2
Nodes and references for the work concept

Nodes	References		
	IT	ES	Total
Economic aspects	27	43	70
Well-being and personal fulfilment	24	7	31
Social utility	8	12	20
Personal development	9	11	20
Effort and time	4	11	15
Rights	4	3	7
Not applicable	8	5	13
No response	5	5	10

Correspondence analysis showed that there were no significant differences for the following nodes: Social utility (inertia=0.01; chi-square=0.95; df=1, p=0.33), Personal development (inertia=0.00; chi-square=0.57; df=1, p=0.81), Effort and time (inertia=0.03; chi-square=3.70; df=1, p=0.05), Rights (inertia=0.00; chi-square=0.15; df=1, p=0.70), Not applicable (inertia=0.00; chi-square=0.12; df=1, p=0.73) and No response (inertia=0.01; chi-square=0.77; df=1, p=0.38). Instead, significant differences were found for the Economic aspects node (inertia=0.06; chi-square=8.07; df=1, p=0.004) and Well-being and personal fulfilment (inertia=0.09; chi-square=12.30; df=1, p=0.000). Spaniards provided more classifiable responses in the Economic aspect node and fewer classifiable responses in the Well-being and personal fulfilment node.

Finally, an analysis was carried out on the perception of the possibility of finding a job in their region or outside their region, as well as the possibility of mobility. The results show that Spanish students have a more optimistic attitude towards the possibility of finding a job in their region (M=2.77; SD=1.09), while Italian students score higher on items related to 'ease of finding a job outside their region' (M=4.05; SD=0.86) and 'intention to move to find a job' (M=4.64; SD=1.38). The comparison between Italian and Spanish students showed statistically significant differences in dimensions D1 (work in own region) and D3 (commuting to work). Cohen's d was high for D3 (commuting-work) and low for D1 (work-own region). Statistical power was acceptable only for D3 (commuting).

Table 3*Descriptive analyses and differences between Spanish and Italian students*

	F (df)	t	IT		ES		p	d	P
			M	SD	M	SD			
D1. Perception of how easy it is to find a job in one's own region	1.44 ₍₁₂₆₎	-2.24	2.38	0.86	2.77	1.09	0.03	0.40	0.72
D2. Perceived ease of finding a job outside one's own region	7.61 ₍₁₂₆₎	1.54	4.05	0.86	3.77	1.18	0.13	0.27	0.45
D3. Intention to move to find a job	2.89 ₍₁₂₆₎	4.51	4.64	1.38	3.47	1.55	0.00	0.80	0.99

Note. N =128; F= Fisher's F; df= Degrees of freedom; t = t test; M=Mean; SD=Standard Deviation; p=Significance; d=Cohen's d; P=Statistical potential.

Perceptions of decent work among university students



Word frequency analysis was also used for the concept of decent work. The words most frequently used to describe decent work are summarised in Table 4.

After performing the word frequency analysis, we coded the nodes shown below. The first node was called *Good and fair financial remuneration*. The responses belonging to this node describe decent work as a job where the remuneration is adequate in relation to the workload. In this sense, words such as money or adequate constitute it. For example: "work that allows you to have a decent salary" (IT-33); "decent work allows you to have a salary commensurate with the work" (ES-144).

The second node was called *Personal well-being and growth* and includes words such as well-being, satisfaction, or fulfilment. This node includes responses that frame decent work as a way of working that allows people to experience feelings of well-being and satisfaction, as well as personal or professional growth. Responses of this type are: "decent work 'is the work that allows you to feel happy and'" (IT-59); "decent work as the professional activity that allows you to feel fulfilled" (ES-96).

The third node refers to responses that generally emphasise the importance of respecting rights for a job to be considered decent and to ensure the dignity of the individual. This node has been labelled *Respect* and includes words such as rights or decent. For example: "any work that respects the" (IT-51); "work in which human rights are primarily" (ES-82).

Table 4
Decent work word frequency analysis

IT		ES	
			
Word	Count	Word	Count
Money	30	Money	28
Decent	12	Conditions	20
Adequate	10	Decent	18
Respect	10	Rights	18
Allow	9	Good	16
Person	7	Fulfilment	15
Satisfaction	7	Time	8
Good	6	Social	8
Security	6	Security	7
Social	4	Life	6
Well-being	4	Contract	5
Rights	4	Adequate	5
Equity	4	Development	5
		Regarding	5
		Activity	4
		Quality	4
		Effort	4

The fourth node, *Safety and security*, brought together all the responses relating to the importance of work being carried out in safe and healthy working conditions. These conditions, according to the participants, contribute to decent work. Some examples are: “decent work is work that respects safe” (IT-5) or “work that is carried out in safe and hygienic” (ES-86).

The fifth node was called *Equity*, which refers to fairness in decent work, the absence of discrimination based on gender or sexual orientation. The word equity is included in this node. Some responses noted: “decent work is a job where I am not underpaid, especially because I am a” (IT-46) or “the absence of discrimination based on gender or sexual” (ES-88).

The sixth node includes those responses that underline the possibility of reconciling private life and work and is a job that respects fair working hours. This node is called *Work-life balance* and includes words such as time and respect. For example, IT-28 says “a decent job is a job with the right working” and ES-93 says “[...] allows a good work-life balance”.

Uncodable responses were placed in the *Not applicable* node. Non-responses were coded in the non-response node. Table 5 summarises the results of these analyses.

Table 5
Nodes and references for the concept of decent work

Nodes	References		
	IT	ES	Total
Good and fair financial remuneration	39	35	74
Personal well-being and growth	16	20	36
Respect	16	19	35
Safety and Security	11	20	31
Equity	1	5	6
Work-life balance	7	12	19
Not applicable	5	4	9
No response	4	1	5

Again, correspondence analysis was used to test for differences between Italian and Spanish students. It should be noted that there are no significant differences for any of the identified nodes: Good and fair financial remuneration (inertia=0.00; chi-square=0.51; df=1, p=0.47), Personal well-being and growth (inertia=0.01; chi-square=0.71; df=1, p=0.39), Respect (inertia=0.00; chi-square=0.35; df=1,

p=0.55), Safety and Security (inertia=0.03; chi-square=3.45; df=1, p=0.06), Equity (inertia=0.02; chi-square=2.80; df=1, p=0.09), Work-life balance (inertia=0.01; chi-square=1.55; df=1, p=0.21), Not applicable (inertia=0.00; chi-square=0.12; df=1, p=0.73) and No response (inertia=0.02; chi-square=1.87; df=1, p=0.17).

Finally, the analysis of the differences regarding the perception of finding a decent job in their region or outside their region revealed significant differences between Spanish and Italian students, in favour of the latter, in the dimensions D5 (decent work-outside region) and D6 (commuting-decent work) (see Table 6). Cohen's d was medium for D5 (decent work-outside region) and D6 (commuting-decent work) and irrelevant for D4 (decent work-inside region). Statistical power was acceptable only for D5 and D6.

Table 6

Descriptive analyses and differences between Spanish and Italian Students

	F _(df)	t	IT		ES		p	d	P
			M	SD	M	SD			
D4. Perception of how easy it is to find decent work in own region	3.08 ₍₁₂₆₎	-0.48	2.28	0.84	2.36	0.98	0.63	0.09	0.12
D5. Perceived ease of finding decent work outside own region	6.79 ₍₁₂₆₎	3.64	4.00	0.89	3.36	1.09	0.00	0.64	0.98
D6. Intention to move in search of decent work	0.16 ₍₁₂₆₎	3.56	4.47	1.43	3.56	1.48	0.00	0.63	0.97

Note. N =128; F = Fisher's F; df = Degrees of freedom; t = t test; M=Mean; SD=Standard Deviation; p=Significance; d=Cohen's d; P=Statistical potential.

DISCUSSION AND CONCLUSIONS

The results show that Spanish and Italian university students attribute common and different elements to work and decent work. The economic aspect and personal well-being are present in both concepts. However, it seems that decent work is identified more with the achievement of healthy, safe, respectful (self-centred) working conditions, while work, in general, is seen as having a social function.

Looking at the five elements of decent work proposed by the ILO (2022), our students seem to have included four of them: fair remuneration, job security, personal development and equal opportunities. However, they do not allude to more participatory and challenging aspects. On the other hand, if we look at the four components of decent work identified by the Psychology of Work Theory (Blustein et al., 2016; Duffy et al., 2016), the students would clearly consider only one of them (the management of survival needs) and more partially and ambiguously way the social contribution or the creation of a self-determined and autonomous life. On the other hand, students do not refer to the fourth factor included in the model developed by this theory, namely social relations. These results highlight the lack of awareness among university students of the full extent of what is involved in achieving one of the Sustainable Development Goals, namely decent work. Therefore, with Dood et al. (2019), we consider these results as a wake-up call for the University to reflect on how to address sustainable employability and decent work to favour the empowerment of students and future workers. Otherwise, the university would be participating in the perpetuation of a biased view of its function as preparation for professional practice, leaving aside the development of critical thinking and awareness at the service of sustainability and social transformation. Despite the commitment expressed by universities to include sustainability as a transversal axis in the training of students, the work of Valderrama-Hernández et al. (2020) shows that there is still some way to go to achieve this goal.

On a comparative level, and in response to the second objective of the study, it is highlighted that Spanish students attach greater importance to financial retribution and less importance to personal well-being. These results complement those found by Zammitti et al. (2023), who show that students from the south of Italy have a lower level of life satisfaction than students from the south of Spain. Another possible explanation could be related to values, as concluded by Caggiano et al. (2017) in their study with young Spaniards and Italians, based on results like those obtained in this paper. This difference could, according to the studies by van Holland et al. (2018), lead to Italian students being able to pursue a more sustainable employability, as they have a higher aspiration for personal well-being. As a result, the need for cross-cultural work is evident, as pointed out in the scientific literature (Blustein et al., 2022; Duffy et al., 2020).

The current state of the labour market (Álvarez-González et al. 2017; Mazalin and Parmač Kovačić, 2015), according to Blustein et al. (2022), directly impacts the conception of decent work and perception of employment chances among students. Spanish students display more optimism towards securing employment or decent work in their region. It appears Italians express more assurance and eagerness to secure a reputable occupation beyond their place of origin, displaying that seeking psychological contentment through fulfilling work (given decent work conditions) has a significant impact on perceived employability evaluations, as demonstrated in the research conducted by Petruzzello et al. The study's results show that Spanish and Italian students' views on work and decent work are influenced by their individual, societal, and cultural backgrounds.

Our findings demonstrate the necessity for dialogic interventions and reflective thinking sessions on work and decent work with students in higher education, despite the limitations of our sample being incidental and restricted to Pedagogy and Psychology degrees from two universities. These results are significant as they were obtained from the very degrees from which professionals who will aid other citizens in the career guidance process will graduate. However, they had not had the chance to ponder the import and impact of decent work and its effect on career advancement. The provision of clear career development guidance is crucial in encouraging decent work and creating a sustainable workforce. Career development processes should be integrated into conversion factors, which are essentially a work culture that enables individuals to adjust their focus towards work performance values that they deem important (Van der Klink et al., 2016).

The literature illustrates that the incorporation of sustainable employability and decent work into career development processes is a useful approach to promote an optimised and rewarding future working experience over an extended period (Hazelzet et al., 2019). Fleuren et al. (2016) argues that providing students with the opportunity to appreciate work and reflect on it can lead to sustainable employability. Through reflecting on university students' conceptions of work and decent work, a critical awareness window has opened for them. Shaping the characteristics of a job that promotes sustainable employability through a fit between the individual and the environment is a joint responsibility of individuals and organisations (Fleuren et al., 2020). Based on this institutional commitment, universities must ensure that curricular placements are carried out in institutions and companies that guarantee decent work.

The present findings, in line with prior research (Blustein et al., 2019b; McMahan and Watson, 2020), emphasise the importance of conducting additional research on individuals' perspectives regarding work and proper working conditions to identify the underlying factors hindering the attainability of decent work. Such research may offer valuable insights for the development of interventions promoting sustainability and establishing more just and humane academic institutions (Hartung and Blustein, 2002).

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Career construction and emotional intelligence as antecedents of vocational identity

Construcción de la carrera e inteligencia emocional como antecedentes de identidad vocacional

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ABSTRACT

This article has a twofold scientific objective: On the one hand, it aims to carry out a validation of the Students Career Construction Inventory (SCCI) for use in the practice of career guidance with students. Secondly, it is intended to test a theoretical model that confirms the mediation of career construction on the effect of emotional intelligence on young people's vocational identity. The sample consisted of 590 university students with an average age of 21.66 years. In the first part of the results, it was shown how the confirmatory factor analysis carried out corroborates the factor structure of the five different factors

contemplated in the theoretical model: crystallizing, exploration, decision making, skill development and transition to the world of work, complementing the results of other previous studies. The results also showed that students with a higher level of trait emotional intelligence (EI) have a higher level of vocational identity. In addition, students with higher career construct scores were also shown to have higher levels of vocational identity. The most significant aspect of this study was the finding that there is a positive spillover effect from trait EI to vocational identity. This means that EI enhances students' vocational identity through a mediating variable, in this case career construction. In the discussion we argue the implications of the results found and propose lines of educational action in the field of career guidance.

Keywords: career guidance, emotional intelligence, trait emotional intelligence, vocational identity, SCCI.

RESUMEN

Este artículo tiene un doble objetivo científico: Por un lado, se pretende llevar a cabo una validación del *Inventario de Construcción de la Carrera para Estudiantes* (ICCE) para su uso en la práctica de la orientación para la carrera con estudiantes. En segundo lugar, se pretende poner a prueba un modelo teórico que confirme la mediación ejercida por la construcción de la carrera en el efecto que la inteligencia emocional tiene sobre la identidad vocacional de los jóvenes. La muestra constaba de 590 estudiantes de universidad con una media de edad de 21.66 años. En la primera parte de los resultados, se mostró cómo el análisis factorial confirmatorio llevado a cabo corrobora la estructura factorial de los cinco factores diferentes contemplados en el modelo teórico: *cristalización, exploración, toma de decisiones, desarrollo de destrezas y transición al mundo laboral*, complementando los resultados de otros estudios previos. Los resultados encontrados también mostraron que los estudiantes con un mayor nivel de inteligencia emocional (IE) rasgo presentan un mayor nivel de identidad vocacional. Además, también se mostró que los estudiantes con una mayor puntuación en construcción de la carrera presentan mejores niveles de identidad vocacional. Lo más significativo de este estudio fue la comprobación de que existe un efecto positivo indirecto desde la IE rasgo hacia la identidad vocacional. Esto significa que la IE mejora la identidad vocacional de los estudiantes a través de una variable mediadora, en este caso la construcción de la carrera. En la discusión se argumentan las implicaciones de los resultados encontrados y se proponen líneas de actuación educativas en el ámbito de la orientación para la carrera.

Palabras clave: orientación para la carrera, inteligencia emocional, inteligencia emocional rasgo, identidad vocacional, ICCE

INTRODUCTION

Research on career guidance suggests that among the weaknesses of university students are difficulties in establishing relationships between their individual characteristics and experiences and the development of career development resources (Monteiro et al., 2023). On the one hand, key individual characteristics for career development include non-cognitive characteristics such as emotional intelligence (Di Fabio and Saklofske, 2014). On the other hand, among the most valuable resources for career development, the conglomerate of career-construction resources stands out in the literature (Savickas, 2013). Although the positive relationship between emotional intelligence and aspects of the career construction process has been previously confirmed (Parmentier et al., 2019), it is still unknown how both variables jointly favour essential career development processes such as vocational identity.

The aim of this article is twofold. On the one hand, it aims to carry out a validation of the Spanish context of the Student Career Construction Inventory (SCCI; Savickas et al., 2018) in its research version, specifically for its use in the career guidance of university students. Second, this paper aims to empirically test a theoretical mediation model of the relationships between trait emotional intelligence (EI), career adjustment responses as measured by the SCCI, and vocational identity. The ICCE is an instrument for assessing career adaptability responses, a concept that is framed within the Career Construction Theory (Savickas, 2005, 2013), which we will discuss below.

Within this theoretical framework, adaptive responses are considered as “thoughts and behaviours that have implications for the construction of career choices” (Savickas et al., 2018, p. 138). This definition justifies the consideration of their potential mediating role in career self-construction. In a sense we can consider that the thoughts and behaviours a person displays can be a mediator between more stable aspects of behaviour, such as trait EI, and desirable expected outcomes such as the attainment of vocational identity. Therefore, specifically, the aim is to test the mediating role that adaptive responses at the vocational level exert on the relationship between EI and vocational identity.

To date, previous studies have attempted to relate other similar types of variables; for example, the relationship between career adjustment resources, as measured by the Career Adapt-Abilities Scale (CAAS) instrument, and vocational identity (IV, henceforth) has been examined (Porfeli & Savickas, 2012; Savickas & Porfeli, 2012). However, according to our review, this is the first study that attempts to delve into the relationship between the following three variables simultaneously: EI, career adjustment responses, and VI. The present study joins other research claiming the

need for career guidance research and interventions within the university context (Monteiro et al., 2023, Pereira-González et al., 2019; Sánchez et al., 2008).

Career Construction Theory Framework

Career Construction Theory (CCT) is a framework that seeks to explain how people construct their educational and professional careers throughout their lives. Within the proposals that this model contemplates, the adaptation of people to the environment in which they develop takes on special relevance, which we could call a contextualist perspective (Savickas, 2013). This approach conceives individuals as actors, protagonists and builders of their own careers, which is why the sense of agency takes on special relevance. The concept of agency comes from Social Cognitive Theory. Agency, in its original conception, is related to the feeling of control that a person has over the contexts in which he or she operates to achieve his or her goals (Bandura, 2001). Therefore, agency has a strong proactive character in personal development, which fits perfectly with the ideas derived from CCT. This theory promulgates that people are “active agents” who construct their own career paths, making decisions, developing the necessary resources and carrying out activities that respond effectively to the demands that arise in the environments in which they operate.

In a rapidly changing work environment such as the one we live in today, typical of the so-called “liquid modernity” (e.g., Bauman, 2013), in which it is necessary to change jobs frequently, or even professions, or also to constantly update oneself in order to optimise the chances of promotion within the same job, the terms in which the modern worker is conceived within this theory take on special meaning: actor, agent, author (e.g., Krumboltz, 2011; Savickas & Savickas, 2019). Precisely, this active and dynamic process, through which individuals are involved in defining and elaborating their own careers, is a process that we can call career construction. This process of personal development and growth is particularly relevant when individuals must adapt effectively to transitions, such as those faced by university students, particularly at the end of their academic studies.

Within CCT, a sequential model of four dimensions is suggested: The first dimension, called adaptive readiness, relates to stable aspects of people’s personality and behaviour, and concerns a personal readiness from the outset to take on the challenges of facing career development. The second dimension refers to adaptability resources, a dimension that refers to the personal resources that an individual deploys in coping with changes and transitions in their working life. The third dimension is related to adapting responses, a dimension that refers to the performance of certain behaviours that enable changes in working conditions,

including appropriate decision-making. It is precisely this third dimension that is tested in this study as a mediating variable.

Finally, we would have the results of this adaptation process (adaptation results), this fourth dimension has to do with the consequences and results of the career development process, for example, with aspects such as satisfaction and success within the educational and professional choices made. In this study, we consider VI as one of the outcomes of the adaptation process in career development, which can be adapted to new contexts, as it is the effect, outcome, or consequence of putting adaptive resources and responses to work.

Nowadays, within this theoretical model, the second dimension (adaptability resources) is the one that has received the most attention from researchers, particularly with the creation, development and applications of the instrument known as the Career Adapt-Abilities Scale (CAAS; Savickas & Porfeli, 2012), discussed above. Meanwhile, the third dimension, relating to the responses that subjects put in place for adaptation, and which reflect the process of career construction itself, has been the subject of less research. This is where part of the novelty and significance of our study arises.

Emotional intelligence and career development

Recent comprehensive reviews of the EI literature (e.g., Keefer et al., 2021) show how, over the past few decades, research has strongly demonstrated the positive effects of EI on a wide range of variables related to personal development, such as improved social relationships in children, youth and adults, better intimate and family relationships, better academic performance, better vocational decision-making, better job performance, and better general well-being. Specifically, trait EI has recently been claimed as a key factor within the set of personal strengths facilitating career development and adaptation, sometimes lumped under the broader concept of psychological capital or also positive self-capital (Da Costa et al., 2021; Di Fabio & Saklofske, 2021; Gutiérrez-Carrasco et al., 2021).

In the field of vocational development, Young et al. (1997) developed one of the first theoretical models of the role that emotion plays in career development, proposing that people with higher EI show more appropriate skills in building their careers. Since then, and in response to the call for a greater role for EI in career guidance (Brown et al., 2003; Hartung, 2011; Puffer, 2011), studies have been emerging that call for EI to be incorporated into the field of career guidance. For example, trait EI has been found to be related to vocational decision-making, such that higher trait EI leads to lower decision-making difficulties, higher decision-making self-efficacy, and more adaptive decision-making styles (Coetzee & Harry, 2014; Di Fabio & Saklofske, 2014, 2021).

Research has also led to the conclusion that EI, understood as ability EI, as assessed by the Mayer, Salovey, and Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002), shows positive relationships with EI (Puffer, 2011). Specifically, the results found show that emotion facilitation positively predicts IV. According to Puffer (2011), emotion facilitation corresponds with activities that involve processes of exploration and engagement linked to IV. These and other findings suggest the desirability of further research along these lines, as Puffer (2011, p.146) himself states: “It is important that consistent patterns are established between emotional intelligence and aspects of career development such as vocational personality, [...], and vocational identity”. However, this relationship between EI and VI has been explored only through the operationalisation of EI as a cognitive ability (i.e., Mayer et al., 2016), but not through the operationalisation of EI as a personality trait (i.e., Petrides et al., 2016).

This study aims to seek some answers to this research need by suggesting new guidelines for career development among university students.

Vocational identity

Within career guidance research and practice, VI plays a very important role as an expected outcome of the process. Turner and Lapan (2005, p. 420) have defined VI in the following terms: “The integration and crystallisation of an individual’s energy, aptitudes and opportunities into a consistent sense of unity of self and adaptation to the world of work”. In our society, VI has usually been considered an important task and acquisition by adolescents and young adults, as it is related to an experiential and emotional attraction to the world of work (Porfeli et al., 2011). Developmental theories, such as that proposed by Erikson (1959), recognise the development of VI as one of the most puzzling, and sometimes even uncomfortable, achievements in the formation of overall identity from adolescence to adulthood. The awkwardness is due to the fact that adolescents are not always willing to spend time and energy on making appropriate decisions that will enable them to shape their academic and professional future, sometimes because the educational system itself does not facilitate and stimulate them to carry out this work of exploration and personal construction, which is absolutely paramount under the perspective of the main theories of career guidance based on the concept of agency and life design (e.g., Krumboltz, 2011; Savickas & Savickas, 2019).

Although the VI concept is related to that of career identity, the two are not the same, as the latter has more to do with identity derived directly from work experiences and transitions (e.g., Guichard et al., 2012). In any case, some authors point to the importance of career identity in career progression, including overall life satisfaction (Di Fabio, 2014; Praskova et al., 2015). From a constructivist point of

view, the social dimension of this variable has been pointed out (LaPointe, 2010), sharing concepts included in Savickas' CCT, such as life themes, a concept coming from the Theory of Vocational Development (Super, 1951) and which assumes that people tend to implement their self-concept through their occupational preferences, in line with what Holland (1997) suggested when recognising vocational choices as an expression of one's own personality.

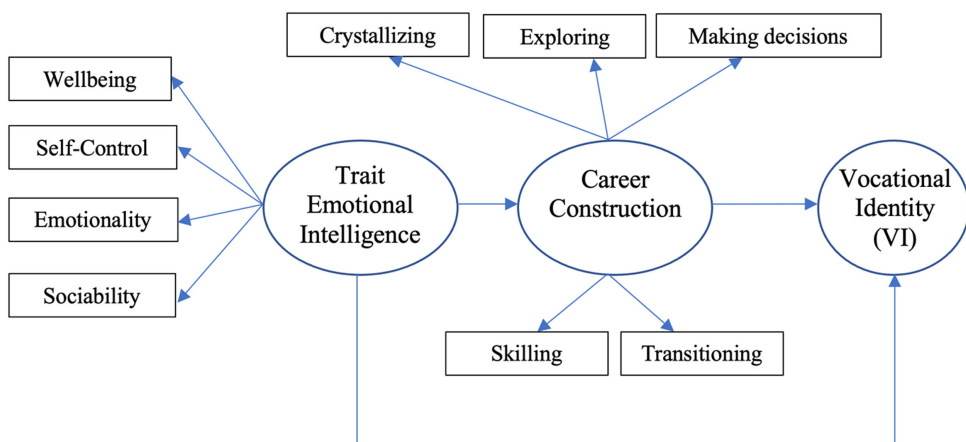
Theoretical model being tested

Under the theoretical framework tested in this study, we aim to test the mediating role of career adaptation responses (adapting responses), measured through the SCCI, in the influence that trait EI exerts on IV. Therefore, the latter variable is in turn the outcome of the adaptation process and the dependent variable in the proposed mediation analysis.

Within the four-dimensional theoretical model conceived by Savickas previously discussed, the aim of our study is to test a three-step theoretical mediation model, where we could consider trait EI as a measure of adaptive readiness, while the measures obtained through the SCCI could be considered as adapting responses, ending the model with the adaptation results, the latter represented by the IV. Figure 1 shows the graphical representation of the proposed model, which is subject to empirical testing. The model represented is an adaptation of the theoretical proposal of Savickas (2005, 2013).

Figure 1

Theoretical model of mediation



Objectives of this study

The aim of this paper is, on the one hand, to analyse the psychometric properties of the SCCI (e.g., internal consistency, factorial validity and convergent validity-relationship with other variables-) in a sample from a different context than usual in order to provide additional evidence on its generalizability (Messick, 1995) and, on the other hand, to test a novel model of career construct mediation (measured with the SCCI) between trait EI and VI.

Accordingly, we put forward the following hypotheses:

Hypothesis 1 (H1). Students with a higher level of trait EI will present a higher level of VI.

Hypothesis 2 (H2). The relationship established in the previous hypothesis will be modified by the mediating effect of career adaptation responses (see Figure 1). This hypothesis posits the following relationships:

Hypothesis 2a (H2a). There is a positive direct effect from trait EI to career construction. This implies that students with higher levels of trait EI show higher levels of career construction.

Hypothesis 2b (H2b). There is a positive direct effect from career construction towards VI. This means that students with higher levels of career construction show higher levels of VI.

Hypothesis 2c (H2c). There is a positive indirect effect from trait EI to VI. This means that EI improves students' VI through career construction as a mediating variable.

METHOD

Sample

Participants in the study were 590 university students (64.8% female, showing a slightly higher proportion than the 56% average female representation in Spanish universities; presumably this difference is due to the over-representation of females in our subsamples from the Bachelor's Degrees in Early Childhood Education and Psychology, where females usually reach percentages between 92% and 76%, respectively -Servicio Integrado de Información Universitaria, 2023-). The mean age was 21.66 years (SD = 4.24). The study was carried out with students from the University of Valladolid, the Universitat Rovira i Virgili, the University of Barcelona, the Complutense University of Madrid, the Polytechnic University of Catalonia and, to a lesser extent, from other universities in the rest of Spain. The most represented degree courses were in Early Childhood and Primary Education (180 subjects, or 31%), 161 in Psychology (27%). There were also students from health sciences and engineering, but in smaller percentages. In terms of year of study, the distribution was as follows: 36.9% in first year, 18% in second year, 28.5% in third year, 16.7% in fourth year and 16.7% at Master's level. Finally, most of the students were full-time students (71.5%), while the rest (28.5%) combined their studies with part-time work.

Subjects were selected by non-probability, convenience sampling, and participated through an online survey, via a link provided to the students for them to answer voluntarily. Anonymity and confidentiality were ensured throughout the data collection process in accordance with current research regulations. Subjects were also informed of the aims of the research and informed consent was requested.

Instruments

The Student Career Construction Inventory (SCCI) - Research Form

The SCCI assesses how students cope with the task of building their careers. It is important to underline that the instrument assesses behaviours, not skills or abilities.

The instrument consists of 25 items grouped into the following five dimensions: self-concept crystallisation (e.g. "Discovering what my interests are"), occupational exploration (e.g. "Reading about occupations"), career decision making (e.g. "Planning how to enter my chosen occupation"), skill development

or instrumentation (e.g. “Preparing for the job I like most”), and transition from academia to work (e.g. “Making plans for my job search”).

Subjects must answer the items on a Likert-type scale ranging from I have not performed the behaviour (1=I have not thought much about it yet) to I have performed or completed the behaviour (5=I have already performed it). The higher the score obtained, the higher the individuals’ level of engagement in career-construction tasks. Current research has found strong internal consistency values, ranging from .85 to .93 (Savickas et al., 2018).

The process of adapting the Spanish version of the SCC (SCC-SV, or ICCE in Spanish) followed the guidelines for the adaptation of instruments (Zenisky & Hambleton, 2012), first with a translation into Spanish, and then, using an independent bilingual translator, a reverse translation was carried out. Finally, each of the original and translated items was analysed, and the final content of the Spanish version of the instrument was agreed upon by the three authors for use in this study.

The Trait Emotional Intelligence Questionnaire - Short Form (TEIQue-SF)

This instrument was initially conceived and created as a brief way to obtain a global trait EI score (Cooper & Petrides, 2010; Petrides, 2009).

For the present study we used the abbreviated form, in its Spanish adaptation (Pérez, 2003; Petrides, Gómez & Pérez-González, 2017), which comprises 30 items grouped into four factors: well-being (e.g. “In general I do not find life pleasant”), self-control (e.g. “I find it difficult to control my emotions”), emotionality (e.g. “I have no difficulty expressing my emotions in words”), and sociability (e.g. “I am able to influence the feelings of others”).

Subjects must answer each of the items on a seven-point Likert-type scale ranging from 1 (completely disagree) to 7 (completely agree). A high score on the scale indicates high levels of trait EI.

This instrument has been widely used in the Spanish context in studies with a sample of university students, teachers at different educational levels, counsellors, and even clinical samples (e.g., Cejudo & Delgado, 2017; Laborde et al., 2016; Pérez-Díaz et al., 2022).

The Vocational Identity Scale

The Vocational Identity Scale is one of three scales in the intervention and assessment instrument called My Vocational Situation (Holland et al., 1980). This scale has shown strong psychometric properties (Holland et al., 1993; Lucas et al., 1988), although it has been pointed out that it is a measure of career commitment

and omits the career exploration part almost completely (Porfeli et al., 2011); this is not important in the present research because the score provided by the instrument is taken as a final outcome of a previous dynamic process.

The scale consists of 18 items that are answered True or False (e.g. “I need to find out what kind of career I should pursue”). Research with this scale has yielded high reliability values, ranging from .86 to .89 (Leung et al., 1992).

The score offered with this scale provides an assessment of the VI of individuals by assessing the accuracy and stability of people’s skills, interests, and career goals. Scores must be reversed in order to obtain the final score; once this is done, a high score leads to a higher VI which, in turn, can lead to better career decision-making. This is a classic scale that continues to recur in career guidance research (e.g., De Abreu et al., 2022).

Data analysis

Descriptive statistics, reliability (Cronbach’s α coefficients) and Pearson’s correlations between the observed measures were calculated with SPSS 22. Furthermore, EQS 6.1 (Bentler 2006) was used to perform the relevant confirmatory factor analyses (CFA) to verify the factor structure of the SCCI (ICCE), as well as to estimate the structural equation models to test the proposed mediation model. In both cases, the maximum likelihood estimation method with the robust Satorra-Bentler correction was used, as the assumption of multivariate normality is not met (multivariate Mardia coefficient = 44.53) (Byrne, 2006; Finney & DiStefano, 2006).

Goodness-of-fit was assessed using robust versions of the following indices: a) Absolute indices, χ^2 , χ^2/df ratio, and RMSEA (Root Mean Square Error of Approximation) with a 90% confidence interval; b) Relative indices, NNFI (Non-normed fit index) or TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index) (Hu & Bentler, 1999; Marsh et al., 1996), where values above .90 for NNFI and CFI or below .08 in RMSEA are considered a reasonable fit (Byrne, 2001), although values above .95 for NNFI and CFI and below .05 in RMSEA are more desirable and considered an excellent fit (Hooper et al., 2008; Hu & Bentler, 1999). Also, the χ^2/df ratio is considered appropriate if it is between 2.00-5.00 (Hooper et al., 2008).

RESULTS

The presentation of this section will follow the following order: First, we present the psychometric properties of the ICCE and, second, the mediation analyses.

Psychometric properties of the SCCI

For the presentation of this part of the results we will follow the following sequence: Firstly, the results of the factor analysis, secondly, the reliability data, and, finally, the correlation analysis.

As for the factor analysis, the models that were tested were the following: One Factor Model (M1), to see if we are talking about a unidimensional variable; Five correlated Factor Model (M2), which is the theoretical proposal; Second order model (M3), which contemplates the 5 previous factors and a higher order factor, in this case conceptualised as “career construction”, which would justify the use of a global score.

The results for the goodness of fit indices are shown in Table 1 and the factor weights in Table 2. The results of the CFAs indicate that the one-dimensional model is not appropriate to describe the SCCI because the values of the goodness of fit indices are not acceptable (M1: RMSEA=.094, CFI=.722, NNFI=.696 and $SB\chi^2/df=6.238$). However, the five-factor correlated model (M2) and the second-order model (M3) do provide a good fit, the latter being slightly better (see Table 1). Although the Chi-square statistic was significant (M3: $SB\chi^2(269) = 772.20$, $p < .001$), indicating a lack of fit, this result is to be expected due to the large sample size ($N = 590$). However, all indices indicated a reasonable fit to the data (Jackson et al., 2009): RMSEA = .056; NNFI = .892; and CFI = .903 (see Table 1).

Table 1

Confirmatory Factor Analysis (CFA) goodness-of-fit indices

Models	$SB\chi^2$	df	$SB\chi^2/df$	NNFI	CFI	RMSEA	90% CI
M1. One factor	1715.49**	275	6.238	.696	.722	.094	[.090, .099]
M2. Five factors	826.21**	265	3.118	.877	.892	.60	[.055, .065]
M3. 5+Second order	772.20**	269	2.871	.892	.903	.056	[.052, .061]

Note. ** $p < .01$, $SB\chi^2$ = Satorra-Bentler chi-cuadrado, df = degrees of freedom, NNFI = Non-normed fit index, CFI = Comparative fit index, RMSEA = Root-mean-square error of approximation, and 90% CI = RMSEA confidence interval.

Table 2 below shows the results corresponding to the factor structure of the SCCI instrument, with the items that make up each of the five dimensions and their corresponding descriptions.

Table 2

Career Construction Inventory for Students, Spanish version (SCCI-SV): Items, descriptive statistics, and standardised loadings

Construct	Item (first-order indicators)	Mean	SD	Loadings
Crystallizing	1. Forming a clear picture of my personality	3.42	1.24	.59
	2. Recognizing my talents and abilities	3.60	1.09	.70
	3. Determining what values are important to me	3.99	0.98	.69
	4. Knowing how other people view me	3.27	1.10	.52
	5. Identifying people that I want to be like	3.35	1.26	.34
	6. Finding out what my interests are	4.02	0.94	.72
	7. Setting goals for myself Exploring	3.86	1.01	.69
Exploring	8. Interviewing people in a job that I like	2.58	1.33	.54
	9. Discussing my career with teachers and advisors	2.64	1.33	.54
	10. Learning about different types of jobs	2.99	1.24	.65
	11. Reading about occupations	2.79	1.30	.64
	12. Investigating occupations that might suit me	3.25	1.19	.66
	13. Working a part-time job related to my interests	2.62	1.47	.52
	14. Determining the training needed for jobs that interest me	3.45	1.16	.66
Decision Making	15. Deciding what I really want to do for a living	3.90	1.12	.7
	16. Finding a line of work that suits me	3.43	1.17	.81
	17. Selecting an occupation that will satisfy me	3.68	1.18	.84
	18. Planning how to get into the occupation I choose	3.51	1.21	.81
	19. Reassuring myself that I made a good occupational choice	3.70	1.24	.62
Skilling	20. Developing special knowledge or skill that will help me get the job I want	3.65	0.99	.75
	21. Finding opportunities to get the training and experience I need	3.42	1.06	.75

Construct	Item (first-order indicators)	Mean	SD	Loadings
	22. Beginning the training I need for my preferred job	3.61	1.13	.72
	23. Qualifying for the job that I like best	3.64	1.09	.75
Transitioning	24. Making plans for my job search	3.07	1.23	.88
	25. Getting a job once I complete my education or training	3.06	1.24	.70
Construct	Construct (second-order indicators)	Mean	SD	Loadings
Career Construction	1. Crystallizing	3.64	0.73	.72
	2. Exploring	2.90	0.87	.77
	3. Decision making	3.64	0.97	.88
	4. Skilling	3.58	0.89	.89
	5. Transitioning	3.06	1.11	.72

Note. All loadings are significant at $\alpha = 0.01$.

The descriptive statistics, reliability (internal consistency, Cronbach's α) and correlations of the measurement instruments are shown in Table 3. The reliability of the total scores of the three measurement instruments is satisfactory (EI, $\alpha=.84$; SCCI, $\alpha=.92$; IV, $\alpha=.82$), as well as the internal consistency of the SSCI dimensions, ranging between .76 and .84. As for the correlations between the observed variables, all were significant and positive, as predicted by the theoretical model. Trait EI showed positive correlations with career construction ($r = .37, p < .01$) and with its five components: crystallisation ($r = .39, p < .01$), exploration ($r = .22, p < .01$), decision making ($r = .34, p < .01$), skill acquisition ($r = .28, p < .01$), and transition to the world of work ($r = .21, p < .01$). Finally, trait EI showed positive correlations with VI ($r = .43, p < .01$). On the other hand, the overall career construction score, assessed with the SCCI, showed significant correlations with the VI ($r = .37, p < .01$). The SCCI components also showed positive correlations with the IV, with the lowest value being exploration ($r = .16, p < .01$), and the highest value being decision-making ($r = .41, p < .01$).

Table 3
Descriptive statistics, reliability (internal consistency, α) and correlations between variables

	Trait EI	SCCI	Crystallization	Exploration	Decision making	Skills	Transition	Vocational Identity
Trait EI								
SCCI	.37**							
- Crystallization	.39**	.76**						
- Exploration	.22**	.81**	.45**					
- Decision making	.34**	.84**	.54**	.55**				
- Skills	.28**	.80**	.51**	.53**	.68**			
- Transition	.21**	.67**	.38**	.50**	.51**	.52**		
Vocational Identity	.43**	.37**	.32**	.16**	.41**	.36**	.23**	
Mean	4.87	3.38	3.64	3.64	3.58	3.06	4.75	
SD	0.66	0.69	0.73	0.87	0.97	0.89	1.11	0.95
Cronbach's α	.84	.92	.79	.80	.83	.84	.76	.82

Note. ** $p < .01$.

Table 4*Goodness of fit indices of mediation models*

Models	χ^2 _{SB}	df	χ^2/df _{SB}	NNFI	CFI	RMSEA	90% CI	Var. IV
M1. Total effect	28.29**	13	2.176	.975	.984	.045	[.022, .067]	30%
M2. Indirect effect	186.01**	52	3.577	.912	.931	.066	[.056, .076]	25.9%
M3. Indirect and direct effects	132.91**	51	2.606	.945	.958	.052	[.041, .063]	36.7%

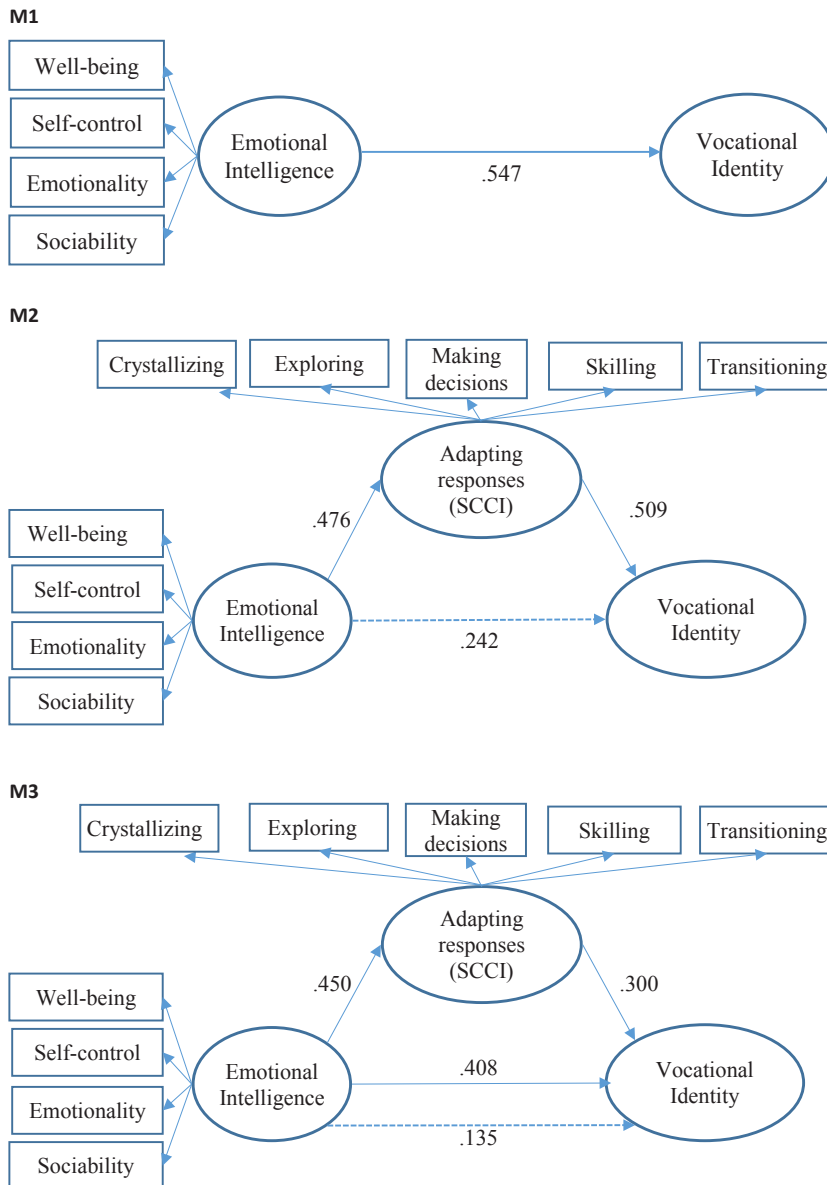
Note. ** $p < .01$, χ^2 _{SB} = Satorra-Bentler's chi-cuadrado, *df* = degrees of freedom, NNFI = Non-normed fit index, CFI = Comparative fit index, RMSEA = Root-mean-square error of approximation, γ 90% CI = RMSEA confidence interval; Var. VI = Explained variance of Vocational Identity.

Mediation Analysis

To test for the existence of full or partial mediation, a sequence of three models is estimated, according to Holmbeck's (1997) method, in which the latent variables consist of the following observable indicators: (a) The independent variable (*X*, trait EI) by the four factors of the TEIQue-SF (well-being, self-control, emotionality and sociability), (b) The mediating variable (*M*, career construction) by the five dimensions of the SCCI (crystallisation, exploration, decision-making, skills and transition to the world of work) and the dependent variable (*Y*, IV) by three groups of six items with similar homogeneity indices. The first is the total effect model (M1: $X \rightarrow Y$), the second is the indirect effect model (M2: $X \rightarrow M \rightarrow Y$, when $X \rightarrow Y$ is set to zero) and the third is the direct and indirect effect model (M3: $X \rightarrow M \rightarrow Y$, when $X \rightarrow Y$ is freely estimated). The mediating relationship occurs when all three steps above are a good fit (although the full effect model is not always necessary (see MacKinnon, 2008). Full mediation occurs when there is no statistically significant difference between models 2 and 3, i.e. the indirect effect ($X \rightarrow Y$) is statistically significant, but the direct effect ($X \rightarrow Y$) is not, i.e. the direct effect does not contribute anything. Partial mediation occurs when there are differences between models 2 and 3, and the direct and indirect effects are statistically significant.

The goodness of fit indices of the mediation analysis are summarised in Table 4 to provide an overview, it can be seen that all models have reasonably good goodness of fit indices.

Figure 2
Steps in the Mediation models



Note. M1. Total effects model; M2. Indirect effects model; M3. Direct and indirect effects model; Dashed line: Indirect effects; Solid line: Direct effects. The graphs show the standardised coefficients.

Mediation model 1 (M1)

First, the total effects model (see Figure 2, M1) presented very good fit indices ($SB\chi^2(13) = 28.29$; NNFI = .975, CFI = .984, RMSEA = .045), in which trait EI explained 30% of the variance of the VI with a standardised coefficient of .547 ($p < .001$).

Mediation model 2 (M2)

Second, the goodness-of-fit indices of the indirect effects model (see Figure 2, M2) were acceptable ($SB\chi^2(52) = 186.01$; NNFI = .912, CFI = .931, RMSEA = .066). Trait EI predicts career construction ($\gamma = .476$, $p < .001$), career construction, in turn, predicts VI ($\gamma = .509$, $p < .001$), and, in addition, there is a statistically significant indirect effect between trait EI and VI ($\gamma = .242$, $p < .001$). In this second model, the explained variance of VI reached a value of 25.9%.

Mediation model 3 (M3)

Third, when the direct effect is included within the model (see Figure 2, M3), the fit is also acceptable ($SB\chi^2(51) = 132.91$; NNFI = .945, CFI = .958, RMSEA = .052). Trait EI predicts career construction ($\gamma = .450$, $p < .001$), career construction predicts VI ($\gamma = .300$, $p < .001$), and there is a statistically significant indirect effect between trait EI and VI ($\gamma = .135$, $p < .001$). The explained variance of the VI reaches a value of 36.7%.

The difference between M3 and M2 is statistically significant ($SB\chi^2$ scaled differences = 44.53, $df = 1$, $p < .001$). The indirect effect of trait EI on VI is significant ($\gamma = .135$, $p < .001$), and in the case of the direct effect ($\gamma = .408$, $p < .001$) as well. These values mean that there is partial mediation since both effects are statistically significant.

DISCUSSION AND CONCLUSIONS

The first aim of this study was to test the psychometric properties of the SCCI (Spanish Version), namely reliability, factorial validity and criterion validity. The results found in this study are favourable, which leads us to affirm that the instrument can be used with samples of Spanish university students similar to the one used in this study for the research and practice of career guidance. The confirmatory factor analysis supports the structure of the five different factors contemplated in the original theoretical model: crystallisation, exploration, decision-making, skills development and transition to the world of work, complementing the results of other previous studies (Savickas et al., 2018).

Regarding the hypotheses proposed, the four hypotheses have been fulfilled. The support of the first hypothesis (H1) provides new empirical evidence on the influence that EI has on the vocational development of students, specifically on such an important and classic variable as IV.

On the other hand, the second hypothesis (H2) aimed to test the mediating effect of career construction, measured through the SCCI. This hypothesis was broken down into three hypotheses. The first two statements of this H2 have been confirmed: The results of this study corroborate the direct influence that EI exerts on some variables linked to vocational development, in this case on the adaptive responses manifested in the career construction process (H2a). Secondly, as expected from the theoretical model, these adaptive responses have, in turn, an effect on trait EI, a variable that should be developed by students at the university stage (H2b).

Finally, regarding the third hypothesis (H2c), we can say that the presence of an indirect effect from trait EI to VI is indeed confirmed. However, we must consider the presence of a direct effect from EI to IV, which means that the mediation effect is only partial, as discussed in the results section. Perhaps this is because the influence of EI on VI is somehow mediated by the career construction effect. For the practical purposes of interventions in the training of individuals, this means that, if no intervention is made, trait EI itself develops VI, but the presence in the model of career construction is something that can be systematically trained through programmes and makes sense. Therefore, although the trait EI of individuals is still influential and its development must be incorporated into guidance programmes, actions through the development of career construction variables might improve this influence.

Therefore, our results provide new evidence on the relationship between trait EI and two very important variables related to career development, namely career construction skills and VI. In addition, our theoretical mediation model proposed to test the mediating role of adaptive responses between EI and VI is

confirmed, which provides empirical support for CCT approaches (Di Fabio, 2014; Savickas, 2005, 2013). This model provides new guidelines for action in the field of vocational guidance, as it confirms the importance of carrying out interventions that incorporate the improvement of the adaptive responses contemplated in the SCCI.

Main educational applications of this work:

1. Development of intervention programmes in higher education that combine trait EI and specific actions of progressive career construction. It should be noted that, on the one hand, our results reveal the prominence of these two variables in the construction and definition of EI in university students. Likewise, on the other hand, previous research has shown that both variables are susceptible to improvement through appropriate psychoeducational interventions (e.g., Di Fabio & Saklofske, 2021; Mattingly & Kraiger, 2019). Such programmes could be promoted either as educational guidance interventions in the university itself, from guidance, information and employment centres (e.g., Sánchez et al., 2008), or integrated into broader generic skills training initiatives (e.g., Crespí & García-Ramos, 2021). Moreover, these proposals would also be potentially adapted to pre-university levels of education, where vocational immaturity is presumably higher and requires more help from educational guidance.
2. Improving decision-making. Effective decision-making requires designing activities that include processes in which both rational and emotional components are involved. Our results, in line with those of previous studies such as Di Fabio and Saklofske (2021), support the convenience of attending to the emotional component of decision-making, which seems to be improved by the application of trait EI. Surprisingly, among the most celebrated career orientation theories, there is hardly any explicit recognition of the role of emotions other than in the work of Gati and colleagues (Gati & Levin, 2014), operationalised through the “Emotional and Personality-Related Career Decision-Making Difficulties Questionnaire”. In the future, it would be interesting to study how scores on this instrument relate to scores on career construction, trait EI, or IV, something still unexplored in the empirical literature. A comprehensive analysis of EI and emotional difficulties in career decision-making could provide valuable information for optimising career guidance processes.
3. Stimulating the sense of agency in the construction not only of the career but also of the IV, first, and of the career identity, later. Given that our results confirm the direct and indirect impact of trait EI on IV, mediated by career construction, personal counselling in the construction of one’s own identity (vocational and career) through awareness of one’s own strengths and weaknesses in EI and career construction is justified.

As for the limitations of this study, we can indicate, firstly, the cross-sectional nature of the research, which is an impediment to drawing conclusions about causality between variables. On the other hand, although global scores were used for the EI and VI variables, some subscales showed levels of reliability that could be improved.

On the other hand, the sample is non-probabilistic, the sample size is relatively small and has an imbalance in its composition. Of course, this does not invalidate the study, but it has limitations that need to be taken into account.

Another limitation has to do with the possibility that some of these constructs behave differently in students from science and technical (STEM) backgrounds than in students from social sciences and education (who were the majority of the participants). Future research and further analysis may provide robustness to this limitation.

Finally, it is important to note that while it is common, in a loose sense, to use Pearson correlations with Likert-type items in these analyses, it would also be appropriate to use polychoric correlations, given the ordinal nature, in a strict sense, of this type of data.

Future research could test the results found here with other samples from other contexts such as secondary education or different types of careers, given that the emotional profile seems to differ depending on the academic area (Sánchez-Ruiz et al., 2010), in line with the assumptions of Holland (1997). It would also be useful to extend the research to other countries and assess the cross-cultural invariance of the mediational model presented and validated in this research. Furthermore, one of the most exciting challenges for the future would be to ratify the four-step model envisaged in CCT: Adaptive readiness, adaptive resources, adaptive responses, and adaptive outcomes. The results of this study are a push towards identifying variables that can demonstrate the sequential or cascading nature of this theoretical model.

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Amotivation in physical education teachers: an approach from their perceived pressures and vocation

Desmotivación en el profesorado de educación física: una aproximación desde la percepción de presiones y su vocación

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ABSTRACT

The increasing personal discomfort experienced by teachers in their work has received a great deal of attention in the last decade. The pressures they perceive in their work environment, or their vocational interest have been pointed out as factors that could influence both their well-being and their teaching practice. Following self-determination theory, the aim of the present study was to verify the existence of profiles of Physical Education (PE) teachers according to their perceived pressures and their vocation, as well as to analyse the frustration of basic psychological needs and amotivation in these profiles. A

total of 245 PE teachers (129 males and 116 females) with a mean age of 39.04 years (DT = 10.12) and 13.70 years of experience (SD = 9.74) participated. Cluster and analyses revealed the existence of three different profiles: a group of teachers who perceived high pressures and had high vocation, another group who perceived low pressures and had low vocation, and a final group who perceived low pressures and showed high vocation. These profiles were characterised by significant differences in the motivational variables analysed, with the group of teachers who showed low levels of perceived pressures and high vocation being identified with the most adaptive motivational patterns. The findings highlight the need for attention to vocational interests in educational institutions and suggest the influence of perceived pressures on teachers' amotivation, which may negatively affect their teaching behaviours.

Keywords: interests, teaching, professors, motivation

RESUMEN

El creciente malestar personal que experimenta el profesorado en su trabajo está recibiendo gran atención en la última década. Las presiones que perciben en su ámbito laboral o el interés vocacional que presentan han sido señalados como factores que podrían influir tanto sobre su bienestar como su práctica docente. Siguiendo la teoría de la autodeterminación, el presente trabajo tuvo como objetivo comprobar la existencia de perfiles en profesores de Educación Física (EF) según las presiones y vocación percibidas, así como analizar la frustración de las necesidades psicológicas básicas y la desmotivación en dichos perfiles. Participaron un total de 245 profesores de EF (129 hombres y 116 mujeres) con una media de 39.04 años de edad (DT = 10.12) y 13.70 años de experiencia (DT = 9.74). Los análisis clúster pusieron de manifiesto la existencia de tres perfiles diferentes: un grupo de profesores que percibían altas presiones y tenían alta vocación, otro grupo que percibía bajas presiones y tenía baja vocación, y un último grupo que percibía bajas presiones y mostraba alta vocación. Estos perfiles se caracterizaron por diferencias significativas en las variables motivacionales analizadas, siendo el grupo de profesores que mostró niveles bajos de presiones percibidas y alta vocación el que se identificó con los patrones motivacionales más adaptativos. Los hallazgos ponen de manifiesto la necesidad de atención hacia los intereses vocacionales desde las instituciones educativas, y sugieren la influencia de las presiones percibidas sobre la desmotivación de los docentes, pudiendo afectar de forma negativa a su práctica docente.

Palabras clave: intereses, enseñanza, docentes, motivación

INTRODUCTION

Teacher motivation in the physical education (PE) classroom has emerged as a factor of interest to the scientific community, with evidence that it can affect teacher-student interactions (Cheon et al., 2014; Franco et al., 2021; Jansen in de Wal et al., 2014) and, consequently, can indirectly influence students' actions and behaviours (Behzadnia et al., 2018). While motivation is positively related to teachers' well-being, job satisfaction and its autonomy-supportive role, it seems to be negatively associated with states of distress, exhaustion and burnout (Slomp et al., 2020).

Self-determination theory (SDT; Deci & Ryan, 1985) is one of the most frequently used frameworks to analyse teacher motivation and, in general, to explain motivational processes involving teachers and students in the context of EF (Vasconcellos et al., 2019). SDT suggests that the regulation of behaviour towards an activity varies on a continuum that extends from autonomous motivation (in teachers, characterised by the pleasure inherent in teaching or by the recognition of the values and importance of that activity), to amotivation. When a teacher is demotivated, he/she probably does not understand why he/she is teaching. This perception seems to be related to certain maladaptive manifestations such as the use of more controlling styles that do not support and accompany students in their learning process, that generate feelings of incompetence in the teacher to motivate students during classes or simply the feeling that their teaching performance is exhausting and frustrating (Franco et al., 2021; Franco et al., 2022; Vermote et al., 2020). While the satisfaction of basic psychological needs (BPN; autonomy, competence and relatedness) seems to promote psychological and physical well-being (Vansteenkiste et al., 2020), studies in recent years have suggested that the frustration of BPNs among teachers may affect not only the well-being of teachers themselves, but also their interactions with students and thus the quality of the teaching-learning process (Vansteenkiste et al., 2020). Although frustration was initially understood as an absence of BPN satisfaction, research has shown that it does not simply reflect the perception that BPN satisfaction is low, but that BPNs are being actively threatened in a given context (Longo et al., 2018; Stebbings et al., 2012). Previous studies have pointed out how this frustration can manifest in the teaching profession (Hornstra et al., 2021). Teachers may feel that their autonomy is frustrated if they cannot decide their own methodological approaches; they may perceive their competence as being undermined if they are not given the opportunity to demonstrate their teaching skills; and finally, they may feel that their relationship with others is being frustrated if they feel alienated by their colleagues at work.

Several authors have identified different sources of frustration of these BPNs in the PE context. Among them, the findings of Bartholomew et al. (2014) revealed that teachers' perceived work pressures were positively associated with the frustration of three BPNs. These pressures were previously identified in a qualitative study based on interviews with teachers (Taylor et al., 2009) and grouped into four different dimensions: pressures from school authorities (e.g., conforming to certain work methodologies), pressures from peers (e.g., feeling challenged by other teachers), pressures felt from being evaluated on the basis of their students' performance (e.g., feeling that their success depends on their students' performance), and time constraints (e.g., feeling that they have to hurry to finish their classes). While we may expect, on the basis of previous work, that teachers' perception of pressure lead to amotivation, it seems that the detrimental effect of pressure on different motivational aspects of PE teachers may not be the same for each of them. For example, the findings of Franco et al. (2021) indicated that the perception of external pressures might vary according to teachers' motivational profile, which suggests that personal motivation might moderate how these pressures affect teaching performance. Along these lines, Vermote et al. (2022) presented how pressures were related to autonomy-supportive, structured and controlling teaching behaviours; specifically, they reported that the source of pressure that most affected teachers was the pressure they felt from being evaluated based on their students' performance.

An underexplored factor among teachers is vocational, understood as the reasons why they decided to pursue the profession, and how it may affect their teaching practice (Pop & Turner, 2009). In recent decades, vocation has been explored from different perspectives and can be understood, in line with the modern-individualist approach, as the preference for pursuing a particular profession (Madero, 2021) based on passion (Dobrow, 2013). Vocation has also been related to high levels of job satisfaction (Rosso et al., 2010). According to a review of studies on vocation in educational contexts with early childhood education teachers, several studies have identified the importance of vocation both in the choice of studies, expressed by students, and in professional practice, declared by active teachers and retired teachers (Romero-Sánchez et al., 2020). In such contexts, in line with Mtika and Gates (2011), a teacher with high vocational levels tends to be highly effective and very aware of their goals and objectives, which could promote their confidence and determination. More specifically, Fray and Gore (2018) noted that most studies have identified intrinsic and altruistic motives for teaching, and Valenzuela et al. (2018) pointed to a predilection for the profession as an intrinsic motive, and with professional security or salary being extrinsic motives (Watt & Richardson, 2007). Despite the relevance that this construct seems to have for teacher performance, previous work has shown that, in addition to a vocation for teaching, teachers also

need to perceive some control over their behaviour (where control is understood as the ability to decide on one behaviour or another). In a qualitative study in which PE teachers were questioned, they it appeared that professional vocation seems to be affected by low student involvement and lack of discipline (Albarracín et al., 2014). Van Uden et al. (2013) also suggest that the role that vocation plays in teachers' experiences is influenced by what they believe others expect of them. It therefore seems that the beliefs PE teachers hold may affect their motivation (Nye et al., 2017).

While both perceived pressure and vocation for teaching have been explored as influential constructs for teachers' experiences and behaviours, they have always been approached from a variable-centred approach, leading to the conclusion that, on the one hand, perceived pressure at work (Cuevas et al., 2018; Franco et al., 2022) and, on the other hand, vocation for teaching (Thomson et al., 2012; van Uden et al., 2013), , can affect teachers' well-being and behaviour. Although these studies have provided valuable insights, they have analysed perceived work pressures and vocation as isolated constructs. The question of whether perceived work pressures and vocation for teaching can coexist among PE teachers – and how their coexistence might affect teachers' amotivation and BPN frustration – remains unanswered.

The person-centred approach has emerged as a widely used alternative to overcome this limitation (Holzberger et al., 2021; Hornstra et al., 2021). This technique has been used in numerous studies to explore the interaction of variables of a different nature, such as motivational regulations (Abós et al., 2018; Franco et al., 2021), autonomy support, satisfaction, competence and relatedness (Hornstra et al., 2021), as well as other dimensions that directly affect teaching, such as burnout and teacher engagement (Abós et al., 2019), , professional beliefs, educational knowledge or perceptions of self-efficacy (Hornstra et al., 2021).

Based on the literature and the findings outlined above, this paper sought to identify profiles of PE teachers in terms of their perceived pressure and their vocation for teaching. For the sake of clarity, and given that the present study represents the first attempt to examine this pathway to date, teachers' perceived work pressures were considered as a unidimensional variable. Second, we considered whether the emerging profiles differed in their levels of BPN frustration and amotivation. In the absence of previous specific scientific evidence in relation to these variables – and taking into account similar studies (e.g., Hornstra et al., 2021) –, it was hypothesised that the profiles of teachers with low perceived pressure and high vocation would be found to present the most adaptive profile (less amotivation and BPN frustration). In the same way – and in the opposite direction – it was hypothesised that a profile with high perceived pressure and low vocation would be found with the least adaptive pattern. The establishment of teacher profiles could offer highly relevant information to advance the understanding of the influence of different backgrounds on teaching practice.

METHOD

Participants

The sample of this study consisted of 245 PE teachers (129 men and 116 women) from Spain (n=28), Argentina (n=102), Brazil (n=55), Colombia (n=30) and Chile (n=30). Participants ranged in age from 23 to 62 years (M = 39.04; SD = 10.12), with an average teaching experience of 13.70 years (SD = 9.74). All participating teachers taught PE at the secondary level or equivalent depending on the country (pupils aged 12-16 years), in public, private and state-subsidised schools. In all countries in the sample, PE is a compulsory subject in the curriculum, and at least two hours per week are required according to the class timetable.

Instruments

- *Perceived pressures at work*: The Spanish version (Franco et al., 2022) of the 16-item tool for measuring work-related pressures developed by Bartholomew et al. (2014) was used, based on from similar previous instruments (Pelletier et al., 2002; Taylor et al., 2008). The items were grouped into four subscales consisting of four items each: pressures related to time constraints in the subject (e.g., “I feel limited because PE is not given enough time in the school timetable”), pressures derived from school authorities (e.g., “I feel pressured to follow the official curriculum strictly”), pressures related to peers (e.g., “I teach as I like, regardless of how my peers teach”), and pressures associated with student performance (e.g., “My school will evaluate me poorly if my students do not achieve good results”). Responses were measured on a 7-point Likert-type scale (1 = strongly disagree and 7 = strongly agree). The instrument was translated into Portuguese following the recommendations of Hambleton and Patsula (1998) using the back translation method, and with data obtained from a Brazilian sample (n = 210) from a previous pilot study the same factor structure was tested, obtaining adequate fit indices ($\chi^2(66) = 271.98$; $p < .001$; $\chi^2/df = 4.12$; CFI = .90; IFI = .91; RMSEA = .07; SRMR = .06). Cronbach’s alpha values ranged from .79 to .81.
- *Vocation*: An ad hoc instrument was created to measure vocation for being a PE teacher. This questionnaire was designed by a PE specialist and a career counsellor in line with the modern-individualistic approach to this construct set out by Madero (2021). The final instrument was composed of five items (see supplementary material) that were answered on 5-point Likert-type scale (1 = strongly disagree and 5 = strongly agree). The factor structure

presented adequate fit indices ($\chi^2(5) = 19.14$, $p = .002$, $\chi^2/df = 3.83$, CFI = .95, IFI = .95, RMSEA = .09; SRMR = .08).

- *Frustration of Basic Psychological Needs*: The Spanish version of the Psychological Need Thwarting Scale (PNTS; Bartholomew et al., 2011) was used (Cuevas et al., 2015). This instrument consists of 12 items measuring frustration with perceived autonomy (e.g., “I feel I am prevented from making decisions about how I teach”), competence (e.g., “I feel I do not measure up because I do not have opportunities to demonstrate my potential”) and social relationships (e.g., “I feel I am rejected by those around me”), each with four items. Responses were measured on a 7-point Likert-type scale (1 = strongly disagree and 7 = strongly agree). The instrument was translated into Portuguese following the recommendations of Hambleton and Patsula (1998) using the back translation method, and with data obtained from a Brazilian sample ($n = 210$) from a previous pilot study the same factor structure was tested, obtaining adequate fit indices ($\chi^2(31) = 59.91$; $p < .001$; $\chi^2/df = 1.93$; CFI = .92; IFI = .92; RMSEA = .06; SRMR = .05). Cronbach’s alpha values ranged from .73 to .91.
- *Amotivation*: the amotivation dimension of the Spanish version (Franco et al., 2022) of the Multidimensional Work Motivation Scale (MWMS; Gagné et al., 2014) was used, introduced with the heading “Why do you, or would you, put effort into your work? This dimension consisted of three items (e.g., “I don’t know why I am a PE teacher, this job is meaningless”). Responses were measured on a 7-point Likert-type scale (1 = strongly disagree and 7 = strongly agree). The instrument was translated into Portuguese following the recommendations of Hambleton and Patsula (1998) using the back translation method. The fit indices obtained for the tool in a Brazilian sample ($n = 210$) from a previous pilot study were adequate ($\chi^2(103) = 140.85$; $p < .008$; $\chi^2/df = 1.37$; CFI = .95; IFI = .95; RMSEA = .07; SRMR = .06). The Cronbach’s alpha values for the amotivation dimension were .89.

Procedure

After receiving approval from the University Ethics Committee, all participants were treated in accordance with the ethical guidelines of the American Psychological Association (2002) regarding consent, confidentiality and the anonymity of their responses. Non-random convenience sampling was used. We contacted the educational centres that have collaboration agreements with the Spanish universities to which the authors of the study belonged, as well as with other universities in Argentina, Brazil, Chile and Colombia with which the researchers collaborate on a regular basis. The teachers were informed of the purpose of

the study and gave their consent to participate. Their participation consisted of completing an online questionnaire through the Google Forms platform, which remained available for 6 months. The response rate ranged from 25% to 80% depending on the country.

Data analysis

Cluster analysis was carried out following the two-stage procedure designed by Hair et al. (1998). First, hierarchical cluster analysis was performed using the Ward method with the variables of vocation and perceived pressure. In a second phase, the k-means test was used to test the solution both in the subsample used in the Ward test and in the other subsample that had not been used. Once the profiles had been identified, multivariate analysis of variance (MANOVA, Wilks' Lambda test) was carried out to test whether there were significant differences between the profiles in terms of BPN amotivation and frustration, followed by the corresponding univariate tests. Finally, Scheffé's test was used for a posteriori comparison and the effect size of differences was calculated. The SPSS 26.0 statistical package was used.

RESULTS

Descriptive statistics and bivariate correlations are presented in Table 1. Overall, teachers showed high levels of vocation and low levels of amotivation and BPN frustration. Scores were moderate on perceived pressure. Vocation was negatively related to amotivation, while amotivation showed a positive association with perceived pressure and BPN frustration.

Table 1

Descriptive statistics and bivariate correlations of the variables under study

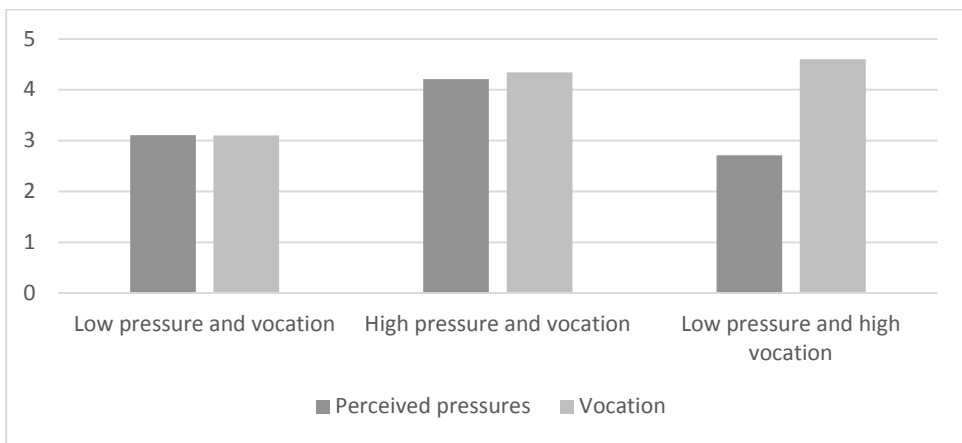
	1	2	3	4	5	6
1. Perceived pressures (1-7)	---	-.07	.64**	.45**	.33**	.16*
2. Vocation (1-5)		---	-.09	-.22**	-.14*	-.15*
3. Autonomy frustration (1-7)			---	.43**	.42**	.20**
4. Competence frustration (1-7)				---	.47**	.23**
5. Relatedness frustration (1-7)					---	.34**
6. Amotivation (1-5)						---
M (SD)	3.17 (.79)	4.17 (.76)	1.27 (.52)	2.10 (1.30)	2.06 (1.23)	1.93 (1.09)

Vocation for teaching and perceived work pressure were included as cluster variables in this analysis. Before cluster analysis, five outliers were removed, resulting in a final sample of 243 physical education teachers (128 men). According to the dendrogram and the agglomeration scheme, grouping the participants into two or three clusters were retained as possible solutions. The three-cluster solution explained between 53% and 74% of the variance in the results. The two-cluster solution did not reach the recommended 50% threshold of variance (Milligan & Cooper, 1985) in explaining the dimensions reflecting the feasibility of implementing motivational strategies. For this reason, together with the fact that it allowed for a meaningful conceptual interpretation, the three-cluster solution was chosen, for which the cross-validation procedure provided a mean kappa value of 0.71, indicating good stability.

The mean scores of the variables used to form the clusters (Figure 1) are presented in Table 2. Cluster analysis revealed the existence of three groups, with multivariate differences between the clusters ($F(4, 478) = .15, p < .001, \eta^2p = .62$). Based on their standardised relative scores, the following labels were assigned comparing the values between these groups: (a) a group perceiving low pressure and having low vocation ($n = 127$); (b) a group perceiving high pressure and having high vocation ($n = 60$); and (c) a group perceiving low pressure and having high vocation ($n = 58$).

Figure 1

Cluster scores established according to perceived pressures and vocation



The univariate differences and contrasts between clusters, as well as the differences found for each of the dependent variables, are presented in Table 2. The univariate differences confirmed the labelling of the clusters. Next, another MANOVA was conducted to test for differences in BPN frustration and amotivation as a function of the clusters. The results of this test revealed that there were differences between these three clusters ($F(8, 468) = 12.48, p < .001, \eta^2p = .18$). Regarding the dependent variables, the results showed higher scores for BPN frustration and amotivation in the high pressure-high vocation group. However, significant differences between the three profiles were only found in autonomy frustration. Finally, the low pressure-high vocation profile presented the lowest levels of amotivation and frustration of autonomy, competence and relationship.

Table 2
Univariate differences and between-cluster contrasts of the variables

	Low pressure – low vocation (n=58) M (SD)	High pressure – high vocation (n=60) M (SD)	Low pressure – high vocation (n=127) M (SD)	F	p	η^2 parcial
Perceived pressures	3.11 (.51) ^a	4.21 (.50) ^b	2.71 (.49) ^c	184.49	.001	.61
Vocation	3.10 (.49) ^a	4.34 (.55) ^b	4.58 (.40) ^c	208.00	.001	.63
Autonomy frustration	2.05 (1.11) ^a	3.23 (1.47) ^b	1.56 (.80) ^c	48.66	.001	.29
Competence frustration	2.32 (1.27) ^a	2.62 (1.36) ^a	1.68 (1.00) ^b	15.06	.001	.11
Relatedness frustration	2.05 (1.04) ^a	2.44 (1.17) ^a	1.62 (.96) ^b	13.04	.001	.10
Amotivation	1.30 (.43) ^{ab}	1.41 (.68) ^a	1.19 (.45) ^b	3.96	.020	.04

Note. Boxes with different letters reflect differences. Those with the same letter reflect no difference. For example, for the differences between clusters in amotivation, cluster 2 (a) is significantly different from cluster 3 (b) because they have different letters. However, cluster 1 (ab) has no difference with the other two clusters as they share the same letters (a and b).

DISCUSSION AND CONCLUSIONS

This study sought, on the one hand, to identify profiles of PE teachers according to the pressures they perceived and their vocation for teaching; on the other hand, we wanted to find out whether the emerging profiles differed in their levels of BPN frustration and amotivation. The discussion is structured in three sub-sections to present the most relevant findings of this study with the greatest clarity. The first section deals with the identification of an ideal profile, with low levels of perceived pressure and high levels of vocation. The second section is devoted to the absence of a profile with high levels of perceived pressure and low vocation. The third section presents the role played by pressure on teachers with high levels of vocation. Finally, conclusions and practical implications, as well as limitations and future lines of research are detailed.

Low perceived pressures and high vocation: The ideal profile

The results of the present study defined a profile characterised by low levels of perceived pressure and high levels of vocation. These teachers showed the most adaptive pattern, exhibiting the lowest values for frustration of the three needs of autonomy, competence and relatedness, as well as for amotivation. A recent line of research has pointed out that when PE teachers perceive pressure, they are more likely to feel demotivated, probably because their psychological needs are violated (Cuevas et al., 2018; Franco et al., 2022). The results of our study therefore align with the literature in suggesting that teachers who do not perceive themselves to be under pressure in their profession experience less amotivation and BPN frustration.

An important contribution of the present study was the incorporation of the vocation variable in profiling, which gives importance to the vocational factor that characterises the profession (e.g., Albarracín et al., 2014). It seems that the coexistence of low perceived pressure and high vocation in the work environment gives rise to an ideal motivational profile for PE teachers showing the lowest levels of BPN frustration and amotivation. If we compare this ideal profile with the group of teachers who, although perceiving few pressures, had low levels of vocation, we see that the latter experience more frustration for all BPNs and greater amotivation.

Different studies that have explored the reasons why a teacher goes into education have identified teaching as a profession of choice (i.e. it seems to be the first choice among prospective teachers and not an alternative to which they turn when other options have failed), in which intrinsic motives seem to play a key role (Valenzuela et al., 2018; Watt & Richardson, 2007). Specifically, it seems that intrinsic and altruistic motives could be determinant in teaching (Fray &

Gore, 2018). Recently, understanding vocation as a preference for the profession (Madero, 2021), it has been suggested that there could be different profiles of teachers depending on the type of motivation they experience. It thus seems that those teachers with a higher vocation are guided by intrinsic and altruistic motives, while extrinsic motives are related to lower levels of vocation (Pop & Turner, 2009). Given the above, the finding concerning the interaction between vocation and pressures in different teacher profiles suggests that, in contexts where no pressures are perceived, teachers who are enthusiastic and passionate about the teaching content or core knowledge – or simply about being teachers – will be less likely to experience frustration than those with low vocation. It is therefore suggested that the vocational factor may act as a protector of motivation. In any case, despite the existence of studies such as Spittle et al. (2009), it would be interesting for future research to further explore how the different motives for becoming a teacher relate to the motivational and behavioural aspects of teachers. Advancing the understanding of these processes could be of great value for improving of career guidance processes.

Lack of a profile of teachers with low vocation and high perceived pressures

Another relevant finding of the present study was the absence of a group with low vocational levels and high perceived job pressures among PE teachers. It has previously been noted that teacher vocation is generally characterised by high levels of altruistic and intrinsic motives for engaging in the profession. It could therefore be expected that teachers with high vocation, whose behaviours are guided by altruistic reasons (e.g. helping adolescents in their education, or contributing to the betterment of society) and intrinsic reasons (e.g. interest in the content or basic knowledge of the subject, or teaching itself) (Pop & Turner, 2009), would be more likely to perceive certain features of the environment as pressures, because they may feel threatened in their goals and objectives as teachers. Thus, when a teacher is concerned about the importance of presenting all of the content or basic knowledge in the syllabus (understood as an intrinsic motive), he/she would be more likely to feel pressure when there are only a few hours available to teach the subject. Such teachers would thus feel frustrated in their BPNs, which would even affect their teaching style and, therefore, student behaviour and motivation (Escriva-Boulley et al., 2021). This would explain the existence of the high vocation and high pressure profile. However, teachers with lower vocation values are more likely to choose the profession based on extrinsic motives such as professional security, salary or status (Valenzuela et al., 2018; van Uden et al., 2013). When this is the case and career choice is motivated by extrinsic reasons (professional security or salary), teachers may be less likely to feel that contextual features, such as time

constraints or peer pressures, may compromise their goals (e.g. a teacher is unlikely to perceive time constraints in the classroom as a pressure that threatens their job stability). This could explain the absence of a low vocation and high pressure profile.

Although there are no previous studies in the literature that have attempted to establish teacher profiles according to the pressures perceived in their work and their vocation, several studies have identified different motivational profiles among teachers (Abós et al., 2018; Franco et al., 2021). These studies have coincided in identifying four teacher profiles: those with high levels of autonomous motivation and low levels of controlled motivation and amotivation, those with high levels of both autonomous motivation and controlled motivation, another group with low levels in both types of motivation, and a final profile with high levels of controlled motivation and amotivation and low levels of autonomous motivation. Given the parallelism between vocation and autonomous motivation noted above, as well as the association found between the perception of pressures at work and maladaptive motivational variables (Bartholomew et al., 2014; Franco et al., 2022), we could hypothesise the identification in the present study of a profile similar to the last described in studies of motivational profiles. However, the fact that a group of teachers with these characteristics did not emerge opens the door to a line of research that has not been explored to date: the interrelationship between vocation and motivational regulations in teachers over time. Through the theory of occupational socialisation (Lawson, 1983a, 1983b), we can understand what factors really determine the choice of profession. It also distinguishes three main phases that allow us to understand how a set of experiences, together with the acquisition of knowledge and teaching skills, and their implementation, generate and foster interest in teaching. Recently, Washburn et al. (2019) analysed the impact of certain motivational variables on teaching styles that promote motivation through this theory, and found that teachers who have previously been in motivational contexts (where interest in teaching is generated) tend to be linked to styles that promote motivation. It would thus be interesting to know in depth how teachers' motivation evolves as a function of the vocation they feel at the beginning of their professional career and to know whether these teachers are more or less vulnerable to the demands of the teaching profession.

The detrimental role of perceived pressures on teachers with a high vocation for teaching

It is surprising how the highest levels of amotivation are found among teachers with the high-pressure-high vocation profile. Although a recent study suggested that teachers motivated by the utilitarian value of the profession (understood as an intrinsic motive) feel greater responsibility for the motivation of their students

(Berger & Girardet, 2021), it seems that the consequences of perceiving that certain pressures may hinder their professional development are more devastating for teachers with high levels of vocation for the profession. The literature has not only shown the detrimental role that pressures have on teacher motivation and well-being (Cuevas et al., 2018; Franco et al., 2022), but also on teaching styles (Soenens et al., 2012) and, consequently, on interactions with students. Different studies with teachers have shown that the need to adhere to strict curricular guidelines (Albarracín et al., 2014), as well as the feeling that they have limited and little control over their teaching in schools (e.g., Buckley et al., 2017) can be a source of work pressures. Feeling pressured, a teacher may make use of more controlling styles. Along these lines, SDT recognises that people may show maladaptive patterns when BPNs are violated (Vansteenkiste et al., 2020). Franco et al. (2021) suggested that when a teacher shows such maladaptive patterns, it seems that the perception of pressures fosters frustration of the three psychological needs and further amotivation.

Interestingly, in the present study, when comparing the profile of teachers with low perceived pressures and low vocation with the group of teachers with high perceived pressures and high vocation, no differences were found in amotivation, competence frustration or relationship frustration, but differences were found in autonomy frustration. Specifically, the results showed a higher score for the autonomy frustration variable in the profile with high pressures and high vocation, while for the profile with low pressures and low vocation, the levels of autonomy frustration were lower. In this sense, while high vocation could act as a protector of certain teacher variables against perceived pressures, it seems that this is not the case when it comes to the need for autonomy. While teachers' high vocation may influence the high expectations that are created around their professional development (Burgueño et al., 2020), it seems that this may make them feel more vulnerable to perceived pressures or characteristics of the work environment that threaten to undermine these expectations. Thus, when teachers perceive such pressures, they may feel that their autonomy is frustrated if they cannot make decisions in class, such as deciding which methodological approach to use or which strategies to select for the development of a given piece of content or core knowledge. This fact suggests that, when we talk about autonomy, vocation seems not to be enough to avoid the detrimental effects that pressures on teachers may generate. It would therefore be interesting to delve deeper into the profiles of those teachers who, despite choosing teaching as a professional vocation, their freedom of decision and independence are affected by pressures and, therefore, their motivation in the classroom is undermined.

Practical implications

In terms of practical implications, the present study sheds light on various educational aspects that seem to affect the teaching-learning process. The identification of three teacher profiles highlights the coexistence of perceived pressures and vocation among PE teachers.

First, the results suggest that, in contexts where there is no high perceived pressures, vocation seems to favour motivation, so that there is a need to improve guidance programmes among young people. Tools could be provided to enable them to reflect on their professional interests and to identify vocational motives that determine the choice of the teaching profession. As pointed out by different studies (e.g., Hernández Franco & Franco, 2020), it is of great importance to accompany young people in the guidance process as a step prior to the choice of studies or profession to attract future teachers to teaching who really feel that their choice is the result of vocation.

Second, this paper highlights, in line with the existing literature, the devastating consequences that the perception of pressure in the work context can have (e.g., Franco et al., 2022). It is therefore suggested that initiatives be proposed that promote the reduction of perceived pressures among PE teachers through, for example, the valuation of PE as a subject or the provision of spaces and materials for the proper development of the subject, which have been reported by teachers as frustrating and limiting in their performance (von Haaren-Mack et al., 2020). Likewise, it is of great importance that the different agents present in the educational community (e.g., administration, management teams, teachers, families) are able to understand the relevance of using pedagogical approaches that, although they may seem to generate chaotic and disorderly contexts in the classroom, seek to favour student autonomy in the proposed activities.

Finally, it should be noted that, despite the initiatives that may be proposed to try to reduce the pressures perceived by PE teachers, it is also necessary to offer tools, strategies and alternatives that would enable future teachers to cope with these pressures. It is thus essential to train teachers to cope with new curricula, to learn how to develop proposals with limited material and facilities that are inappropriate for the content or to provide methodological resources that allow teachers to feel secure and confident in the face of the imposition of certain methodological approaches in the schools where they work.

LIMITATIONS AND FUTURE LINES OF RESEARCH

This study has several limitations. As it is a cross-sectional study, it is not possible to establish cause-effect in the relationships found in the work. With regard to the sample, it is possible that the perception of pressures differs depending on the country, which is why further research should be carried out in international studies that address the relationship between the perception of pressure and different motivational variables. On the other hand, the nature of the methodology through the use of questionnaires may provide limited information. The absence of Portuguese versions of the questionnaires, as well as the design of the items to assess vocation, which were elaborated ad hoc, could be another limitation of the study. Regarding the vocation construct, for example, a recent study suggested reconceptualising the importance of the variable, given that it has been approached from different perspectives (Hoff et al., 2020). Future research could carry out a comparative analysis according to the country of the participants, taking into account other contextual variables that could affect perceived pressure and vocation. It would also be interesting to analyse this work in terms of different levels of education. It would also be useful to analyse the pressures perceived by teachers through interviews that would provide more complete and verifiable information. The use of mixed methods in education can be a valuable tool that would help us to better understand the reality of education. Finally, it would be interesting to validate a tool for assessing vocation.

CONCLUSIONS

The findings of the present study highlight the role that pressure has on different psychological and behavioural aspects of teachers. Furthermore, it suggests that pressures, although identified as a positive and motivating aspect in previous studies, can lead to teacher amotivation. It would therefore be advisable, on the one hand, to support orientation processes for future teachers and, on the other hand, to promote awareness through initiatives to reduce pressure on teachers in the educational context, as well as to provide future teachers with strategies to enable them to deal with the pressures present in their work, given the effects they may have on their own motivation and professional performance and, consequently, on the experience of their students in PE class.

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Influence of expectancies of success on the choice of vocational education or scientific-technological baccalaureate

Influencia de las expectativas de éxito en la elección de Formación Profesional o Bachillerato científico-tecnológico

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ABSTRACT

The number of students pursuing scientific-technological careers is declining, with significant gender differences. Similarly, at the end of the compulsory stage, an increasing number of students continue their studies in vocational education rather than the baccalaureate. The reasons for this trend are not clearly known, but it seems that students' expectancies and the influence of their teachers and parents may play a role. Thus, this study examines the impact of students' expectancies of success in science and technology, as well as their perceptions of their parents and teachers' expectancies of success, on their choice of study

type (vocational education or baccalaureate) and branch (scientific-technological or not). A convenience sample of 276 students was surveyed using a valid and reliable instrument in a quantitative, explanatory design. The findings show that students and their parents' expectancies of success have a strong influence on the choice of baccalaureate studies in boys, but not in girls. In addition, the choice of scientific-technological studies is influenced by their expectancies of success and those of their parents in boys, and by their expectancies of success and those of their teachers in girls. These findings emphasize the importance of the construct of expectancies of success in the formation of scientific vocations and the academic orientation. For this reason, to increase scientific-technical vocations, it is necessary to implement methodologies and strategies that improve students' expectancies of success in science and technology, as well as the expectancies that their parents and teachers place on them.

Keywords: expectancies of success, vocational education, baccalaureate, science, technology

RESUMEN

Existe un descenso significativo en el número de estudiantes matriculados en carreras científico-tecnológicas, con notables diferencias de género. Asimismo, cada vez son más los y las estudiantes que continúan sus estudios en la Formación Profesional en lugar del Bachillerato al final de la etapa obligatoria. No se conocen claramente los motivos de esta tendencia, pero parece que las expectativas de los estudiantes y la influencia de su profesorado y madres y padres podrían tener un papel relevante. Por este motivo, esta investigación analiza el impacto de las expectativas de éxito en ciencias y tecnología en la elección del tipo de estudios (Bachillerato o Formación Profesional), así como en la rama elegida (científico-tecnológica o no). Para ampliar el ámbito del estudio, también se considera la percepción que posee el estudiantado sobre las expectativas de éxito que sus padres, madres, y profesorado tienen sobre ellos. El diseño fue cuantitativo, de tipo explicativo, utilizando un instrumento válido y fiable para encuestar a una muestra de conveniencia de 276 estudiantes. Los resultados revelan que las expectativas de éxito del estudiantado y la de sus padres y madres tienen un alto impacto en la elección de estudios de Bachillerato en los chicos, pero no en las chicas. Por otro lado, los hallazgos revelan que la elección de estudios científico-tecnológicos está influida por las propias expectativas de éxito y la de sus padres/madres, en el caso de los chicos, y por las propias expectativas de éxito y las de su profesorado, en el caso de las chicas. Estos resultados ponen de manifiesto la importancia del constructo expectativas de éxito en la orientación académica, así como en la formación de las vocaciones científicas. Por este motivo, para el fomento de las vocaciones científico-técnicas sería necesario poner en práctica metodologías y estrategias de enseñanza que mejoren las expectativas de éxito de los estudiantes, así como desarrollar intervenciones que mejoren las expectativas que sus padres/madres y profesorado les depositan.

Palabras clave: expectativas de éxito, formación profesional, bachillerato, ciencias, tecnología

INTRODUCTION

Spain has been experiencing a decline in the number of students interested in scientific and technological careers. The latest report from the Ministry of Universities on data and figures from the Spanish University System (2022) records an 8.1% decrease in the number of students enrolled in Sciences and a 26.2% decrease in the case of Engineering and Architecture compared to 15 years ago. Additionally, there are significant gender gaps. For example, this report indicates that in the 2020/2021 academic year, there was a high percentage of women in Health Sciences (71.4%), while their presence was low in Engineering and Architecture (25.7%). On the other hand, the field with the most gender parity was Sciences, with 50.7% of enrollees being women. However, there are inequalities in terms of gender representation in some disciplines; for example, women make up only 26.65% of students in physics-related disciplines (Grañeras-Pastrana et al., 2022).

This issue is also observed at the non-university levels of the education system, where there is a decrease in the number of students interested in baccalaureate studies and an increase in students interested in vocational education. Despite a balanced distribution in the number of students in the Science and Technology track of Baccalaureate (47.47% female students), girls represent less than 20% of students in vocational education programs related to fields such as Construction and Civil Works, Electricity and Electronics, or Information Technology and Communications. However, they constitute a majority in vocational education programs related to Chemistry and Healthcare (Grañeras-Pastrana et al., 2022).

Research in science education has focused on the affective and attitudinal domain of students as a potential explanation for the decline in scientific vocations (Potvin and Hasni, 2014; Toma and Lederman, 2022; Tytler, 2014). Among the numerous variables investigated, expectancies of success have received significant attention (Toma, 2021; Wigfield and Eccles, 2020). This construct was proposed by Eccles and Wigfield (1995) in their expectancy-value theory, one of the frameworks for studying students' choices, persistence, and performance. They defined expectancies of success as students' beliefs about how well they will perform in a future task (Eccles and Wigfield, 1995, 2020), closely related to the concept of self-efficacy proposed by Bandura et al. (2001). There is a relationship between these concepts and the choice of educational pathways, as well as a positive impact on academic performance and motivation toward schoolwork (Martínez-Vicente et al., 2023). Thus, nearly four decades of educational research using this theoretical framework reveals that expectancies of success play a significant role in the selection of scientific and technological university careers (Wigfield and Eccles, 2020).

However, the decline in scientific and technological vocations begins to be observed as early as secondary education (Maltese and Tai, 2011). Nevertheless,

both companies and society as a whole are increasingly demanding highly qualified professions related to science and technology (Ra et al., 2019). Therefore, given the current situation where it is necessary to increase students' interest in scientific and technological university careers, it is important to understand which variables influence students in their choice between vocational education and baccalaureate (the Spanish pre-university program), which serves as the first gateway to science-related university careers. To the best of the authors' knowledge, the literature has overlooked the impact of expectancies of success on the choice between vocational education and baccalaureate studies. Hence, this research embarks on this endeavor. Specifically, the following research questions were addressed:

- (i) What influence do students' expectancies of success in science and technology, as well as those of their parents and teachers, have on their choice between vocational education and baccalaureate type of studies?
- (ii) What influence do students' expectancies of success in science and technology, as well as those of their parents and teachers, have on their choice of science and technology-related studies?

METODOLOGY

Design and context

This is a quantitative, explanatory study that encompasses research aimed at testing models of relationships between a set of variables derived from an underlying theory (Ato et al., 2013). Data collection took place during the months of May and June 2022. After obtaining the necessary permissions from the institutions and teachers contacted through convenience sampling, they were provided with the questionnaire to share with the students, ensuring voluntary, anonymous, and confidential participation.

Participants

Through convenience sampling (Cohen et al., 2018), a total of 276 students participated in the study. They were either enrolled in vocational education ($n = 87$, 65.5% in science and technology programs) or baccalaureate ($n = 189$, 64.6% in science and technology track) in the cities of Burgos (86.2%), Madrid (11.6%), or Salamanca (2.2%). The mean age of the participants was 18.05 years ($SD = 4.56$; $MD = 17$). Slightly more than half of the sample identified as female (51.3%), while the rest identified as male.

Instruments

The instrument used for measuring expectancies of success was designed and validated by Thomas and Strunk (2017) and was available in three versions suitable for students, parents, and teachers. The student version consisted of seven items (e.g., I can get good grades in science and technology; Science and technology are challenging for me). In the parent version, the same items were used, but the wording was modified to reflect the student's beliefs about their parents' expectancies of success. For example, the item "I can get good grades in science and technology" was modified to "During secondary school, I perceived that my parents believed I could get good grades in science and technology." Finally, the teacher version included similar wording changes (e.g., During secondary school, I perceived that my teachers believed I could get good grades in science and technology).

Validity and reliability of the instruments

Firstly, the construct validity and internal reliability of each version of the instrument were examined, as the original version was published in English. The items were adapted to Spanish following a cross-cultural translation procedure (Beaton et al., 2000). Subsequently, an exploratory factor analysis was conducted to determine to what extent the Spanish versions of the instrument have the same factorial structure as the original versions. Specifically, the items were subjected to a robust exploratory factor analysis using the Maximum Likelihood method, as this procedure provides more accurate results and is theoretically superior to other extraction methods (Ferrando et al., 2022). The number of factors to extract was determined using parallel analysis (Lloret-Segura et al., 2014). Consistent with the original instruments and Eccles and Wigfield's Expectancy-Value Theory (1995, 2020), a one-dimensional structure is expected for each version of the instrument (students, parents, teachers). The reliability of internal consistency was established using Cronbach's alpha (α) and McDonald's omega (ω), with appropriate minimum values above .70.

The Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity indicated that the data were suitable for exploratory factor analysis. Specifically, the KMO values were .86, .88, and .87, respectively for the student, parent, and teacher versions, and Bartlett's test of sphericity was statistically significant ($p < .001$) in all three cases. The exploratory factor analysis revealed the presence of a two-dimensional structure in all three questionnaires, which was supported by the results of the parallel analysis (see the scree plots and parallel analysis charts in the Appendix).

However, it is important to note that the second factor is composed of items that are phrased negatively; this would seem to indicate that it is a statistical artifact rather than an appropriate factorial structure (see Tables 1-3). Thus, even though two out of the three versions of the instrument (students and teachers) reveal two factors with eigenvalues greater than 1, this criterion is not recommended in the literature as it may result in an excessive extraction of factors (Lloret-Segura et al., 2014). Furthermore, specialized literature indicates that negatively phrased items often load onto another factor, as is the case here (Zhang et al., 2016). Therefore, in instruments where the structure is unidimensional, the use of negative items can distort the dimensionality of the scale. Consequently, given these limitations of negative items, and because the two-dimensional structure is not in line with the theoretical foundation of the construct of expectancies of success (Eccles and Wigfield, 1995, 2020), the decision has been made to retain unidimensional structures, which exhibit appropriate factor loadings and optimal internal consistency reliability.

Therefore, the questionnaire for students explained 47.9% of the variance, and in the present sample, the scores exhibited good reliability ($\alpha = .85$, $\omega_t = .83$). Regarding the questionnaire assessing parental expectancies of success, the one-dimensional structure explained a total of 46.7% of the variance and also yielded scores with adequate reliability in the current sample ($\alpha = .87$, $\omega_t = .84$). Finally, the one-dimensional version of the instrument measuring teacher expectancies of success explained a total of 44.4% of the variance and also demonstrated good score reliability in the current sample ($\alpha = .87$, $\omega_t = .87$). These values suggest that the instrument in its adapted Spanish version has evidence of validity and reliability that meets current psychometric standards (Ferrando et al., 2022; Lloret-Segura et al., 2014).

Table 1
Exploratory Factor Analysis for the Student Version

	Factor		Factor ¹
	I	II	I
1. I am confident that I can learn science and technology.	.767		.763
2. I don't believe I can pursue science and technology in higher education (e.g., university) (r)		.764	.330
3. Science and technology are complicated for me (r)		.768	.477
4. I can get good grades in science and technology	.876		.860

	Factor		Factor ¹
	I	II	I
5. I am not one of those who excel in science and technology (r).		.808	.483
6. I believe I could learn the most complex scientific and technological content.	.841		.828
7. I can excel in science and technology.	.864		.882

Note.¹unidimensional structure; (r) reverse-scored items.

Table 2
Exploratory Factor Analysis for the Parents version

	Factor		Factor ¹
	I	II	I
1. ...were confident that I could learn science and technology.	.779		.780
2. ... believed I wouldn't be able to pursue science and technology in higher education (e.g., university) (r)		.871	.338
3. ... believed science and technology was complicated for me (r)		.859	.366
4. ... believed I could achieve good grades in science and technology	.824		.838
5. ... believed I am not one of those who excel in science and technology (r)		.828	.315
6. ... believed I could learn the most complex scientific and technological content	.792		.789
7. ... believed I could be good at science and technology	.944		.936
8. ... believed I could excel in science and technology	.953		.949
9. ... believed I wasn't good at science and technology (r)		.767	.382

Note.¹unidimensional structure; (r) reverse-scored items; the items were preceded by the prompt: "During high school, I noticed that my parents...".

Table 3
Exploratory Factor Analysis for the Teacher version

	Factor		Factor ¹
	I	II	I
1. ...were confident that I could learn science and technology.		.733	.360
2. ... believed I wouldn't be able to pursue science and technology in higher education (e.g., university) (r)	.801		.815
3. ... believed science and technology was complicated for me (r)	.916		.908
4. ... believed I could achieve good grades in science and technology		.799	.398
5. ... believed I am not one of those who excel in science and technology r)	.894		.886
6. ...believed that I could be good in science and technology		.877	.406
7. ...believed that I could Excel in science and technology		.878	.319
8. ...believed that I was bad at Science and Technology (r)	.861		.853

Note.¹unidimensional structure; (r) reverse-scored items; the items were preceded by the prompt: "During high school, I noticed that my teachers...".

Data analysis

Various independent samples t-tests were conducted to examine potential differences in levels of expectancies based on the type of studies (baccalaureate or vocational education) and field (scientific-technological or non-scientific-technological). The statistical assumptions were met (Knapp, 2018): (i) normal distribution of variables (kurtosis and skewness ± 2); and (ii) no violation of the assumption of variance homogeneity (p values $> .05$). Cohen's d was used to determine the effect size: small (.2), moderate (.5), and large (.8).

Additionally, a logistic regression model was employed with three continuous variables (student expectancies, parental expectancies, and teacher expectancies) after meeting the required statistical assumptions (Knapp, 2018): (i) inspection of histograms and kurtosis and skewness levels (± 2) indicated a normal distribution of variables; and (ii) Pearson correlation between variables ranged from .62 to .70, confirming the absence of multicollinearity issues in the data. Given the sufficient sample size, both analyses were conducted independently for girls and boys.

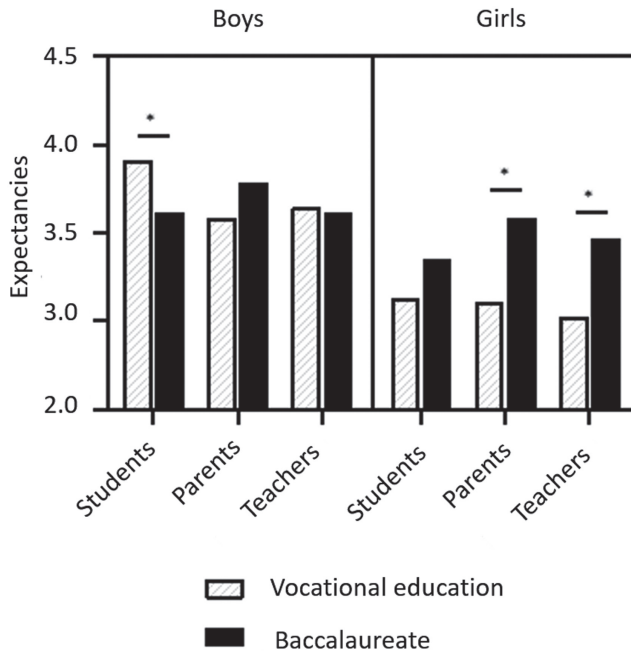
RESULTS

RQ1. What influence do students' expectancies of success in science and technology, as well as those of their parents and teachers, have on their choice between vocational education and baccalaureate type of studies?

The independent samples *t*-tests (Figure 1) revealed that, in the case of boys, vocational education students have significantly higher expectancies of success than their baccalaureate counterparts $t(133) = 2.04, p = .04, d = .35$, with a medium effect size. Conversely, for girls, statistically significant differences were found, with a medium effect size, in favor of those enrolled in baccalaureate in the expectancies of success of their parents $t(139) = -2.51, p = .01, d = .48$, and those of their teachers $t(139) = -2.45, p = .02, d = .49$.

Figure 1

Expectancies of success in vocational education and baccalaureate



Note. * $p < .05$.

Regarding the logistic regression analysis (Table 4), the model with the three predictor variables was statistically significant for boys $\chi^2(3, n = 135) = 14.72$,

$p < .01$, but not for girls $\chi^2(3, n = 141) = 7.94, p = .05$). This indicates that, in the case of girls, their expectancies of success, those of their parents, and those of their teachers do not influence or predict their choice of studies. Conversely, in the case of boys, the model explained 14% (Nagelkerke R^2) of the variance in their choice of study type.

The strongest predictor was the expectancies of success from their parents, with an odds ratio of 2.61 ($p = .002$). This suggests that boy students whose parents have high expectancies of success in science and technology for them are more than twice as likely to enroll in baccalaureate studies compared to students whose parents have low expectancies of success.

The second statistically significant predictor was their own expectancies of success, with an odds ratio of 0.36 ($p = .001$). This indicates that, surprisingly, students with high expectancies of success in science and technology are less likely to enroll in baccalaureate studies than their peers with low expectancies of success. Finally, the expectancies of the teachers did not reach statistical significance ($p = .498$).

Table 4
Predictive model for baccalaureate choice

	B	SE	Wald	Odds ratio	95% CI EXP(B)	
					Lower	Upper
Boys						
Expectancies students	-1.02	.33	9.60	.36*	.19	.69
Expectancies parentes	.96	.34	7.92	2.61*	1.34	5.10
Expectancies teachers	-.20	.30	.46	.82	.46	1.47
Constant	1.44	.99	2.09	4.21		
Girls						
Expectancies students	-.33	.35	.92	.72	.36	1.42
Expectancies parentes	.42	.34	1.53	1.52	.78	2.93
Expectancies teachers	.46	.37	1.54	1.59	.77	3.28
Constant	-.63	.86	.54	.53		

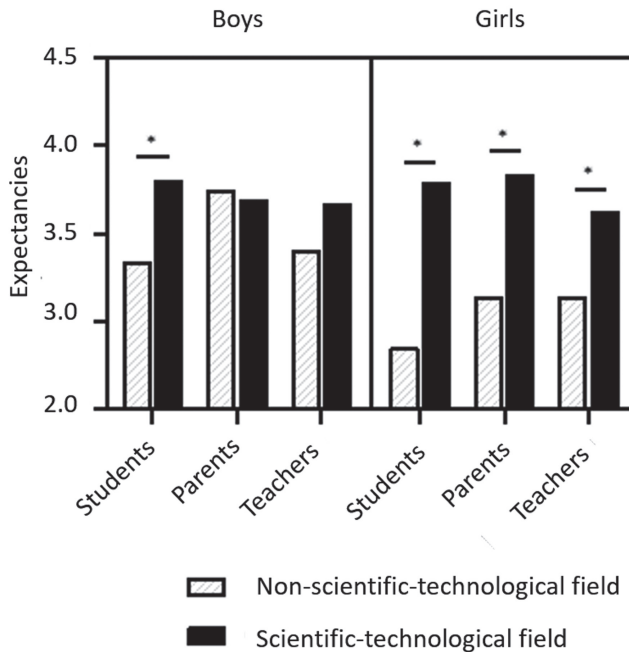
Note. * $p < .05$; SE (standard error); CI (confidence interval).

RQ2. What influence do students' expectancies of success in science and technology, as well as those of their parents and teachers, have on their choice of science and technology-related studies?

The independent samples *t*-tests (Figure 2) revealed that, in the case of boys, students in scientific and technological fields have significantly higher expectancies of success in science and technology than their peers in other fields of study, with a moderate effect size, $t(133) = 2.51, p = .01, d = .57$. For girls, statistically significant differences were found with moderate to large effect sizes in favor of those enrolled in scientific and technological studies in all three variables: their own expectancies of success $t(139) = 7.22, p < .01, d = 1.23$, those of their parents $t(139) = 4.67, p < .01, d = .79$, and those of their teachers $t(139) = 3.28, p < .01, d = .56$.

Figure 2

Expectancies of success in scientific-technological and other type of studies



Note. * $p < .05$.

Regarding the logistic regression analysis, the model was statistically significant for both boys $\chi^2(3, n = 135) = 12.85, p < .01$, and girls $\chi^2(3, n = 141) = 52.54, p < .01$, explaining 15.4% and 41.5% (Nagelkerke R²) of the variance in the chosen

study mode (scientific and technological or not), respectively. Table 5 summarizes the results of the logistic analysis.

For boys, the variable with the highest statistical significance was their expectancies of success, with an odds ratio of 3.13 ($p = .005$), suggesting that students with high expectancies of success in science and technology are three times more likely to enroll in scientific and technological studies. The second significant variable was parental expectancies, with an odds ratio of 0.32, indicating that students whose parents express high expectancies of success are more likely to enroll in non-scientific and technological studies. Finally, teacher expectancies did not make a significant contribution to the model ($p = .165$).

On the other hand, for girls, the variable with the highest statistical significance was also their own expectancies of success, with an odds ratio of 9.22 ($p < .001$). These values indicate that girls with high levels of expectancies of success in science and technology are nine times more likely to choose scientific and technological studies. Additionally, teacher expectancies also influence their choice of studies, but in an inverse manner, as indicated by the odds ratio of 0.32 ($p = .011$). Therefore, female students whose teachers have high levels of expectancies of success are less likely to enroll in scientific and technological studies. Finally, parental expectancies do not influence their decisions ($p = .154$).

Table 5
Predictive model for scientific-technological type of studies

	B	SE	Wald	Odds ratio	95% CI EXP(B)	
					Lower	Upper
Boys						
Expectancies students	1.14	.41	7.87	3.13*	1.41	6.96
Expectancies parentes	-1.14	.49	5.41	.32*	.12	.84
Expectancies teachers	.62	.45	1.92	1.86	.77	4.48
Constant	-.43	1.31	.11	.65		
Girls						
Expectancies students	2.22	.51	19.22	9.22*	3.42	24.90
Expectancies parentes	.58	.41	2.04	1.79	.80	4.00
Expectancies teachers	-1.13	.45	6.42	.32*	.13	.77
Constant	-5.82	1.18	24.46	.00		

Note. * $p < .05$; SE (standard error); CI (confidence interval).

DISCUSSION

The present study analyzed the impact of students' expectancies of success in science and technology on their choice of baccalaureate or vocational education studies, as well as the branch (scientific and technological or not). To broaden the scope of the study, the perception that students have of their parents' and teachers' expectancies of success for them was also considered. In general, the results indicate that expectancies of success are a significant factor in students' selection. Specifically, the expectancies of success of boys and their parents played a prominent role in the choice of baccalaureate or vocational education studies, while these factors had no effect on girls. On the other hand, the expectancies of success for both boys and girls were significant when it came to pursuing baccalaureate or vocational education studies related to science or technology. Similarly, the expectancies of success of parents, in the case of boys, and teachers, for girls, influenced the selection of a scientific and technological field. These findings are consistent with previous research demonstrating the impact of expectancies of success on study selection in secondary school students (Aschbacher et al., 2010, 2014; Bøe, 2012; Guo, Marsh, et al., 2015; Guo, Parker, et al., 2015), vocational education (Merino Pareja et al., 2020), and university (Phan, 2014). The results presented align with other studies that analyze the influence of self-perceived abilities on the choice of vocational education programs, showing gender differences, with boys opting for scientific and technological options while girls prefer studies related to human interaction (Santana Vega et al., 2019; Sánchez-Martín, et al., 2023). However, these findings are novel in that they assess the influences of students' expectancies of success, their parents, and their teachers on the choice between vocational education and baccalaureate studies, as well as between vocational education and baccalaureate studies related or unrelated to the scientific and technological field. Consequently, the study's results are relevant and have important educational implications.

Educational implications

Regarding the choice between vocational education and baccalaureate studies, the implications differ for boys and girls. Surprisingly, in the case of boys, those with higher expectancies of success chose vocational education over baccalaureate, and there were no differences in parental and teacher expectancies of success between the two groups. However, in the case of girls, those with higher expectancies of success from their parents and teachers chose baccalaureate studies. Therefore, these results suggest that educational measures aimed at encouraging girls to pursue baccalaureate studies should focus on the development, implementation,

and practice of tools and methodologies that improve the perception of teacher and parental expectancies of success in girls.

Regarding the choice of scientific and technological studies, boys with higher expectancies of success in science and technology chose an educational option related to this field. Additionally, the results show that girls pursuing studies related to science or technology outperform their peers in terms of high levels of their own expectancies of success, those of their parents, and those of their teachers. Therefore, educational initiatives aimed at increasing interest in scientific and technological studies should provide experiences that enhance students' expectancies of success, such as the use of inquiry-based teaching methods (Muñoz-Domínguez et al., 2022). Furthermore, in the case of girls, these educational measures should include specific strategies to effectively convey parental and teacher expectancies of success to students.

Limitations and avenues for future studies

Despite their importance and interest, it is important to consider the following limitations when interpreting these results. Firstly, since the sample for this study was collected using convenience sampling techniques, the results cannot be generalized to all Spanish students. This underscores the need for further research with a representative sample. Secondly, the expectancies of success from parents and teachers were collected based on the beliefs and perceptions of the students. It would be interesting to replicate this study by also surveying parents and teachers and analyzing whether their self-reported expectancies of success, compared to the students' beliefs, provide any additional explanatory value.

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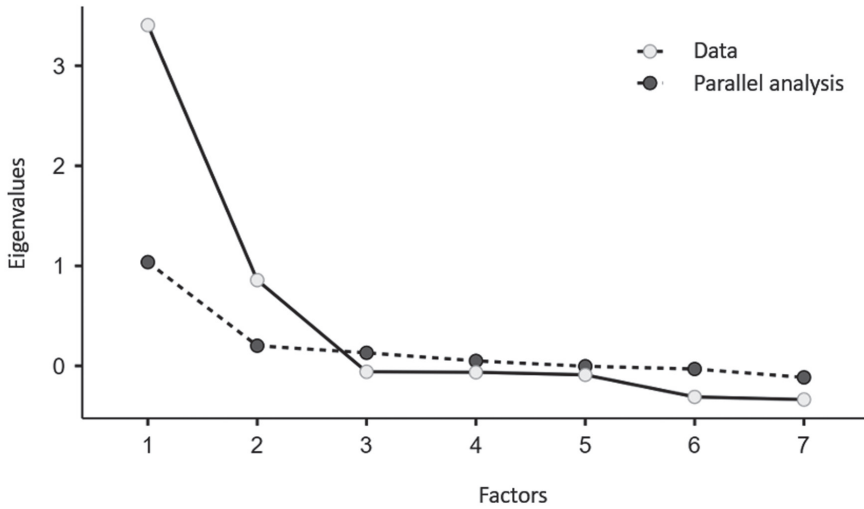
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APPENDIX

Figure 3

Sedimentation graph with results of parallel analysis for the questionnaire “students’ expectancies of success”

**Figure 4**

Sedimentation graph with results of parallel analysis for the questionnaire “parents’ expectancies of success”.

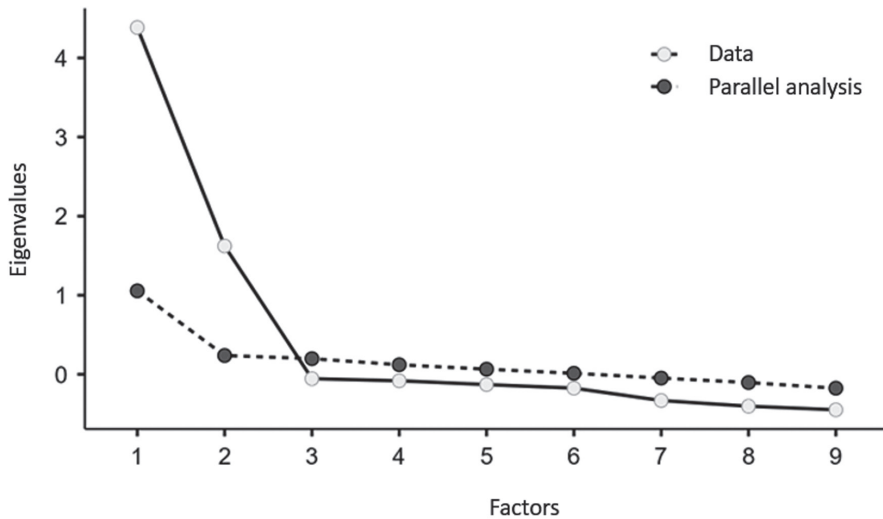
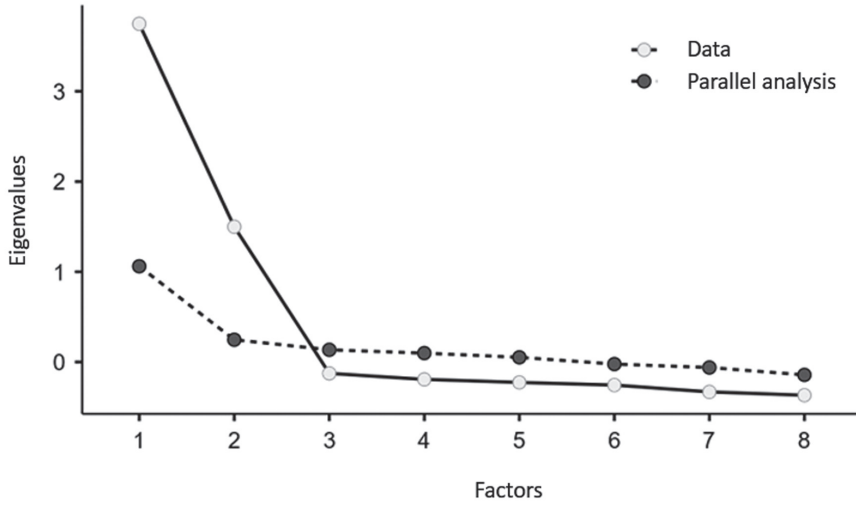


Figure 5

Sedimentation graph with results of parallel analysis for the questionnaire "teachers' expectancies of success".



Factors influencing early school dropout: student's perspective

Factores de influencia en la intención de abandono escolar temprano: perspectiva del estudiantado

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ABSTRACT

Reducing early school dropout rates continues to be a priority line of action for education systems worldwide. In this sense, it seems appropriate to advance in the understanding of the factors that predispose students to make this decision, which can have disruptive effects on both personal and social levels. Sensitive to its importance, this work aims to identify factors that influence the intention to drop out of school early. To do so, we adopted a quantitative methodological approach through a survey procedure. Its application took place in the Autonomous Community of La Rioja (Spain), where the problem of early school leaving is a key area of work in its political agenda. The survey was carried out by administering an ad hoc questionnaire to the population of students in the last years of compulsory education and the first year of non-compulsory education. The participating sample consisted of 1157 students. The results indicate that the usefulness attributed to the study activity and the perceived relative ease of obtaining the academic qualification are two factors of significant influence on the intention to drop out of school early. Additionally,

the socio-familial context of the students and the human resources of the school are also significant predictors of this same intention. We conclude by stressing the need to address the problem of early school leaving from a multidimensional approach that helps students to become aware of the usefulness and deep meaning of the educational task, while at the same time promoting positive motivational beliefs about the value of effort in order to successfully face valuable and challenging educational goals.

Keywords: early school dropout, student perception, perceived usefulness, self-efficacy, perceived ease, secondary education

RESUMEN

En la actualidad, reducir la tasa de abandono escolar temprano continúa siendo una línea de acción prioritaria para los sistemas educativos de todo el mundo. En este sentido, parece conveniente avanzar en la comprensión de los motivos que predisponen al estudiantado a tomar esta decisión con efectos perturbadores tanto a nivel personal como social. Sensibles con su importancia, este trabajo tiene como objetivo identificar factores de influencia en la intención de abandono escolar temprano. Para ello, adoptamos un enfoque metodológico de carácter cuantitativo a través del procedimiento de encuesta. Su aplicación tuvo lugar en la Comunidad Autónoma de La Rioja (España), donde el problema del abandono escolar temprano constituye un área clave de trabajo en su agenda política. La encuesta se realizó mediante la administración de un cuestionario *ad hoc* a la población de estudiantes escolarizados en los últimos cursos de la etapa obligatoria y primer curso de la etapa no obligatoria. La muestra participante estuvo constituida por 1157 estudiantes. Los resultados indican que la utilidad atribuida a la actividad de estudio y la facilidad relativa percibida para conseguir el título académico son dos factores de influencia significativa en la intención de abandono escolar temprano. En otro orden, el contexto sociofamiliar del estudiantado y los recursos humanos del centro también son predictores significativos de esta misma intención. Concluimos subrayando la necesidad de abordar el problema del abandono escolar temprano desde un enfoque multidimensional que ayude al estudiantado a tomar conciencia de la utilidad y significado profundo de la tarea educativa, promoviendo al mismo tiempo y de forma relacionada creencias motivacionales positivas sobre el valor del esfuerzo para afrontar con éxito metas educativas valiosas y desafiantes.

Palabras clave: abandono escolar temprano, percepción del estudiantado, utilidad percibida, autoeficacia, facilidad percibida, educación secundaria

INTRODUCTION

Despite the fact that the reduction of Early School Leaving (ESL) is one of the primary objectives outlined in major European agreements and structural reform programs, it remains a significant educational and social challenge in Spain. Following the COVID-19 lockdowns, this problem seems to worsen with an increase of 0.6% in the rate of early school leaving, standing at 13.9% overall; 16.5% for males and 11.2% for females, compared to 9.7% in the European Union (Ministry of Education and Vocational Training, 2023). The ESL rate is defined as the percentage of 18-24 year olds who have not completed upper secondary education and have not followed any type of study or training in the last four weeks (Instituto Nacional de Estadística [INE], 2022).

The scientific literature in this field considers Early School Leaving (ESL) as the outcome of a process that begins when students still in school. This process is determined by a complex interplay of both academic and non-academic factors, which are highly sensitive to the variation of personal situations and social context. Moreover, it has a strong impact both on the later life of the individual who fails to complete their educational process and on society as a whole (Bayón-Calvo et al, 2020; Bayona-i-Carrasco & Domingo, 2021; Conde et al, 2023; González-Rodríguez et al, 2019; Montero-Sieburth & Turcatti, 2022). Some of the effects of ESL are often related to situations of unemployment and job insecurity, poverty and social exclusion, as well as to problems related to physical and mental well-being (European Education and Culture Executive Agency, 2019; World Health Organisation, 2021). Against this background, the fundamental question arises: What factors exert the most significant influence on a student's intention to prematurely leave school without completing compulsory education, and to what extent can individual characteristics account for significant differences in early school leaving intentions? Broadly speaking, these questions constitute the problem under study in this paper.

Previous research highlights the influence of individual student variables, such as gender, age, nationality and place of residence, on their expectations and school decisions (Bayón-Calvo et al, 2020; Cardwell, 2023). Within this same dimension, other studies refer to personal factors related to students and their educational history, such as healthy habits, emotional situation, academic pathway, grade repetition and disruptive behavior within the school environment (Conde et al, 2023; González-Rodríguez et al., 2019; López-Aguilar et al, 2023; Montero-Sieburth & Turcatti, 2022). These factors can generate disengagement and a lack of commitment to the educational process, significantly impacting the decision to continue studying.

It is true that, in addition to individual variables and personal and school history factors, there are other aspects related to the cognitive dimension of students that

may also influence ESL. Some research underscores the importance of considering students' personal perception or internal belief systems regarding the consequences of their behaviour and the surrounding social context (Tarabini et al., 2019).

In this regard, prior studies, such as Eccles and Wigfield (2002), have highlighted the importance of several cognitive factors in students' decisions. These factors include perceived utility of the educational process, perceived self-efficacy in achieving academic goals, and the degree of overall and relative ease that students attribute to the educational task in relation to the estimated utility value, time and effort to achieve it. In addition, there exists empirical evidence that the decisions made by students and the outcomes of these decisions in terms of educational commitment, responsibility, continuity of effort or perseverance are influenced to a large extent by their emotional state (Schunk & Usher, 2020; Tarabini et al., 2019; Vera et al., 2021).

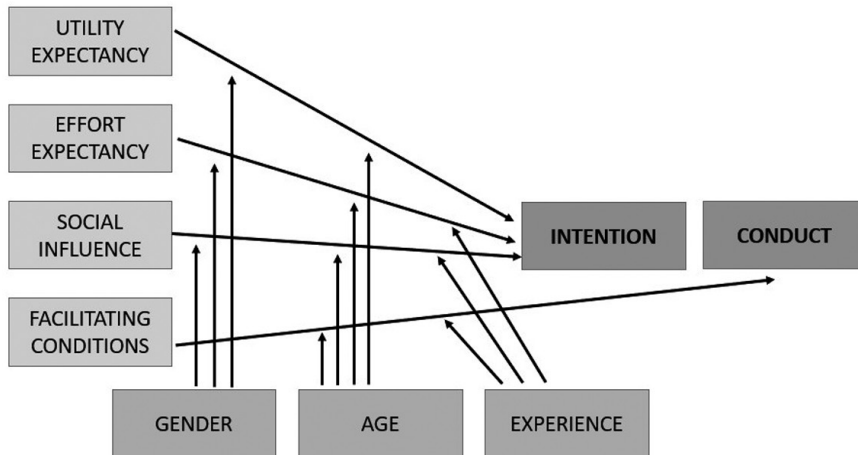
In relation to the above, and based on the Theory of Reasoned Action (Venkatesh et al., 2003), we find that these same factors have been examined in scientific fields beyond education. This has given rise to very interesting research models that can be used to understand and predict students' ESL intentions in the context under study (Figure 1). In general terms, the starting hypothesis of these models assumes that our actions are shaped by our evaluation of the expectations or expected outcomes of our actions. Specifically, the perceived usefulness of the task, the perceived self-efficacy in achieving the goals set, or the perceived level of ease in relation to a given activity or situation. Furthermore, the influence of other moderating variables, such as gender, age or school history, is explored.

In the same line of research, other authors have also identified risk factors for ESL that enhance the understanding of this phenomenon. Some of these factors are linked to subjective normative beliefs or negative influences from friends, peers or reference group with high levels of absenteeism, antisocial attitudes or educational problems (González-Rodríguez et al., 2019; Montero & Turcatti, 2022; Sánchez-Alhambra, 2017). In addition, socio-familial characteristics perceived by students (Conde et al., 2023) and the characteristics of the teaching context where their educational activity takes place (Olmos & Gairín, 2022) may also have an influence. In relation to the educational context, some studies have concluded that students' commitment to their educational process does not arise exclusively from the merit or personal effort of the students. It is significantly influenced by the enabling conditions, support and assistance perceived from the teaching staff and the school's administrative team (Tarabini et al., 2019).

Consequently, the aim of this study is to identify factors influencing ESL intention through the perspective of the students themselves. In addition, we endeavor to explore potential noteworthy distinctions in terms of moderating variables, such as gender, age or the educational history of the students under investigation.

Figure 1

Venkatesh et al. (2003) research model based on the Theory of Reasoned Action



Source. Adapted from Venkatesh et al. (2003).

METHOD

A cross-sectional design was used for this study, based on the application of a survey to the population of students enrolled in the last years of compulsory education or in the first year of non-compulsory education during the 2020/2021 academic year.

To select the sample subjects, convenience sampling method was carried out. The questionnaire was distributed to educational centers via the Directorate General for Educational Innovation. Following the acquisition of parental consent, all students were invited to participate, with the final sample being made up of those who agreed to participate freely. Data collection was carried out online, using the questionnaire implemented in the LimeSurvey tool, in April and May 2021.

Participants and procedure

The study population of this research consisted of 6131 students in the Autonomous Community of La Rioja (Spain), distributed among 46 schools in which the last years of the compulsory stage and the first year of the non-compulsory stage are taught. All students invited to participate were informed of the purpose

of the study and were asked to respond honestly, as the collection and subsequent processing of the data would be completely anonymous at all times. It should be noted that the university's ethics committee gave a favorable opinion on this research. In fact, the entire process was carried out in accordance with the ethical code proposed by the Committee on Publications Ethics and Estalella (2022), specifically designed for socio-educational research involving a minor population.

Finally, the participating sample consisted of 1157 students from 17 schools. As shown in Table 1, all grades or schooling programs included in the study are represented with at least 10.7% of the population. With a margin of error of 1.6% and a confidence level of 95%, this sample is considered acceptable in socio-educational studies (Herba & Rocha, 2018).

Table 1

Relationship between population and sample

	Total	4º ESO (Academic)	4º ESO (Technological)	PMAR2	FPB	1º CFGM	ATE	ASE
Population	6131	2118	902	390	1052	1615	26	28
Sample	1157	463	210	121	172	173	8	10
%	18.9	21.9	23.3	31.0	16.3	10.7	30.8	35.7

Note. PMAR2: 2nd year of the Program for the Improvement of Learning and Performance; FPB: 1st and 2nd of Basic Vocational Training in any of its families; CFGM: 1st year of the Intermediate Training Cycle in any of its families; ATE: Therapeutic-Educational Classrooms; ASE: Socio-educational Inclusion Classrooms.

Regarding the sample's characteristics, we successfully obtained representation from population centres of different sizes (48.06% resided in an urban setting, 30.16% in a semi-urban setting and 21.78% in a rural setting). 72.34% of the participants were in the compulsory school age range (14-16 years) compared to 27.66% over 16 years. The remaining socio-demographic data of the participants are shown in Table 2.

Table 2
Sociodemographic characteristics

		Gender		
		Man	Woman	Other
569		49.18%	557	48.14%
			31	2.68
		Age (years)		
14	15	16	17	>18
25	2.16%	355	39.50%	193
		457	16.68%	72
			6.22%	55
				4.75%
		Place of residence		
		Big town		
252	21.78%	349	30.16%	556
				48.06%
		Language of birth		
		Arabic languages		
1005	86.86%	59	5.10%	91
				7.87%
		Country of origin		
		Morocco		
950	82,11%	50	1.99%	23
		4.32%	1.99%	11
				0.95%
				100
				8.64%
		Ownership of the center		
		Publics		
648		56.01%	509	43.99%
		Disruptive behavior (expulsions from the classroom/center)		
		Rarely		
950	82.10%	118	10.19%	56
			4.84%	16
				1.38%
				17
				1.46%
		Course repetition		
		No		
526	45.46%	631	54.53%	85
				7.34%
				1072
				92.65%

Instrument

Following an exhaustive and methodical literature review on the main causes and factors influencing early leaving, an ad hoc questionnaire was developed with the dimensions and factors considered (see Table 3), with a total of 62 items, with Likert-type response options (1 = strongly disagree, 5 = strongly agree). The full questionnaire can be found in (Suberviola et al., 2023).

Table 3
Description of the dimensions and factors of the study

Dimensions	Factors	Variables
Moderating variables	Identity	Gender
		Age
		Place of residence
		Native language
		Country of birth
	School history	Schooling program
		Center ownership
		Disruptive behavior
		Course repetition
		ACNEAE
Performance expectations	Perceived usefulness (UTL)	Job development
		Personal development
		Social development
	Perceived self-efficacy (AUT)	Ability
		Academic skills
		Perseverance
Effort expectations	Global Ease of Use (FACG)	Overall Ease of Use
	Relative ease of use (FACR)	Relative ease of use

Dimensions	Factors	Variables
Social-educational influence	Subjective norm (NSUB)	Family influence
		Equal influence
		Social influence
	Context (CONT)	Educational climate
		Labor market possibilities
		Neighborhood-zone
Facilitating conditions	Functional Resources (RRFF)	Organization-planning
		Assessment
		Curricular rigidity
	Material resources (RRMM)	Information
		Infrastructure
	Human resources (HR)	Teaching materials
		Faculty
		Student body
	Intention to leave school early (INT)	
Intention to leave school early (INT)		

The content validation of the questionnaire was developed by adapting the Delphi method, which involved a structured sequence encompassing three phases (preliminary, exploratory, final). These phases were carried out by a coordinating group and an expert group. The validation process was completed with a pilot test on a sample with homologous characteristics to our study population. This validation process involved eliminating and/or modifying the wording of some items, as well as changing the dimension of some of them.

Subsequently, a confirmatory factor analysis (CFA) was carried out to assess that the designed instrument provided reliable measures with which to make valid inferences. Convergent validity was analyzed through factor loadings and average variance extracted, while discriminant validity was assessed through the HTMT (heterotrait-monotrait) ratio of correlations (Henseler et al., 2015). Regarding reliability, composite reliability (CF) and internal consistency measured with McDonald's omega method were analyzed. This coefficient was selected instead of Cronbach's α , since it generates greater stability and a better estimate of reliability as it is not affected by the number of items or compliance with the tau equivalence principle (Dunn et al., 2014).

Based on the validity results, the of seven items in six of the factors (UTL, AUT, NSUB, CONT, RRMM and RRHH) was considered because they had a factor loading below .5, a threshold considered acceptable (Hair et al., 2010). After these modifications, six factors (FACG, FACR, CONT, RRMM, RRHH and INT) had McDonald FC and omega values equal to or higher than the recommended value of .7 (Lloret et al., 2014). The remaining factors (UTL, AUT, NSUB and RRFF) had McDonald FC and omega values between .6 and .7, also accepted as adequate (Ursachi et al., 2015), so their reliability is considered acceptable. On the other hand, although most of the factors had mean variance extracted values below .5, given that their FC was above .6, their convergent validity is still considered adequate (Hamid et al., 2017) (Table 4).

Table 4
Reliability and convergent validity

	Ítem	Factor Loading	Composite Reliability	Mean Variance Extracted	McDonald's Omega
Utility	UTIL1	.83	.71	.47	.68
	UTIL2	.74			
	UTIL4	.50			
Self-efficacy	AUT1	.55	.64	.31	.65
	AUT3	.54			
	AUT4	.65			
	AUT5	.50			
Overall ease	FACG1	.59	.71	.45	.70
	FACG2	.65			
	FACG3	.76			
Relative ease	FACR1	.79	.82	.61	.83
	FACR2	.83			
	FACR3	.71			
subjective norm	NSUB1	.50	.60	.36	.61
	NSUB2	.72			
	NSUB3	.69			
Context	CONT1	.69	.70	.45	.73
	CONT2	.82			
	CONT5	.52			

	Ítem	Factor Loading	Composite Reliability	Mean Variance Extracted	McDonald's Omega
Functional resources	RRFF1	.58	.67	.34	.67
	RRFF2	.69			
	RRFF3	.54			
	RRFF4	.53			
Material resources	RRMM1	.69	.78	.47	.76
	RRMM2	.71			
	RRMM3	.66			
	RRMM4	.67			
Human Resources	RRHH1	.57	.71	.45	.70
	RRHH2	.73			
	RRHH4	.70			
Abandonment intention	INT1	.88	.76	.53	.70
	INT2	.78			
	INT3	.48			

Finally, evidence of discriminant validity was also collected (Table 5), as in no case was the threshold suggested by Kline (2016) of .85 exceeded.

Table 5
Discriminant validity

	UTIL	AUT	FACG	FACR	NSUB	CONT	RRFF	RRMM	RRHH	INT
UTIL	-									
AUT	.497	-								
FACG	.358	.745	-							
FACR	.598	.685	.424	-						
NSUB	.518	.440	.330	.586	-					
CONT	.367	.672	.389	.515	.580	-				
RRFF	.348	.711	.431	.568	.552	.558	-			
RRMM	.285	.533	.327	.469	.473	.477	.815	-		
RRHH	.238	.498	.312	.399	.472	.520	.756	.746	-	
INT	.443	.472	.280	.574	.300	.450	.323	.260	.294	-

Data analysis

First, the presence of extreme or spurious data (outliers) was analysed by calculating the Mahalanobis distance. The results showed p-values greater than .001 ($p = .13 - .94$) for all the factors of the scale, so that the sample was considered to be free of multivariate outliers.

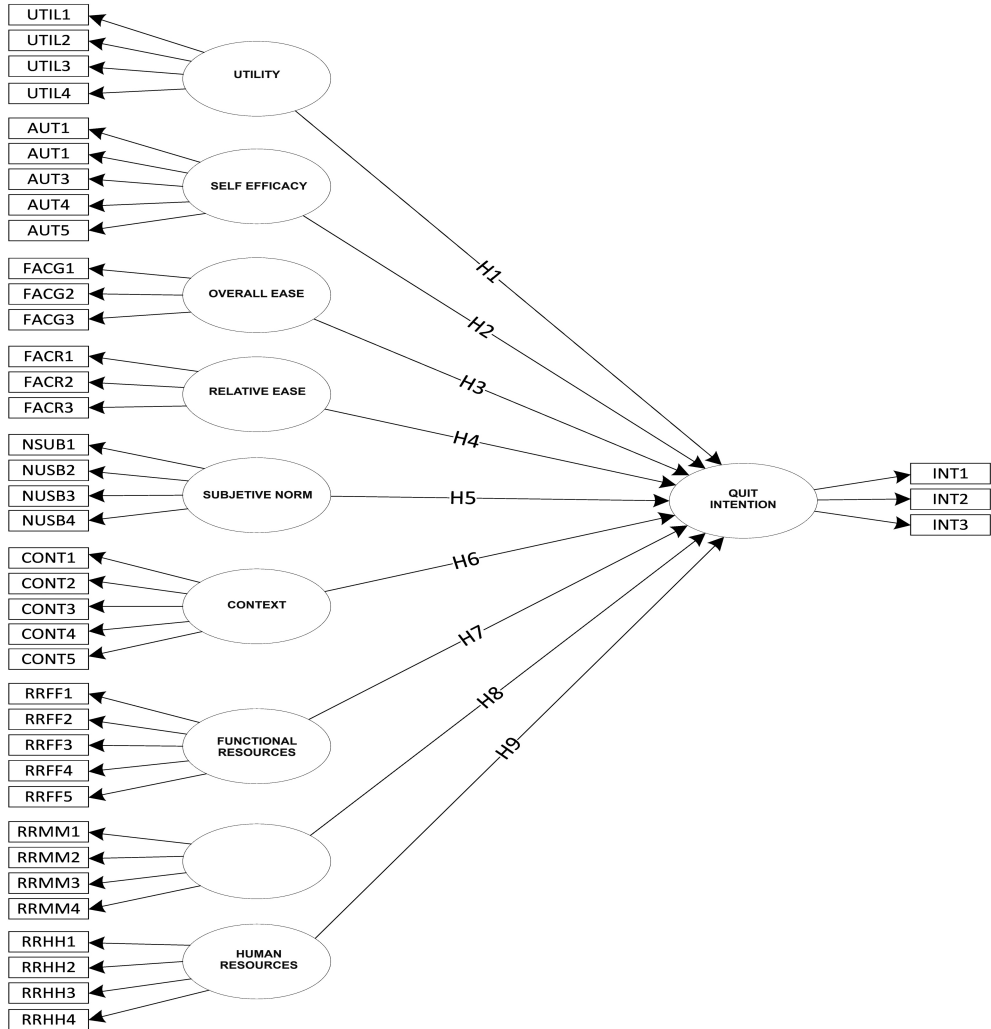
After verifying the psychometric requirements of reliability and validity, the structural model was created to test the hypotheses (Figure 2). It should be noted that, according to Mardia's test, the multivariate normality condition was not met, so a robust estimator was used. In particular, the maximum likelihood method with Satorra-Bentler corrections was used, as it generates reliable statistics, even when normality assumptions are violated.

Finally, the possible differences between the different interest groups (moderator variables) were analyzed. For this purpose, with the SEM model validated, a multigroup confirmatory factor analysis was carried out. In order to compare the means of the factors considered, we first evaluated for measurement invariance. Measurement invariance is considered to be admissible if, first, the plausibility of the model is confirmed for each of the groups considered and, sequentially, at least configuration invariance, weak or metric invariance and strong or scalar invariance are satisfied (Svetina et al., 2021). Configuration invariance was assessed through a global model fitting, while metric and scalar invariance were assessed progressively by comparing two nested models that are identical except for the set of constraints added in one of them.

In those cases where scalar invariance was confirmed, the means of the latent variables were compared. For this purpose, and given that the assumption of normality was not met, the differences between two groups were analyzed using the Mann-Whitney U test and the comparison between more than two groups was carried out using the Kruskal-Wallis test. If the results of this test indicated statistically significant differences, to identify which groups differed, a post hoc comparison with Dunn's test was performed between each pair of groups with Bonferroni significance correction. In all cases it was confirmed that there was no evidence against homogeneity of variances using Levene's test. Effect sizes for differences between two groups were calculated using the rank biserial correlation (r_b), with the effect being very small if r_b is less than 0.10, small if $r_b = 0.10-0.29$, moderate if $r_b = 0.30-0.49$ and large if r_b is greater than or equal to 0.50. For differences between more than two groups, effect sizes were obtained with epsilon squared (ϵR^2), with the effect being very small if ϵR^2 is less than 0.01, small if $\epsilon R^2 = 0.01-0.05$, moderate if $\epsilon R^2 = 0.06-0.13$ and large if ϵR^2 is greater than or equal to 0.14.

In particular, for both the AFC and the structural model (SEM), the packages psych (Revelle, 2021) and lavaan (Rosseel, 2012) were used.

Figure 2
Proposed structural model



Note. Error terms and covariances between first-order factors are omitted for clarity.

RESULTS

The structural equation model illustrated in Figure 3 reflects the nine investigated factors and their influence on the intention to leave school early. Looking at the fit indices of the model, all were satisfactory according to the criteria recommended in the literature (Kline, 2016) (Table 6), so it can be stated that there is a good fit between the proposed research model and the observed data.

Table 6
Model goodness-of-fit indices

	Absolute fit		Incremental adjustment		Parsimonious fit	
	SRMR	RMSEA (IC 90%)	CFI	TLI	PNFI	χ^2/df
Recommended adjustment level	$\leq .05$	$\leq .05$	$\geq .90$	$\geq .90$	$\geq .70$	≤ 3
Adjustment level obtained	.041	.037 (.034, .040)	.939	.928	.760	2.37

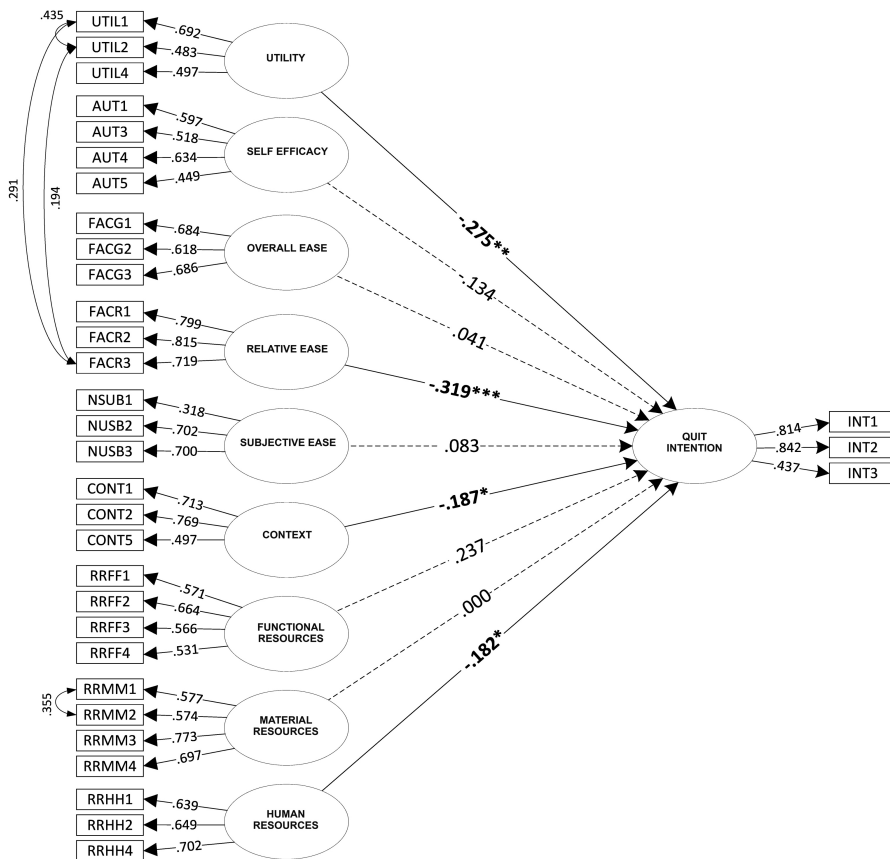
Note. SRMR: Standardized Root Mean squared Residual; RMSEA: Root Mean Square Error of Approximation; IC: Intervalo de confianza; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; PNFI: Parsimony Normed Fit Index; df: degrees of freedom.

On the other hand, the model is able to explain approximately 41% of the total variance of the quitting intention construct ($R^2 = .411$), which is considered acceptable (Hair et al., 2011) and supports the conformity of the model.

Table 7 shows the standardized model estimates of the relationships explored in the model. To establish the degree of relationship intensity, a relationship is considered strong when β is greater than .2 and moderate when β is between .1 and .2 (Chin, 1998).

From this regression analysis, it is observed that both “relative ease” ($\beta = -.319$, $p < .001$) and “perceived usefulness” ($\beta = -.275$, $p < .01$) have a significant effect on intention to drop out. Likewise, the factors “social context” ($\beta = -.187$, $p < .05$) and “human resources” ($\beta = -.182$, $p < .05$) are also statistically significant predictors of intention to drop out. As for the rest of the factors investigated, none of them was statistically significant at the global level.

Figure 3
Adjusted research model



Note. * $p < .05$; ** $p < .01$; *** $p < .001$. Covariances between first-order factors are omitted for clarity.

Table 7
Regression parameters for the research model

Hypothesis	Model relationships	Estimate	E.T.	β
H1	Utility \rightarrow Quit intention	-0.290	.102	-.275**
H2	Self-efficacy \rightarrow Intention to quit	-0.171	.308	-.134
H3	Overall ease \rightarrow Intention to quit	0.040	.117	.041
H4	Relative ease \rightarrow Intention to quit	-0.300	.079	-.319***

Hypothesis	Model relationships	Estimate	E.T.	β
H5	Subjective norm \rightarrow Intention to quit	0.149	.141	.083
H6	Context \rightarrow Intention to abandon	-0.168	.078	-.187*
H7	Functional resources \rightarrow Quit intention	0.280	.190	.237
H8	Material resources \rightarrow Intention to abandon	0.000	.126	.000
H9	Human resources \rightarrow Quit intention	-0.203	.097	-.182*

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. E.T.: Typical error; β : standardized coefficient.

Regarding the results obtained in the multigroup analysis, the increase in CFI (Δ CFI), RMSEA (Δ RMSEA) and SRMR (Δ SRMR) was established as an evaluation criterion. Following the criterion proposed by Chen (2007), a .01 change in CFI is considered acceptable, so that if the difference in CFI between two nested models is greater than .01 in favor of the less restrictive model, the more restrictive model should be rejected. It is also considered that variances of RMSEA (Δ RMSEA) $\leq .015$ and SRMR (Δ SRMR) $\leq .030$ for metric invariance and .010 for scalar invariance are adequate to accept the invariance. All in all, measurement invariance was confirmed for all the variables analyzed, making it possible to compare the means of the latent variables.

With respect to the gender variable, it was observed that women's intention to quit (MM = 1.55) was lower than that of men (MH = 1.73), finding statistically significant differences with small effect size ($Z = 6.8$, $p < .001$, $rb = .13$). Perceived self-efficacy' values were also significantly lower for females (MM = 3.63) than for males (MH = 3.80), albeit with a very small effect size ($Z = 3.5$, $p < .001$, $rb = .07$). However, in both "perceived usefulness" (MM = 4.03, MH = 3.85; $Z = -4.3$, $p < .001$, $rb = -.10$) and "relative ease" (MM = 4.34, MH = 4.08; $Z = -8$, $p < .001$, $rb = -.15$), "subjective norm" (MM = 3.70, MH = 3.48; $Z = -5.9$, $p < .001$, $rb = -.11$) and "resource functions" (MM = 3.51, MH = 3.40; $Z = -3.1$, $p = .002$, $rb = -.05$), women showed higher values.

With respect to the age variable, a direct relationship between age and intention to drop out was identified: students aged 18 or older were those who indicated a higher intention to drop out ($M_{\geq 18} = 1.98$ vs. $M_{17} = 1.81$, $M_{16} = 1.60$ and $M_{\leq 15} = 1.52$). Statistically significant differences were found with a small effect size ($\chi^2 = 98$, $gl = 3$, $p < .001$, $\epsilon R^2 = .028$).

Specifically, these differences were observed between participants aged 15 or younger and those aged 17 ($Z = -6.56$, $p < .001$) and 18 or older ($Z = -8.37$, $p < .001$), as well as between participants aged 16 and those aged 17 ($Z = -5.18$, $p < .001$) and 18 or older ($Z = -7.21$, $p < .001$). Despite expressing a higher intention to drop out,

the 18+ age group also offered higher scores, with significant differences, on the variables “usefulness” ($M_{\geq 18} = 4.11$, $M_{17} = 3.84$, $M_{16} = 3.90$ and $M_{\leq 15} = 3.97$; $\chi^2 = 15$, $gl = 3$, $p = .002$, $\epsilon R^2 = .004$), “overall ease” ($M_{\geq 18} = 3.54$ vs. $M_{17} = 3.28$, $M_{16} = 3.30$ and $M_{\leq 15} = 3.35$; $\chi^2 = 18$, $gl = 3$, $p < .001$, $\epsilon R^2 = .005$), and “material resources” ($M_{\geq 18} = 3.89$ vs. $M_{17} = 3.82$, $M_{16} = 3.70$ and $M_{\leq 15} = 3.65$; $\chi^2 = 35$, $gl = 3$, $p < .001$, $\epsilon R^2 = .007$) and “functional resources” ($M_{\geq 18} = 3.75$ vs. $M_{17} = 3.50$, $M_{16} = 3.38$ and $M_{\leq 15} = 3.38$; $\chi^2 = 58$, $gl = 3$, $p < .001$, $\epsilon R^2 = .013$).

Regarding the schooling programme, students enrolled in non-regular pathways (FPB, PMAR, ASE and ATE), presented a higher score, with a significant difference and small effect size ($Z = 12$, $p < .001$, $rb = .23$), in intention to drop out (MNO_ORDINARIES = 2.01, MORDINARIES = 1.52) and a lower score, also with significant difference and small effect size ($Z = -7.5$, $p = .001$, $rb = -.15$), in “relative ease” (MNO_ORDINARIES = 4.01, MORDINARIES = 4.27).

It was also observed that students who had repeated a school year scored significantly higher on intention to drop out (MREPETIDORS = 1.87, MNO_REPETIDORS = 1.46; $Z = -13$, $p < .001$, $rb = -.22$). However, their scores were lower on “context” (MREPETIDORS = 3.74, MNO_REPETIDORS = 4.01; $Z = 6.8$, $p < .001$, $rb = .13$), “self-efficacy” (MREPETIDORS = 3.45, MNO_REPETIDORS = 3.68; $Z = 5.9$, $p < .001$, $rb = .10$), “relative ease” (MREPETIDORS = 4.11, MNO_REPETIDORS = 4.27; $Z = 4.7$, $p < .001$, $rb = .08$) and “global ease” (MREPETIDORS = 3.27, MNO_REPETIDORS = 3.40; $Z = 3.4$, $p < .001$, $rb = .06$).

Finally, no statistically significant differences in intention to drop out were identified as a function of place of residence.

DISCUSSION AND CONCLUSIONS

Given the need to reduce the ESL rate in our educational system (Ministry of Education and Vocational Training, 2023), it is necessary to continue building knowledge that allows us to better understand the reasons that lead young adolescents to drop out of school. To contribute to this purpose, this research has focused on identifying the factors that influence the intention to drop out of ESL from the perspective of the students themselves. Possible significant differences in terms of moderating variables such as gender, age and school history have also been considered.

Based on the results obtained, it can be concluded that, from the perspective of the students themselves, perceived usefulness and relative ease are the two factors with the greatest significant influence on the intention to drop out.

In this sense, and as shown in similar studies (Conde et al., 2023; Moeller et al., 2020), the utility value or meaning that a student attributes to his or her educational process at school is a determining factor in his or her decision to drop out or not.

This value may be related to motivations such as obtaining an academic degree, achieving a good financial situation, following a vocation or gaining prestige. In addition, the results also suggest that the intention of the students investigated is influenced to a large extent by the perceived ease or difficulty of educational activity. This perception is related to the consequences or the value of the expected results of their personal effort and dedication to study. Along the same line of thought as Tarabini et al. (2019), we can conclude that if a student considers that the effort of continuing with their studies is not worth it because they cannot imagine a better future or do not believe that they will be adequately recognized, it is likely that they will not find it worthwhile to continue studying.

However, contrary to expectations (Casanova et al, 2018), this direct effect on ESL intention does not occur significantly with perceived academic self-efficacy. For Shunk and DiBenedetto (2020), the positive influence of self-efficacy on engagement, self-regulation and effort does not emerge suddenly. It is a cognitive process in which students use different sources of information to construct an interpretation of their personal ability to cope effectively with what the instructional context demands of them in a given situation. Accordingly, a possible explanation for the results obtained on self-efficacy is the possible formation of weak or erroneous conceptions on the part of the students about the expected academic achievements or goals, the utilitarian value of the educational task or the deep meaning of the same for their future personal and professional life project. The results of other studies (López-Aguilar et al., 2023) highlight the importance of this approach in the field of higher education, confirming its influence on students' capacity and management of resilience to effectively face adverse educational situations and the risk of dropping out.

With respect to the socio-educational dimension investigated, the analysis carried out reveals a significant influence of the family context (family climate, family support in studies) and the student's immediate environment (job opportunities, leisure and free time, socio-economic and cultural level of the place of residence). These results confirm findings obtained in recent research in this same field of study (Conde et al., 2023), highlighting the significant influence of socio-familial characteristics on students' attitudes and behaviors in the classroom as determinants of ESL. In the same line of research, other authors highlight the significant effect of socio-economic and cultural context on the intention of ESL (González-Rodríguez et al., 2019).

However, in contrast to what has been pointed out by other authors in this same dimension (González-Rodríguez et al., 2019; Montero & Turcatti, 2022), no significant influence of the students' subjective normative beliefs on what their friends or peer group think about the intention of ESL was observed. This result suggests that most of the students investigated are in what some call "middle adolescence" (Allen &

Waterman, 2019), a stage where students expect understanding, empathy and the possibility of expressing themselves freely without feeling judged by their peer group. From this perspective, it is possible to think that the peer group's point of view has a greater impact on aspects such as clothing, music or leisure activities, compared to important decisions related to study, which are considered more in later adolescent stages.

In relation to the facilitating conditions of the school, the human resources factor (teachers, management team, classmates) is the one that has the greatest influence on the students' decisions regarding the intention to undertake ESL. On the other hand, the impact of the school's functional and material resources was not found to be statistically significant. These results coincide with the findings of Tarabini et al. (2018), who highlight the importance of the attention and pedagogical support of teachers, tutors, counsellors, the management team and peers themselves as key resources for influencing students' attitudes and educational decisions.

Regarding the moderating variables considered in the study, as in other studies (Bayón-Calvo et al., 2020; Cardwell et al., 2023; Ministry of Education and Vocational Training, 2023), gender and age have a significant effect on school decisions, expectations and outcomes.

For example, women's intention to drop out is significantly lower than men's. We also found a direct relationship between age and intention to drop out. We also found a direct relationship between age and intention to drop out, with a significant influence on students aged 18 and over. A possible explanation for this result is to be found in the repetition of school years, a variable with an important level of influence on the intention to drop out. In agreement with other authors (Cerdà et al., 2020), these data invite us to think that repetition is not only an unfavourable predictor of early dropout, but also that it is not useful as a strategy to increase student performance.

These same variables also explain differences in the different cognitive factors studied (perceived usefulness, perceived ease and perceived self-efficacy), as well as in those related to the socio-educational context (subjective norm) and the center itself where the educational activity takes place (functional resources, material resources). The results obtained invite us to continue reflecting on the differences in the belief systems and attitudes of boys and girls towards school, teachers, school work and learning, making clear the strength of subjectivity and the role played by the construction of masculinity and femininity among the adolescent population (Salas-Rodríguez, 2022).

On the other hand, the significant influence of students' school history on their intention to drop out is confirmed. In this case, the results coincide with those obtained in other similar studies (Conde et al, 2023; González-Rodríguez et al., 2019; López-Aguilar et al, 2023; Montero-Sieburth & Turcatti, 2022), highlighting

the important effects of the schooling program and grade repetition. In this case, it is worth noting that students enrolled in non-routine pathways have a high dropout intentionality. Possibly, this is due to the fact that the criteria adopted for this organization generate feelings of frustration and demotivation that can lead to dropping out of the educational system (Cerdà, et al., 2020). Similarly, a significant influence of these variables (pathway and repetition) is observed on internal student factors such as ease and perceived self-efficacy.

In sum, since these results we can conclude that the phenomenon of ESL is a complex and multidimensional problem. The factors that explain it are many and affect it in different ways depending on the individual characteristics of the students and their own educational reality. In this study, the usefulness attributed to the study activity, the perceived relative ease of obtaining the academic degree and the conditions posed by the immediate context are key factors for understanding and intervening on the intention of ESL. In this sense, it seems appropriate to help students to become aware of the usefulness and deep meaning of the educational task, while promoting positive motivational beliefs about the value of effort in order to successfully face valuable and challenging educational goals.

LIMITATIONS OF THE STUDY AND FUTURE LINES OF RESEARCH.

Although it is possible to consider that the instrument designed provides reliable measures with which to make valid inferences, the results obtained suggest that some of the items that make up the scales could be improved. This is because their factor loadings are small and the error variances show a high proportion of the variance that does not covary with the factor (see, for example, item NSUB1).

It is also worth considering the risk of random, inattentive or effortless responses in a self-administered survey. Although no multivariate outliers were identified in the participant sample, it is important to recognize that there is always a degree of uncertainty related to the validity and reliability of the data collected with this type of survey. In this sense, it would be interesting to complement these results with interviews or focus groups, to better understand the conceptions and positions of young adolescents in relation to ESL.

On the other hand, although in this study an adaptation of the model designed by Venkatesh et al. (2003) has been proposed as a research model, in which all the effects are considered as direct, in order to enrich the analysis a model with indirect effects could be proposed, such as, for example, the influence of perceived self-efficacy on ease or that of the subjective norm on usefulness, among others. Likewise, although the model is statistically acceptable, some of the evaluated relationships are not corroborated, such as the effect of self-efficacy or the subjective norm on the intention of ESL. Therefore, the incorporation of variables identified in

other research, such as aspects attributable to the individual (e.g. skills, health) or issues linked to educational policies and practices in schools (e.g. coexistence policy, measures to address diversity, methodological strategies) is proposed (Romero-Sánchez & Hernández-Pedreño, 2019) (Romero-Sánchez & Hernández-Pedreño, 2019). This would allow us to test its effect and rule out specification errors in the proposed model due to the omission of relevant variables. Finally, another line of future work envisaged is the extension of the study to other territories to analyze possible differences according to contexts and regions.

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Academic achievement prediction in secondary education by decision tree analysis

Predicción del rendimiento académico en educación secundaria mediante el análisis de árboles de decisión

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ABSTRACT

The aim of the present study was to develop a predictive model of academic achievement (school success or failure) by applying a decision tree analysis. A cross-sectional study was carried out to design a system for the early detection of academic failure. 219 adolescents (aged 14 to 16) participated and information on their socioeconomic status, body mass index (BMI) percentile, physical activity, leisure time spent in front of screens, enjoyment,

hope, anger, anxiety, boredom, behavioral engagement, emotional engagement, cognitive engagement, self-perceived school performance and intention to go to university was collected as input variables in decision tree analysis. 6 failure and 3 success groups were found able to predict academic performance. Good accuracy was obtained in the training (80.11 %) and validation (81.40 %) datasets of the decision tree. It is possible to predict academic failure or success by assessing weight status, physical activity, anger and hope during school attendance, intention to go to university and self-perceived school performance.

Keywords: high schools, academic achievement, prediction, physical activity level, decision tree

RESUMEN

El objetivo del presente estudio fue desarrollar un modelo de predicción del rendimiento académico (éxito o fracaso escolar) mediante la aplicación de un análisis de árbol de decisión. Se realizó un estudio transversal para diseñar un sistema de detección temprana del fracaso escolar. Participaron 219 adolescentes (de 14 a 16 años) y se recabó información de su estatus socioeconómico, percentil de índice de masa corporal (IMC), actividad física, tiempo de ocio frente a pantallas, niveles de disfrute, esperanza, ira, ansiedad, aburrimiento, compromiso conductual, compromiso emocional, compromiso cognitivo, rendimiento escolar autopercebido e intención de ir a la universidad, como variables de entrada en el análisis del árbol de decisión. Se encontraron 6 grupos de fracaso y 3 de éxito capaces de predecir el rendimiento académico. Se obtuvo una buena precisión en los conjuntos de datos de entrenamiento (80.11 %) y validación (81.40 %) del árbol de decisión. Es posible predecir el fracaso o el éxito académico mediante la evaluación del estado de peso, la actividad física, la ira y la esperanza durante la asistencia a la escuela, la intención de ir a la universidad y el rendimiento escolar autopercebido.

Palabras clave: educación secundaria, rendimiento académico, predicción, nivel de actividad física, árbol de decisión

INTRODUCTION

School failure is a polysemic term often associated with not achieving an academic goal, which usually means not passing certain subjects or achieving a minimum degree. Without a doubt, being able to prevent such situations would reduce the students and families' frustration and would be a great advance for society, so that all students could have a good education (Alexander et al., 1997, 2001; Cairns et al., 1989). To academic failures, several authors have proposed different forms of early detection based on various factors, such as emotions, physical fitness, sedentary lifestyle or academic commitment, which are detailed below (Alzina & Escoda, 2012; D'Mello et al., 2008; Pekrun et al., 2002; Weiner, 1982). It should be noted that these forms of early detection are created to detect school failure early enough so that professionals in the education system can intervene and improve the student's situation.

A factor that has been shown to be highly relevant in predicting both academic performance and school failure is the socio-economic status of students' families (Parr & Bonitz, 2015; Trujillo-Torres et al., 2020). Concretely, school failure in Spain is not distributed equally in the socioeconomic stratification, since the student's social class can affect school failure and performance, since the percentage of school failure is higher in working class than in middle class children (Martínez-García, 2011).

Pekrun et al. (2002) defined student emotions as the students' personal experience when performing academic activities, identified them as a very important part of their personal motivation in achieving academic success and avoiding school failure. Along the same lines, D'Mello et al. (2008) highlighted the fact that knowing students' emotions was important to carry out a good teaching process, due to the links between cognition and emotion. These relationships have been described by explaining that students experience confusion when they face obstacles in their objectives, or detect contradictions, incongruities or anomalies in the teaching process (Festinger, 1962; Graesser & Olde, 2003). If confusion is not resolved it can lead to irritation, frustration, anger and sometimes even rage. It is therefore understandable that multiple studies have concluded that negative emotions such as anger, anxiety and boredom are negatively correlated with academic performance (Pekrun, 2006; Pekrun et al., 2011). However, too low values have also not been found to be positive for emotions such as anger (Lane et al., 2005; Pekrun et al., 2011). On the other hand, a learner can experience a range of positive emotions (such as enjoyment) when challenges are faced, knowledge is uncovered, and concepts are mastered. Students who are actively engaged in the learning process can have a flow-like experience, when they are so engrossed in the material that time and fatigue disappear (Csikszentmihalyi, 2014). In fact, a

positive emotion such as hope is considered to have sufficient potential to redirect underachieving students (Dixson, 2019).

Another factor that has been linked to academic performance is the practice of physical activity (PA) and some related concepts such as sedentary behavior or physical fitness. In a longitudinal study, Pellicer-Chenoll et al. (2015) concluded that the cluster of students with higher PA and fitness had a lower body mass index (BMI) and higher academic performance compared to classmates who performed less PA. In turn, the cluster of students with the lower PA showed lower levels of physical fitness, higher BMI and lower academic performance than the rest of the student's profiles. Several studies have found this kind of relationship between PA (Marques et al., 2017; Morales, Pellicer-Chenoll, et al., 2011; Rasberry et al., 2011; A. Singh et al., 2012; Sullivan et al., 2017) or physical fitness (Coe et al., 2013; Van Dusen et al., 2011; Wittberg et al., 2009) and academic performance. However, there are even studies that argue that there is no conclusive evidence on the beneficial effects of PA on students' overall cognitive and academic performance (Rasberry et al., 2011). These discrepancies between the different studies may be due to different conceptions of academic performance and the way of measuring and considering the practice of PA. In general, the relationship between the two variables is considered positive or non-existent (Singh et al., 2019).

The possibility of sedentary habits having a negative influence on academic performance (apart from the fact that PA could have a positive influence) has also been explored. Peiró-Velert et al. (2014), observed the influence of the time spent in the sedentary use of screens (e.g., video games, mobile phones, television...) on academic performance. The results showed that there was an inversely proportional relationship between academic performance and the use of screens.

Student engagement has also been explored as a possible factor with an influence on academic failure. Carini et al. (2006), corroborate that student engagement is positively linked to desirable learning outcomes such as critical thinking and grades. Dogan (2015) analyzed this factor divided into three engagement dimensions: cognitive, behavioral and emotional. His results showed that cognitive engagement predicted academic performance, but emotional and behavioral engagement were not predictors. Other studies mentioned that behavioral engagement is important to achieve positive academic results and prevent dropping out (Connell & Wellborn, 1991; Finn, 1989).

As explained above, it is now known that these factors in isolation have an impact on academic performance. However, a limited number of studies have been published with the aim of developing an early detection system of academic failure using most of the above factors.

Casillas et al. (2012), examined the combined effects of predictor variables on estimating academic failure. His findings highlight the importance of using

several predictor factors (i.e., psychosocial, and behavioral) to achieve an accurate estimation of students at risk of drop out.

Davis et al. (2014), conducted a study that assessed the extent to which several social-emotional skills learning (academic self-efficacy motivation, social connections, importance of school and school management, management of psychological and emotional distress, and academic stress) could be used as predictors of academic outcomes. Their results indicated that the combination of social-emotional learning subscales effectively discriminated between students who made positive progress toward high school graduation and those identified as having dropped out.

Zhang et al. (2018), focused their efforts on finding out the type of predictive model that achieved the best accuracy. They made a comparison between classification models, such as naive Bayes, support vector machines, decision tree and multilayer perceptron. They obtained better results with the last two. In fact, other studies have used decision trees as the analysis method to predict school drop-outs and have found results with a relatively high accuracy in their estimations (Quadri & Kalyankar, 2010; Veitch, 2004). It should be noted that this analysis for this type of study is highly relevant and important compared to other predictive analyses due to its efficacy and multiple benefits. For example, decision tree can handle different kinds of input data (i.e., nominal, numeric, and text), it is easy to understand, and it can process erroneous data set values, among others (Rokach & Maimon, 2014).

As a summary of the factors most frequently used to predict academic failure or success, we refer to one of the most recent reviews, conducted by Alyahyan and Düşteğör (2020), which provides information on the variables most commonly used in this type of study, based on York's (2015) (York et al., 2015) definition of academic success. According to this review, student demographics and psychological factors have proved to be two of the most widely used for prediction, along with prior academic achievement and students' environment factors.

As can be seen, although the theoretical basis seems to have a solid foundation on the most influential factors, other relevant factors such as PA, BMI or sedentary habits have not been addressed. There is, however, ample literature that has demonstrated their influence on academic achievement. This could be because the studies carried out with these types of variables have focused on examining academic performance rather than academic failure or pass. For this reason, it is quite possible that these factors have not appeared as relevant because they have not been analyzed.

As has been explained above, some studies have used relatively novel analysis methods (such as decision tree) to predict academic failure using combinations of psychological and demographic variables. However, no studies have been published

on developing early detection systems of academic failure using combinations of not only psychological and demographic characteristics but also variables related to lifestyles, like the practice of PA and sedentary activities. Therefore, we consider our work to be novel, as it includes the most influential factors on the prediction of students' academic success studied, according to Alyahyan and Düştegör (2020), so far plus other elements and aspects that had not been considered in an interrelated manner until now, as BMI, PA or sedentary habits. Furthermore, the application of a multifactorial and non-linear analysis, such as the decision tree, avoids the limitations that linear analyses may entail (e.g., reduction of statistical power when many factors are added or multicollinearity) and, in addition, this analysis provides classification and prediction results that can be easily interpreted visually. Last, the importance of this type of study lies in the fact that if a combination of factors that can identify school failure is found, in turn, actions can be promoted to help avoid them and thus seek to achieve success.

The aim of this study was therefore to develop a predictive model of academic achievement (school success or failure) by means of decision tree analysis, using emotions on attending to school, school engagement, PA, leisure time spent in sedentary activities that require the use of screens, socio-demographic characteristics, and school adjustment variables.

METHODS

Study design and participants

A cross-sectional study was carried out to design a system for the early detection of academic failure in students of third and fourth grades of secondary education in Spain. For this, students completed a set of questionnaires at the beginning of one quarter to measure PA, hours spent on screen sedentary activities, socioeconomic status, emotions related to class attendance, school engagement and school adjustment. These variables together with the BMI were used as input variables to design a classification tree to predict the academic results (success or failure) at the end of the quarter (output variable).

The sample was composed of 219 adolescents (aged 14 to 16). The participants were recruited from the compulsory secondary education schools in Valencia (Spain). The inclusion criteria were: i) should be between 14 and 16 years old (both inclusive), ii) not be neurologically or intellectually unable to understand and complete the questionnaires, and iii) refusal of their progenitors to participate in the study. The participants' characteristics are reported in Table 1.

Table 1*Students' characteristics*

Variable	Total sample (n=219)	Male (n=100)	Female (n=119)
Age (years)	14.94 (0.79)	15.05 (0.79)	14.84 (0.77)
Height (cm)	167.95 (8.82)	173.36 (7.96)	163.42 (6.73)
Weight (kg)	61.52 (11.16)	66.52 (11.91)	57.26 (8.49)
BMI percentile	61.93 (24.94)	63.77 (26.62)	60.38 (23.45)

Note. Data expressed as mean (standard deviation). BMI = Body Mass Index.

The procedures applied in this study were approved previously by the Institutional Review Board of the University of Valencia (Code: 1503291) while also meeting the requirements set out in the Declaration of Helsinki (1975, subsequently revised in 2008). The parents of the participants supplied their written informed consent before participating in the experiment.

Measures

All the measures were taken at the participants' high school in their habitual classroom. The researchers explained how to complete the set of questionnaires and resolved the students' doubts. The time required to fill out all the questionnaires was between 50-60 minutes.

It should be noted that the questionnaires were administered at the beginning of the quarter. This allowed establishing a predictive relationship between the input variables and academic failure. The academic qualifications for each student obtained at the end of the quarter were anonymized. Their academic performance was codified as "suspended" if the student did not pass one of the subjects (academic failure) or "approved" if the student passed all the subjects in the quarter (academic success).

Family Affluence Scale (FAS) II

This is a questionnaire to determine the socioeconomic status (SES) of the families of adolescents in European and North American countries (Currie et al.,

2008). Four objective questions were asked to quantify vehicles, vacation trips, personal bedroom, and computers, to estimate family wealth. The answers were codified from 0 (minimum number of vehicles, trips...) to 3 (maximum number of vehicles, trips...) depending on the number of possible responses of each item. The final score of the scale was computed as the mean value of the items' scores, 0 being the lowest SES and 2.25 the highest.

Body Mass Index Percentile

Weight and height were self-reported by the participants and BMI (kg/m²) was calculated. It should be noted that Sherry et al. (2007), reported good validation results of the self-reported weight and height in adolescents. Growth tables (Kuczmarski et al., 2000) were also used to calculate the BMI percentile (adjusted for age and sex).

Physical Activity Questionnaire for Adolescents (PAQ-A)

PAQ-A was first validated by Kowalski et al. (1997), as a modified version of the PA questionnaire for older children. They found a good convergent validity of this questionnaire in measuring the general PA level of high school students. Later, Martínez-Gómez et al. (2009), validated the Spanish version of the PAQ-A obtaining moderate relationships with accelerometer data ($\rho = 0.34 - 0.39$). This questionnaire is useful for measuring PA levels from very low to very intense in the last 7 days and is appropriate for teenagers between the ages of 13 and 18. It consists of eight questions that assess different aspects of the PA performed by the adolescent in different periods of the day. PAQ-A is a simple questionnaire, easy to complete and manage in the school environment. The overall result of the test is a score of 1 to 5 points (1 the lowest value and 5 the highest value) to determine the level of PA performed by each teenager.

Adolescent Sedentary Activity Questionnaire (ASAQ)

ASAQ is used to measure time spent in a range of sedentary behaviors outside school hours during a normal week (Hardy et al., 2007). In brief, in this questionnaire, participants answer questions about fifteen sedentary habits, with details of how long (hours and minutes) they carry out each one every week. For this study, only the seven items referring to leisure sedentary activities that required the use of a screen technology were used. The final score for the leisure time spent in sedentary

activities in front of screens was computed as the total time reported in each of these scores in minutes.

Emotional Scales Questionnaire Related to Class Attendance (AEQ)

The AEQ was first designed by Pekrun et al. (2011), to measure the emotions experienced by students in relation to class attendance. The complete questionnaire consists of 24 scales measuring several emotions that are organized in three sections to assess class-related, learning-related, and test-related emotions. The items are answered based on a 5-point Likert scale, where the lowest value (1) refers to total disagreement with the statement, while the highest value (5) corresponds to complete agreement with what the item expresses. For this study, we selected the 42 items of the scales for enjoyment (8 items), anger (7 items), anxiety (11 items), boredom (9 items) and hope (7 items) during class assistance (class-related emotions) in the Spanish version. This version of the questionnaire was validated by Rosas (2015), who found good parameters regarding reliability and structural and construct validity. The final score for each subscale is computed as the mean value of its items.

School Engagement Measure Questionnaire (SEM)

The School Engagement Measure questionnaire consists of 19 items, with a Likert format with a range of 5 points (Fredricks & McColskey, 2012). The Spanish version of the questionnaire was validated by Díaz et al., (2016), who determined that 16 items were clustered into three engagement subscales: behavioral (4 items; e.g., “I pay attention in class”), emotional (5 items; e.g., “I am interested in the work at school”) and cognitive (7 items; “When I read a book, I ask myself questions to make sure I understand what it is about”) engagement. The cognitive engagement refers to the level of taking part in school life and developing complex reasoning skills (Doğan, 2014). The concept of emotional engagement includes the student’s interest in school is accepted as the student’s reactions in the classroom and the student’s level of interest, boredom, unhappiness, happiness, and anxiety (Skinner et al., 1990). Finally, behavioral engagement is linked with participation in academic, social, or extracurricular activities. The score of each dimension is calculated as the mean value of the items assigned to that subscale.

Brief Multidimensional School Adjustment Scale

The Brief Multidimensional School Adjustment Scale assesses the degree to which the adolescent is integrated into the school environment (Rubia et al., 2010). It consists of 10 items with a Likert format with a range of 6 points, which are divided into 3 dimensions: i) problems of adaptation to the school environment (items 6, 7, 8, 9 and 10), ii) self-perception of school performance (items 1, 2 and 5), and iii) intention to go to university (items 3 and 4). Of all the dimensions, only the self-perception of school performance and intention to go to university were used and computed as the mean of the items that make them up. It measures a positive and integrated self-concept as a student, as well as expectations of continuing with higher education (Rubia et al., 2010).

Statistical Analysis

Data analysis was performed using the Matlab R2018a program (Mathworks Inc., Natick, USA). First, a classification tree was applied to obtain a prediction model of academic performance (i.e., students suspend some subjects) using as input variables SES, BMI percentile, PA, leisure time spent in front of screens, enjoyment, hope, anger, anxiety, boredom, behavioral engagement, emotional engagement, cognitive engagement, self-perceived school performance and intention to go to university.

The classification tree was validated using a subsample of the dataset. This technique consists of dividing the total number of available cases (i.e., 219) into two data sets: training (i.e., 80% of cases; $n = 176$) and validation (i.e., 20% of cases; $n = 43$). No significant differences were found between the training and validation datasets in the variables used in this study. The training dataset was then used to obtain the decision tree, while the validation dataset was used to verify its validity. The decision or classification tree is a method that divides the sample into two subgroups using an independent explanatory variable. For this, a cut-off point of the explanatory variable is established, which divides the sample into two sub-nodes based on the value of the subjects in the variable, i.e. the cases that are above the threshold from a group and the cases that are below form the other group. This process is repeated for each subgroup, until all the cases are correctly classified.

In this study, the CART algorithm with the deviance was used as the as the split criterion, which is a binary algorithm that divides each group into two subgroups. In addition, to avoid possible over-training (avoiding low external validity) a condition was laid down during the training process that each node should have at least 10 cases to reduce the final number of nodes and divisions. The classification

tree thus divides adolescents according to discriminating variables to classify all participants according to whether they passed all subjects (i.e., approved) or not (i.e., suspended).

Once the model was obtained, it was applied to the validation data set to obtain classification performance variables. The accuracy of the classification and the suspended and approved prognostic values were computed. These variables were calculated as described in Eqs. (1, 2 and 3).

$$\text{Accuracy (\%)} = \frac{\text{True Approved} + \text{True Suspended}}{\text{Total sample}} \cdot 100 \quad \text{Eq. 1}$$

$$\text{Suspended prognostic value (\%)} = \frac{\text{True Suspended}}{\text{True Suspended} + \text{False Suspended}} \cdot 100 \quad \text{Eq. 2}$$

$$\text{Approved prognostic value (\%)} = \frac{\text{True Approved}}{\text{True Approved} + \text{False Approved}} \cdot 100 \quad \text{Eq. 3}$$

RESULTS

In the following section, the results obtained are provided with respect to the descriptive data of the sample, as well as those of the decision tree. Descriptive data are shown in Table 2.

Table 2
Descriptive data of the input variables of the classification tree

Variable	Approved students	Suspended students	All Students
Socio-Economic Status	2.62 [2.53–2.72]	2.43 [2.35–2.52]	2.52 [2.45–2.58]
BMI percentile	58.43 [53.31–63.55]	64.66 [60.30–69.03]	61.93 [58.61–65.25]
Physical activity	2.43 [2.28–2.57]	2.38 [2.25–2.50]	2.40 [2.30–2.49]

Variable	Approved students	Suspended students	All Students
Leisure time spent in front of screens	315.40 [266.04–364.76]	367.73 [325.59–409.87]	344.79 [312.79–376.79]
Enjoyment	2.65 [2.48–2.81]	2.31 [2.15–2.46]	2.46 [2.34–2.57]
Hope	3.36 [3.16–3.57]	2.84 [2.65–3.02]	3.07 [2.93–3.21]
Anger	2.25 [2.10–2.40]	2.52 [2.33–2.71]	2.40 [2.28–2.53]
Anxiety	1.90 [1.72–2.07]	2.25 [2.07–2.43]	2.09 [1.97–2.22]
Boredom	2.75 [2.53–2.97]	2.99 [2.78–3.20]	2.88 [2.73–3.04]
Behavioral Engagement	3.98 [3.82–4.14]	3.49 [3.34–3.64]	3.70 [3.59–3.82]
Emotional Engagement	3.24 [3.04–3.44]	2.90 [2.74–3.07]	3.05 [2.92–3.18]
Cognitive Engagement	2.43 [2.27–2.59]	2.31 [2.18–2.44]	2.36 [2.26–2.46]
Self-perceived scholar performance	4.13 [3.93–4.33]	3.21 [3.02–3.40]	3.61 [3.46–3.76]
Intention to go to university	5.1 [4.78–5.42]	3.73 [3.37–4.09]	4.33 [4.07–4.59]

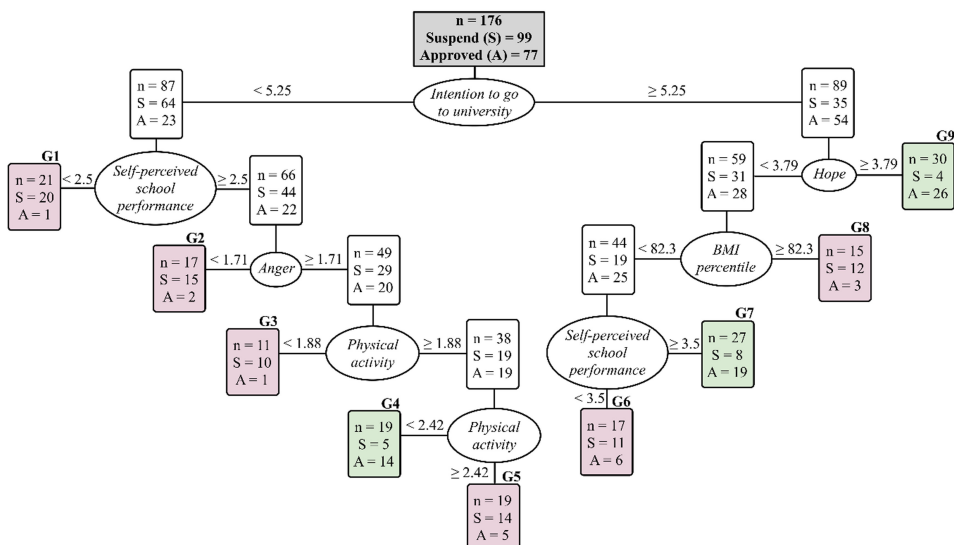
Note. Data expressed as mean [95 % confidence interval]. BMI = Body Mass Index.

The classification tree obtained with the training dataset is shown in Figure 1. The subjects assigned in this dataset are divided into subgroups using the input variables until the terminal nodes are reached. There were 9 terminal nodes, each representing a group of participants of the training data set. These terminal nodes are represented in Figure 1 as G1, G2, [...], G9 and were used to classify students based on academic failure (i.e., suspend) or success (i.e., pass).

As an example, the first node (i.e., G1) is explained below to clarify Figure 1. G1 consisted of 21 students, of whom 20 had suspended and 1 had passed the

evaluation. This is therefore considered an academic failure node with a participant grouping accuracy (from the training data set) of 95 % (i.e., 20 divided by 21). As the 21 students in this node presented an intention to go to the university lower than 5.25 points and a self-perceived school performance lower than 2.5 points, future students with these characteristics will have a high risk of school failure that should be reduced.

Figure 1
Classification tree for adolescents in Approve (A) and Suspend (S) stages



Note. BMI = Body Mass Index.

Table 3 shows the characteristics of each terminal node to clarify the results. In the first column, each terminal node classifies students by academic success or failure, based on the proportion of people who pass or suspend from the training data set that were classified in each of them. The following columns show the variables in each terminal node to describe the characteristics of each one.

Table 3*Characteristics of the terminal nodes of the decision tree*

	BMIp	PA	Hope	Anger	SP	IGU
G1 (Suspend)	–	–	–	–	<2.5	<5.25
G2 (Suspend)	–	–	–	<1.71	≥2.5	<5.25
G3 (Suspend)	–	<1.88	–	≥1.71	≥2.5	<5.25
G4 (Approve)	–	1.88–2.42	–	≥1.71	≥2.5	<5.25
G5 (Suspend)	–	≥2.42	–	≥1.71	≥2.5	<5.25
G6 (Suspend)	<82.3	–	<3.79	–	<3.5	≥5.25
G7 (Approve)	<82.3	–	<3.79	–	≥3.5	≥5.25
G8 (Suspend)	≥82.3	–	<3.79	–	–	≥5.25
G9 (Approve)	–	–	≥3.79	–	–	≥5.25

Note. body mass index percentile (BMIp), physical activity (PA), self-perceived scholar performance (SP), Intention to go to university (IGU).

Table 4 reported the performance of the decision tree to classify students from the training and validation data sets. From these results the decision tree was seen to perform well both in the training (80.11% accuracy) and validation (81.40% accuracy) datasets.

Table 4*Performance variables of the decision tree in both training and validation data sets*

	Decision tree	
	Training	Validation
Accuracy (%)	80.11	81.40
APV (%)	77.63	79
SPV (%)	82	83.33

Note. Abbreviations: APV, Approved Prognostic Value; SPV, Suspended Prognostic Value.

DISCUSSION AND CONCLUSIONS

The purpose of this manuscript was to develop an early detection system of academic failure by means of decision tree analysis using as potential input variables the emotions of students during class attendance, school engagement, intention to go to university, self-perceived school performance, socio-economic status, BMI percentile, PA and leisure time spent in sedentary activities that require the use of screens (e.g., watching TV). As supported by the results, the decision tree demonstrates a good classification accuracy as it was possible to implement this system in schools as an easy way of detecting adolescents at risk of suspending a subject. This system only requires the students to provide weight, height, PAQ-A (8 items), the items related with anger (7 items) and hope (7 items) during school attendance (i.e., from AEQ) as well as the items related with intention to go to university (2 items) and self-perceived school performance (3 items) from the brief multidimensional school adjustment scale. Therefore, although all the input variables used in this study are important factors in academic performance, not all of them are necessary to adequately predict school failure.

School failure is determined by the difficulties students encounter in reaching educational goals (Eisenberg et al., 2006; Enguita et al., 2010). As this is influenced by multiple factors, it is decisive to know which factors interfere to a greater or lesser extent in academic failure (Yu et al., 2018) to be able to develop early detection systems. To the authors knowledge, several studies have carried out an analysis focused on predicting academic failure (Casillas et al., 2012; Respondek et al., 2017; Yu et al., 2018). Casillas et al. (2012) use variables such as academic achievement, psychosocial characteristics and behavioral indicators, and Respondek et al. (2017) use perceived academic control and emotions (e.g., enjoyment, boredom and anxiety). Nevertheless, PA as well as the use of screen media technology during sedentary leisure activities have not been taken into account, despite the relationship found between these variables and academic performance (Morales, Pellicer-Chenoll, et al., 2011; Peiró-Velert et al., 2014).

By including all these variables in an analysis, a decision tree with high accuracy (i.e., 80.11 % in training data and 81.4 % in validation data) was obtained in our study. These results support previous studies, such as that of Zhang et al. (2018), who observed that the best methods to predict academic performance (five categories) were decision tree and multilayer perceptron (accuracy 57.41 and 62.04 % for the validation data set, respectively) as against Naïve Bayes or support vector machines (35.65 and 48.61 %, respectively). Vairachilai (2020), concluded that Naïve Bayes and decision tree had higher accuracy (77 and 71 %, respectively) than support vector machine (38 %). Finally, in the study by Ashraf et al. (2018), the decision tree was found to be the most accurate predictive analysis (97.3% accuracy). It should

be noted that Ashraf et al., did not apply a cross-validation procedure and their results (i.e., very high accuracy) could be indicative of an overtrained model. All in all, it can be said that the decision tree is a suitable tool for predicting academic performance and the performance parameters of our study are similar or higher than those presented in other studies with a similar classification purpose.

It should be noted that the decision tree obtained in this study determines the characteristics of the student groups that approved or suspended all the subjects. The results determined nine groups (terminal nodes of the decision tree), of which six represent groups of students that failed in some subject while the other three represent students who passed all the subjects.

Thus, there are six combinations of characteristics that lead to academic failure in adolescents. For example, students allocated in G1 (Figure 1) did not present a high intention to go to university and showed low self-perceived school performance, resulting in many probabilities (i.e., around 95 %) of suspending some of the subjects of the course (i.e., G1 in figure 1). But what is really interesting is that, on the left branch of the tree, the students with the intention of going to university lower than 5.25 need to have a relatively high score in self-perceived school performance (≥ 2.5), to experience at least a minimum level of anger (≥ 1.88) during some events attending school and to perform a moderate level of PA (from 1.88 to 2.42 points) to reach academic success (i.e., pass all subjects). Students with the intention of going to university lower than 5.25 who present any other combination of the above variables will have a high probability of failing a subject (i.e., G1, G2, G3 and G5 of figure 1). This fact is highly relevant for suggesting strategies to help these students, who have a moderate desire to go to university, to pass high school assessments. For example, if a student allocated in G3 is detected, it could be interesting to promote active lifestyles with the objective of moderately increasing the PA performed by the student in the hope of changing from G3 (failure) to G4 (success).

As can be seen in this decision tree, the intention to go to university is a variable of great importance, as it is necessary to know the rest of the factors that influence students. In contrast, in a previous study it had not been considered as an effective predictor variable (Fernandez-Lasarte et al., 2019). This may be due to the fact that this study has not analyzed this factor using non-linear analyses, which modulate the weight of each predictor variable by interrelating it with the other variables.

These results are in line with previous studies. On the one hand, it may seem contradictory that a very low value of anger is an important characteristic in determining school failure in some students (i.e., G2) since multiple studies mention that a high degree of anger is negative for academic performance (Pekrun, 2006; Pekrun et al., 2011). Nevertheless, some studies conducted, such as those by Pekrun et al. (2011) and Lane et al. (2005) concluded that a certain amount of anger can have positive effects on academic performance, while both very high and very low values

of anger are negative for students' academic achievement. This could be explained by the students' control of their emotional intelligence, since Parker et al. (2004) suggested that individuals with a high level of emotional intelligence are aware of the positive effects of anger on academic performance and are able to regulate their mood to reach appropriate states and achieve academic success. Therefore, if a student with a very low level of anger (i.e., allocated in G2) is detected, it would be interesting to analyze his or her ability in the emotional intelligence domain so that he or she can control emotions such as boredom (Pekrun et al., 2010), hopelessness (Titz, 2001) and anger, which, without proper control, can destabilize the emotional state and thus avoid school failure.

On the other hand, the results extracted from Groups 3, 4 and 5 corroborate that it is necessary for students to have a moderately active life in order to be academically successful. G3 (failure) reaffirms that lack of PA is positively correlated with school failure (Pellicer-Chenoll et al., 2015) and, inversely, G4 (success) corroborates that the moderate practice of PA is positively related to academic success (Morales, González, et al., 2011; Morales, Pellicer-Chenoll, et al., 2011; Pellicer-Chenoll et al., 2015). These results can be explained by neurophysiological reasons (Hillman et al., 2005; Tomporowski et al., 2008; van Praag, 2009), since physical exercise improves blood flow to the brain and thus cognitive functions are improved, or by psychosocial reasons (Sallis et al., 1999; Sigfúsdóttir et al., 2007), since PA is positively associated with mental health, self-esteem, emotional well-being and self-concept, which may have a positive influence on academic performance (Pellicer-Chenoll et al., 2015). Even so, this correlation between PA and academic performance is not entirely linear and Morales, Pellicer-Chenoll, et al. (2011) have already suggested that high levels of PA do not lead to improvements in academic performance, which would support the results found in G5 (failure). In other words, the relationship between PA and school performance could be non-linear, since the moderate levels are those most linked with school achievements (i.e., quadratic function).

Considering the right branch of the tree, it should be noted that there are two groups of characteristics that lead to academic success: i) intention to go to university equal or higher than 5.25 and experience hope during class attendance at least up to 3.79 points; and ii) intention to go to university equal or higher than 5.25, experience low-to-moderate levels of hope during class (i.e., <3.79), to have a BMI percentile lower than 82.3 and to have high self-perceived school performance (i.e., ≥ 3.5). A good way of helping students motivated to go to university is to be sure that they experience hope during class attendance (i.e., help these students to be allocated in G9) to dramatically improve their academic success. These results are in line with other studies, which observed a positive correlation between hope and academic performance and proposed the application of interventions to increase academic hope due to its benefits (Feldman & Kubota, 2015).

However, if hope cannot be encouraged to high levels in some students, a healthy lifestyle should be promoted to control the BMI percentile and prevent students from becoming overweight (i.e., 85 ≤ 94 percentile) or obese (>95 percentile) (Kuczmariski et al., 2000) so that they do not fail academically (i.e., G8). These results are in line with previous studies in which having a higher percentage of BMI can cause disconnection or lack of commitment to academic work (Finn et al., 2018; Peterson et al., 2012). Those who are overweight or obese may have lower productivity due to health problems, which may be related to social, psychological and affective issues (Shaw et al., 2015). Since childhood overweight and obesity are related to PA, diet, and sedentary lifestyle, those students with healthy lifestyles could therefore have a lower BMI and probably achieve good academic performance (Pellicer-Chenoll et al., 2015). The results obtained in previous studies are therefore corroborated, confirming that obesity is important in determining academic performance and consequently that healthy lifestyles are also important factors. However, although healthy habits are important for academic success, the results of this study determine that the educational system should also try to make the students have a moderate-to-high self-perceived school performance in order to achieve academic success (i.e., G7) and avoid failure (i.e., G6), as shown in both branches of the tree. Therefore, if there is not high motivation to go to university and high hope feelings, then teachers should encourage this aspect more strongly by promoting moderate-to-high self-perceived performance in order to avoid academic failure. One way to improve self-perceived school performance could be to adjust the difficulty of classroom tasks to the level of the students, trying to find tasks that are difficult for them but at the same time accessible and passable. This would reduce stress and maintain psychological and emotional health (Solberg et al., 1998). Furthermore, this factor is even more relevant when observing the results of previous studies, where it has been found that a decrease in self-perceived school performance leads to a decrease in academic expectations (García-Escalera et al., 2020). This suggests that, for example, if a student is in G6, if his or her self-perceived school performance is not promoted, he or she could move to G1, increasing the probability of academic failure (see the ratio of failures and passes in these groups in Figure 1 to understand this example). In fact, Godoy et al., (2013) concluded that a negative academic self-perception can be a determining factor in academic performance, and they mention the need to work on students' self-perception at school because this could promote the improvement of academic performance (Moreira et al., 2016).

As has been demonstrated in the above paragraphs, knowing the characteristics of these groups would not only be interesting for understanding the nature of failing in the academic process, but also for implementing strategies to help students to be successful in school. The decision tree thus has two main practical applications:

to detect students at risk of academic failure and to provide an individualized orientation to design strategies to avoid failure.

A strong point of this study was its use of a decision tree approach for testing multifactorial combinations including variables related to active lifestyles. Also, it was carried out in only one city, so that its findings should be corroborated and extended to other places with a higher number of participants to increase the generalizability of the results. Another limitation is the limited number of input variables, since other interesting variables such as dietary habits or school social relationships could increase the performance of the decision tree in classifying students according to their academic results.

Practical application

This predictive model of academic achievement presented in this study can have a practical transfer of knowledge to the education system, as it could be used as a tool to detect school failure. This tool would make it easier to guide the intervention of education professionals to improve their situation (i.e., teachers and specialist professionals). In order to implement it properly, school management should make these questionnaires available, as well as an explanation of their use. In addition, to further improve their usability, policy-makers could create a learning course or create a web application that explains, step by step, the procedure and provides feedback to address each detected situation of possible academic failure. In any case, a detailed explanation of how to apply this system with the tools currently available is presented below. These steps should only be followed for those students whose grades are low or who the teacher/professional feels may need it:

1. Answer the questions 3 and 4 of the *Brief Multidimensional School Adjustment Scale*. If the result is equal to or higher than 5.25 read point 2.a. and if it is lower than 5.25 read point 2.b.
- 2.a. Answer the 7 *hope* items of *Emotional Scales Questionnaire Related to Class Attendance (AEQ)*. If the result is lower than 3.79, the teacher would weigh and measure the student to calculate the BMI percentile. If the BMI percentile is equal or higher than 82.3, this student needs to be helped based on these characteristics. Instead, if the student has a lower percentile of 82.3, he/she must answer questions 1, 2 and 5 of the *Brief Multidimensional School Adjustment Scale*. If the result is lower than 3.5, this student also needs to be helped. In this way, with a maximum of 12 simple questions and the calculation of the BMI percentile, the academic achievement of the student and the reasons for his or her performance could be determined.

2.b. Answer the questions 1, 2 and 5 of the *Brief Multidimensional School Adjustment Scale*. If the result is lower than 2.5, this student needs to be helped based on these characteristics. However, if the result is equal or higher than 2.5, this student must answer the 7 *anger* items of *Emotional Scales Questionnaire Related to Class Attendance (AEQ)*. If the result is lower than 1.71, this student needs to be helped based on these characteristics. Last, if the result is equal or higher than 1.71, this student must answer the *Physical Activity Questionnaire for Adolescents (PAQ-A)* (8 items). If the result is lower than 1.88 or equal or higher than 2.42, this student needs to be helped based on these characteristics. In this way, with a maximum of 18 simple questions the academic achievement of the student and the reasons for his or her performance could be determined.

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The effect of executive functions on early mathematical skills: a structural equation model

El efecto de las funciones ejecutivas sobre la competencia matemática temprana: un modelo de ecuaciones estructurales

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ABSTRACT

Although the role of executive functions in childhood mathematics learning has been extensively studied, there is no consensus on the specific contribution of each executive function in the development of early mathematical skills. This study aimed to determine the validity of a structural equation model of the executive functions of verbal working memory, behavioral inhibition, cognitive inhibition, cognitive flexibility, and planning to explain the variability in the level of development of early mathematical skills in children in kindergarten. We implemented a cross-sectional design of descriptive correlational cut, in which 130 students in the second cycle of early childhood education participated, 64 girls (49.2%; M=66.50 months, SD=7.95 months), 66 boys (50.8%; M=65.30 months, SD=8.10 months), belonging to four Chilean schools. We used five executive tasks and a test of early mathematical skills for the assessments. We performed descriptive analyses, correlations,

and structural equation modeling to determine the combined statistical effect of executive functions on early mathematical skills. The results show that the five executive functions explain 57.3% of the variability of the scores achieved by children in early mathematical skills, highlighting the role of verbal working memory, cognitive flexibility, and planning. These results represent a significant contribution to current knowledge on the executive functions that may explain the differentiated performance in mathematics of children in early childhood education, providing relevant information to teachers regarding the executive demands necessary for each mathematical skill, which may favor the integration of teaching strategies that incorporate the stimulation of executive functions in classroom work, thus promoting improvements in the learning of this disciplinary area.

Keywords: working memory, inhibition, cognitive flexibility, planning, mathematical skills, childhood education

RESUMEN

Si bien el rol de las funciones ejecutivas en el aprendizaje de las matemáticas en la infancia ha sido largamente estudiado, no existe consenso respecto del aporte específico de los distintos componentes de las funciones ejecutivas en el desarrollo de las competencias matemáticas tempranas. El objetivo de este estudio fue determinar la validez de un modelo de ecuaciones estructurales de las funciones ejecutivas de memoria de trabajo verbal, inhibición conductual, inhibición cognitiva, flexibilidad cognitiva y planificación para explicar la variabilidad del nivel de desarrollo de las competencias matemáticas tempranas de niños y niñas de Educación Infantil. Se implementó un diseño transversal de corte descriptivo correlacional, en el cual participaron 130 estudiantes de segundo ciclo de Educación Infantil, 64 niñas (49.2%; M=66.50 meses, DT=7.95 meses), 66 niños (50.8%; M=65.30 meses, DT=8.10 meses), pertenecientes a cuatro centros educativos chilenos. Para las evaluaciones se utilizaron cinco tareas ejecutivas y un test de habilidades matemáticas tempranas. Se realizaron análisis descriptivos, correlaciones y modelos de ecuaciones estructurales, para determinar el efecto estadístico combinado de las funciones ejecutivas sobre las habilidades matemáticas tempranas. Los resultados evidencian que las cinco funciones ejecutivas explican el 57.3% de la variabilidad de las puntuaciones alcanzadas por los niños y niñas en las competencias matemáticas tempranas, destacando el rol de la memoria de trabajo verbal, la flexibilidad cognitiva y la planificación. Estos resultados suponen una importante contribución al conocimiento actual sobre las funciones ejecutivas que explican el desempeño diferenciado en matemáticas de niños y niñas de Educación Infantil, aportando información relevante a los docentes respecto a las demandas ejecutivas necesarias para cada habilidad matemática, lo que puede favorecer la integración de estrategias de enseñanza que incorporen la estimulación de las funciones ejecutivas en el trabajo de aula, promoviendo así mejoras en el aprendizaje de esta área disciplinar.

Palabras clave: memoria de trabajo, inhibición, flexibilidad cognitiva, planificación, habilidades matemáticas, educación infantil

INTRODUCTION

Mathematical performance is a basic instrumental skill for all educational systems. However, it is estimated that the rate of school-age children facing mathematical learning difficulties ranges between 1 and 7 % (Mammarella et al., 2021). These problems generally appear early, and continue over time (Chu et al., 2016) and despite this evidence, there is little identification for it within Early Childhood Education, meaning that learning difficulties are often undetected until after several years in school, increasing its persistence (Zhang et al., 2019).

In order to foresee these problems, there have been sizable efforts at the school level in recent decades to strengthen the so-called early mathematical skills of children in Early Education, since these are considered fundamental skills for learning the discipline and arise as a potent, stable predictor for academic achievement in both mathematics and other areas (Devlin et al., 2022).

From a theoretical standpoint, early mathematical skills include the abilities to understand, evaluate, and use mathematics in various intra- and extra-mathematical situations and contexts where they are needed (Cerdeña et al., 2012). Current theoretical positions about these mathematical skills broaden the reductionist focus of emphasizing only the development of relational logic skills as a basis for numbers acquisition (Piaget, 1965). Authors like Van de Rijt and Van Luit (1998) proposed an interactionist focus to explain the development of early mathematical skills, integrating logical thinking or Piaget operations into the development of numerical skills, such as subitization, counting experience, or general number knowledge (Barrouillet & Camos, 2003).

The present study intends to understand, conceptualize, and operationalize the early mathematical skill construct, with the skills to resolve a set of tasks in these two areas (Cerdeña et al., 2012). There will be a definition of eight elementary domains for early mathematics, namely comparison, classification, correspondence, seriation, verbal counting, structured counting, resultant counting, and general number knowledge, all of which are homologized to the structure of the early mathematical evolution scale used in this study (Van Luit & Van de Rijt, 2009).

Various authors have concluded that all these skills are developed at an early age, before entering school, and that they are a requirement to be able to follow a formal mathematical education (Aragón et al., 2015; Wongupparaj & Kadosh, 2022), since they are the basis for more advanced skills which help continue with acquiring more complex mathematical knowledge and skills in later school stages (Devlin et al., 2022; Purpura et al., 2017). This makes it important to evaluate children in Early Education, where the basis of future learning takes shape.

While there are authors who say that early mathematical skills predict future results, even more than the cognitive skills of the subject (Chu et al., 2016), others

have centered on describing how the presence of higher cognitive processes at an early age can predict or at least explain differentiated mathematical performance (Cheung & Chan, 2022; Morgan et al., 2019), which has opened a fruitful line of research in order to examine possible precursor variables for early mathematical skills, especially within the realm of executive functions.

Executive functions and mathematical skills

Various studies have focused on determining the executive functions which can play a relevant role at an early age in acquiring and developing mathematical skills (Cheung & Chan, 2022; Wongupparaj & Kadosh, 2022), showing that children who begin Early Education with better executive skills have a mathematical performance advantage which can persist during their school years (Bernal-Ruiz et al., 2020).

Executive functions are higher-order cognitive processes which order and direct all cognitive and behavioral operations (Diamond, 2020) and are composed of at least three related, but distinct, cognitive domains. They allow individuals to exert greater control over information processing and behavior (Morgan et al., 2019). These are working memory, inhibition, and cognitive flexibility (Diamond, 2020; Miyake et al., 2000). Working memory implies simultaneous maintaining and manipulation of information during task execution (Allen et al., 2021); its content can be verbal or visuo-spatial (Diamond, 2020). Inhibition is the ability to annul a dominant or overwhelming response in favor of a more adaptable one (Diamond, 2020), and is itself divided into behavioral and cognitive inhibition, with the former related with impulse management and self-control and the second with selective attention (Diamond, 2020).

Finally, cognitive flexibility integrates focus, maintenance, and flexible adaptation to changing objectives or stimuli (Arán & Krumm, 2020). Planning and problem solving arise from these three components (Diamond, 2020).

On these grounds, various studies have indicated the significant role played by executive functions in developing mathematical skills, contributing empirical evidence on the close relation between both constructs (Cheung & Chan, 2022).

Within the components of executive function, Morgan et al. (2019) studied working memory, cognitive flexibility, and inhibition among kindergarteners as predictors for their academic achievements during second grade, concluding that the three components of the executive functions could significantly and positively predict achievements in reading, math, and science. In turn, Purpura et al. (2017) indicate that inhibition is widely related with emerging aspects of mathematics, and working memory is related with more complex aspects, while cognitive flexibility concerns the more conceptual or abstract components of this discipline. Simanowski & Krajewski (2019) concluded that working memory as a first factor and

inhibition and cognitive flexibility as a combined factor showed a strong association with number base elements.

Amongst the executive function components, working memory stands out as a fundamental variable for mathematical problem solving and for developing skills in this area (Allen et al., 2021). In the study by Aragón et al. (2021) analyzing general and specific domain precursors of informal mathematical skills, working memory was the most relevant predictor. For Fung et al. (2020), verbal working memory is the executive function with the strongest direct relation with mathematical skills in early ages. Similarly, cognitive flexibility emerges as a predictive factor in longitudinal studies, as it explains a significant amount of mathematical performance variation during early primary school years (Magalhães et al., 2020).

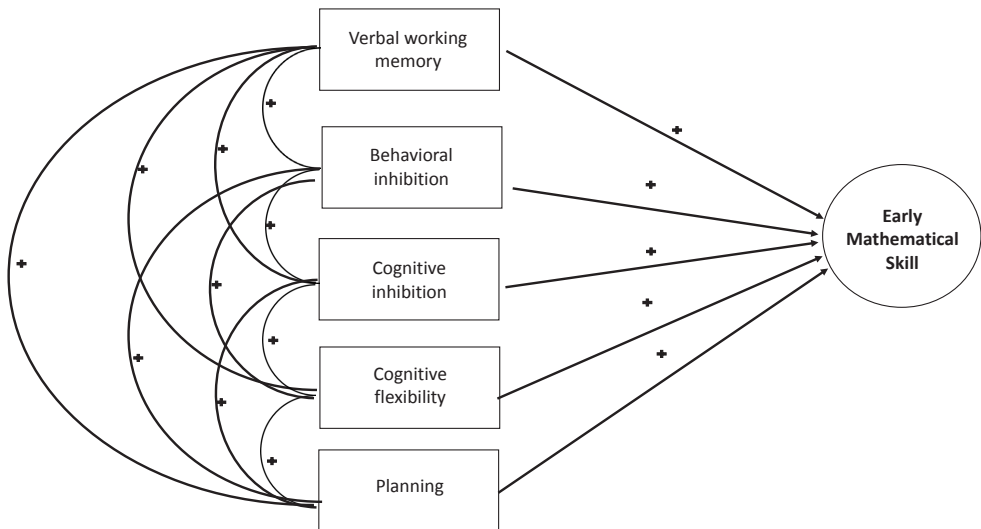
Despite the abundance of international studies about the relation between various components of executive functions and early mathematical skills, there is a limited body of evidence considering the specific role of executive function components in the specific domains of mathematics (Allen et al., 2021; Arán & Krumm, 2020). Most have examined relations between executive functions and general academic results in this discipline, using only a broad consideration of mathematics without considering that this discipline includes multiple components with varying cognitive complexity, making it fundamental to specifically know the underlying executive processes for each of them.

Considering this background, it is necessary to ask: Is it possible to establish a model where reciprocal interaction between executive function components (i.e. verbal working memory, behavioral inhibition, cognitive inhibition, cognitive flexibility, and planning) can explain varying development levels for early mathematical skills in the logico-relational and numerical dimensions, which examine tasks for comparison, classification, correspondence, seriation, verbal counting, structured counting, resultant counting, and general number knowledge, among children between 4 and 6 years old? Do any of these executive function components have a greater impact when explaining this variability?

The proposal is to examine the validity of a complex interaction model as a function of the aforementioned theoretical background, as illustrated in Figure 1. This model proposes that the variables for verbal working memory, behavioral inhibition, cognitive inhibition, cognitive flexibility, and planning are reciprocally, significantly, and positively interrelated, and that they in turn have a direct and positive relation with the scores achieved by children in early mathematical skills.

Figure 1

Hypothetical Structural Equation Model for Early Mathematical Skills



The following hypotheses are presented on the basis of the preceding paragraphs:

- H1: There is a covariation between verbal working memory, behavioral inhibition, cognitive inhibition, cognitive flexibility, and planning as independent variables explaining much of the score variations in early mathematical skills.
- H2: Verbal working memory is the most important predictor when explaining the percentage of variability explained by the set of executive function components regarding performance in early mathematical skills among children in Early Education.
- H3: The five executive function components are positively and significantly related with performance in early mathematical skill among children in Early Education.

METHOD

Research design

As a function of the objectives and hypotheses, the research assumes a quantitative paradigm with a correlational descriptive character, and a cross-sectional design, since the fundamental intention is to establish a relational predictive model for the various executive function components regarding early mathematical skills among children in Early Education.

Participants

The present study involved 130 students in the second cycle of Early Education, 64 girls (49.2%; M=66.50 months, SD=7.95 months) and 66 boys (50.8%; M=65.30 months, SD=8.10 months), belonging to four urban educational centers in the region of Valparaíso, Chile, of which two were charter establishments (N=89; 68.5%) and two were public (N=41; 31.5%). The latter two are funded entirely by the State, and mainly receive students with high social vulnerability. To determine students' social vulnerability in Chile, information is gathered from databases available from various public organisms, and a student vulnerability index (SVI) is assigned to schools according to the vulnerability of the students which enter them, which is directly proportional to student poverty levels. Therefore, higher student poverty leads to a higher SVI for the educational center. This index includes 23 indicators, such as the students' geographical zone, poverty condition, school diet, crowding, parents' education level and occupation, dental aspects, and more.

The exclusion criteria were: (a) any neurodevelopmental disorder diagnosis, (b) receiving medical or psychopharmacological treatment which can affect performance in the tasks applied for executive function and early mathematical skills, and (c) families not authorizing study participation.

Instruments

To evaluate executive functions, a battery of five tasks was defined with adequate psychometric properties for scientific research (Kurgansky, 2022).

To evaluate Verbal Working Memory, we used the "number inversion" task from Bateria IV COG by Woodcock-Muñoz (Woodcock et al., 2019), which is applied among children ages 2 and up. This task presents subjects with a series of 2 to 8 digits (5 tries each one), after which they must repeat the numerical sequence in inverse order. It lasts around 5 minutes and has a Cronbach's α of .84.

To evaluate Behavioral Inhibition, we used the “*Bzz! inhibition*” test from the TENI Neuropsychological Evaluation Test (Tenorio et al., 2012) for children ages 3 to 9. In this test, an electronic screen shows various bees which fly around making noise, which the child must squash during 1 minute by pressing them with a finger. After this, the subject is told that for a time (five minutes) they will be alone, and they must not touch the screen to squash the bees which continue making noise while flying across the screen. The child must then inhibit the desire to squash the bees and follow the instructions given. The result of this task is evaluated by whether or not the child was able to inhibit the bee-squashing action. If they could not stop, they are evaluated for how long they took to touch the screen again and how many times they did so. The test lasts 7 minutes, and has a Cronbach’s α of .9.

To evaluate Cognitive Inhibition, we used the Stroop “Sun-Moon” task (Archibald & Kerns, 1999). This task includes two paper pages with images of suns and moons randomly placed into files and columns. The first page is the congruent condition, where children must say “sun” for images with suns and “moon” for images with moons during 45 seconds. The second page is the incongruent condition, where children must say the opposite of the drawing they say as quickly as possible, saying “moon” when they see a sun and “sun” when they see a moon. The inhibition measurement is the sum of correct run-throughs of the incongruent condition. Its duration is around 3 minutes. This task has a high reliability level, with test-retest scores of .91 for the incongruent condition.

To evaluate Cognitive Flexibility, we used the “*Dimensional Change Card Sort*” (DCCS) test (Zelazo, 2006). In this test, children have to classify bivalent cards according to different rules (shape or color). Afterwards, the classification rule changes as a function of a mark on the cards. The test measurement is the number of correctly classified cards. The DCCS lasts around 7 minutes and has a Cronbach’s α of .94.

To evaluate Planning, we used the Porteus Maze Test (Porteus, 1965), consisting of 12 labyrinths on paper with increasing difficulty. It lasts for 5 minutes and presents adequate internal consistency, with a Cronbach’s α of .81 (Krikorian & Bartok, 1998).

Finally, to evaluate Early Math Skills we used the Early Numeracy Test (ENT) (Van Luit & Van de Rijt, 2009) previously adapted for Chile (Cerdeña et al., 2012), whose objective is evaluating early numerical knowledge, as well as detecting students with mathematical learning difficulties. It has 40 graphic items on paper, with a maximum score of 40 points – one for each correct item. The average test application time is 30 minutes, and it must be administered individually. The ENT evaluates 8 components of early mathematical education: comparison, classification, one-to-one correspondence, seriation, verbal counting, structured counting, resultant counting, and general number knowledge. The Cronbach’s α of the Chilean version is .91.

The test application order begins with the cognitive flexibility test. The subsequent order is: verbal working memory, cognitive inhibition, early mathematical skill, planning test, and finally the behavioral inhibition test. This is done in order to facilitate motivation, since the longest test (the mathematical test) is in the middle, and the final test is on the electronic device, which gets the most attention from children.

Procedure

An informative letter was initially sent to 6 educational centers in the region of Valparaíso, Chile, which have an agreement with the professional practice/internship department of the sponsoring University, in order to request authorization to perform the study on their premises. In the 4 centers which agreed to participate, meetings were held with the families of Early Education students in order to explain the objective, characteristics, and scope of the study, as well as to obtain authorization to carry out the study with their children via signing informed consent.

Students who were authorized by their families to participate in the study and who gave their own assent were individually evaluated on their executive functions and their early math skills by two psychologists with cognitive evaluation experience, in two sessions of around 30 minutes each in a quiet room during the school day. Pauses took place between tests to avoid fatigue or tiredness affecting results.

The present study implemented all procedures in accordance with the guidelines from the Singapore Declaration on Research Integrity (World Conferences on Research Integrity, 2010). Authorization was also obtained from the Research Ethics Committee of the sponsoring University.

Data analysis

In order to establish the characteristics presented by each of the variables examined, we began with descriptive analyses, with determinations of central trend measurements, variability, maximums, minimums, and confidence intervals, along with kurtosis and asymmetry indices for the general sample. Correlation analyses were also determined between all variables via the Pearson coefficient. Finally, to represent the interaction between the five independent variables and early mathematical skill we opted to perform a structural equation model. To analyze the hypothetical model (see Figure 1), the maximum robust likelihood (RML) estimation model was used, due to the mainly ordinal nature of the analyzed data (Flora & Curran, 2004). Similarly, a set of various indices was analyzed to place the suitability

of the proposed model in contrast, highlighting the χ^2 statistic, the comparative fit index (CFI), the non-normalized fit index (NNFI) and the root mean square error of approximation (RMSEA).

The data analysis software used was SPSS® along with EQS statistical software, version 6.2.

RESULTS

To begin, the study variables' univariant descriptive statistics were determined (see Table 1).

Table 1

Medians (M), standard deviations (SD), confidence Interval (C.I.), maximums and minimums, asymmetry, and kurtosis of variables

Variables	M	SD	C.I.	MIN-MAX	Asymmetry	Kurtosis
Verbal Working Memory	2.17	2.83	1.68-2.67	0 – 10	1.011	-0.168
Behavioral Inhibition	10.80	6.58	9.66-11.95	2 - 19	-0.260	-1.694
Cognitive Inhibition	18.76	8.47	17.28-20.25	0 - 40	-0.227	0.023
Cognitive Flexibility	8.59	5.54	7.62-9.56	0 - 16	-0.371	-1.023
Planning	132.49	39.69	124.52-138.46	59 - 171	-0.673	-1.108
EMS (*) Comparison	4.18	0.95	4.01-4.34	1 – 5	-1.129	0.907
EMS Classification	2.29	1.30	2.07-2.52	0 – 5	0.243	-0.243
EMS Correspondence	3.17	1.21	2.96-3.38	0 – 5	-0.410	-0.308
EMS Seriation	2.12	1.49	1.86-2.38	0 – 5	0.305	-0.801
EMS Verbal Counting	1.22	1.32	0.99-1.45	0 – 5	0.736	-0.514
EMS Resultant Counting	2.15	1.64	1.87-2.44	0 – 5	0.227	-1.158
EMS Structured Counting	1.96	1.39	1.72-2.20	0 – 5	0.279	-0.855
EMS General Number Knowledge	2.03	1.49	1.77-2.29	0 – 5	0.400	-0.759
EMS Total	19.12	7.94	17.74-20.50	4 - 38	0.223	-0.825

Note. (*) Early Mathematical Skills

In order to observe the type of relation between each of the five executive functions with the scores achieved in each of the mathematical skill dimensions, both logico-relational and numerical, we used the Pearson correlation coefficient. The correlation matrix, in turn, indicates that the five analyzed executive functions present significant positive associations with total early math skill scores, as well as with each of the specific dimensions and domains of this early mathematical skill. There is also a notable and significant positive relationship between the dimensions of the logico-relational and numerical skills with total early mathematical skill (see Table 2).

Table 2
Pearson correlation matrix for Executive Functions with Early Mathematical Skill

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Verbal Working Memory	1	.148	.280**	.399**	.277**	.221*	.313**	.393**	.562**	.568**	.497**	.625**	.535**	.656**
2. Behavioral Inhibition	1	.194*	.220*	.220*	.071	.209*	.233**	.175*	.128	.214*	.096	.141	.034	.203*
3. Cognitive Inhibition	1	.315**	.328**	.240**	.304**	.216*	.211*	.294**	.152	.294**	.152	.308**	.297**	.347**
4. Cognitive Flexibility	1	.149	.198*	.198*	.333**	.307**	.307**	.360**	.379**	.280**	.280**	.392**	.386**	.459**
5. Planning	1	.209*	.209*	.264**	.416**	.350**	.201*	.180*	.277*	.266**	.266**	.370**	.370**	.370**
6. EMS (*) Comparison	1	.251**	.188*	.271**	.239**	.255**	.236**	.414**	.410**	.410**	.410**	.537**	.400**	.706**
7. EMS Classification	1	.539**	.487**	.474**	.445**	.495**	.530**	.459**	.716**	.530**	.530**	.459**	.459**	.716**
8. EMS Correspondence	1	.588**	.488**	.504**	.504**	.504**	.504**	.504**	.760**	.504**	.504**	.504**	.504**	.760**
9. EMS Seriation	1	.593**	.626**	.585**	.799**	.626**	.585**	.799**	.761**	.626**	.585**	.799**	.799**	.761**
10. EMS Verbal Counting	1	.601**	.839**	.601**	.839**	.601**	.839**	.601**	.839**	.601**	.839**	.601**	.839**	.601**
11. EMS Structured Counting	1	.948**	.948**	1	.948**	.948**	.948**	1	.948**	.948**	1	.948**	.948**	.948**
12. EMS Resultant Counting	1													
13. EMS General Number Knowledge	1													
14. EMS Total	1													

Note. * $p < .05$; ** $p < .01$; (*) Early Mathematical Skill.

Finally, in order to respond to one of the study objectives and hypotheses, an analysis was done on the initial hypothetical structural equation model which examined the relations between the five executive functions considered as independent variables and early mathematical skill, considered as a dependent variable with a latent character (see Figure 2).

Figure 2
Structural Equation Model of Executive Functions related with components of Early Math Skill

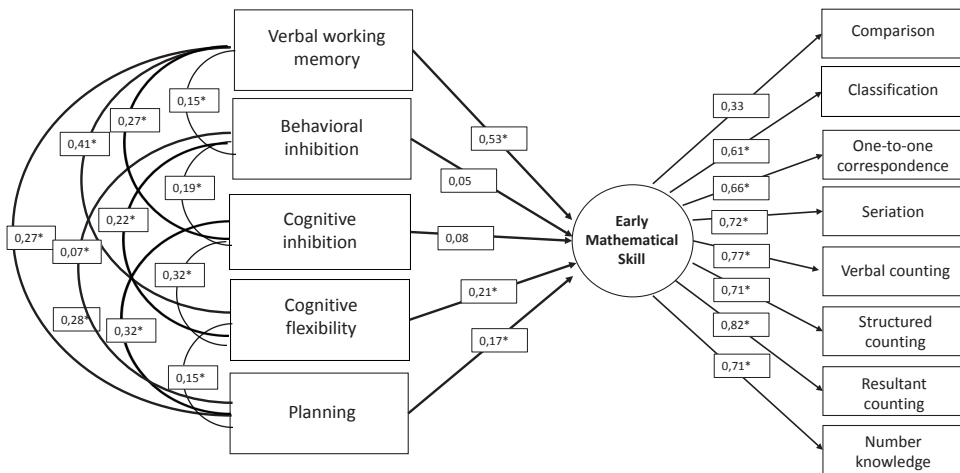


Figure 2 shows the graphic solution of this model where the five executive functions explain 57.3% of variability in the total scores achieved in early math skill (EMS). The model also shows adequate χ^2 fit indices (54) = 76.7; $p < .05$, CFI = .959; NNFI = .940, RMSEA = .058; IC (.022 - .085).

Based on the analysis of the standardized model regression coefficients, there is evidence of a significant positive relation between EMS and verbal working memory ($\beta = .53$; $p < .05$), cognitive flexibility ($\beta = .21$; $p < .05$), and planning ($\beta = .17$; $p < .05$). However, there is no observably significant relation between EMS and behavioral inhibition ($\beta = .05$; $p > .05$) or cognitive inhibition ($\beta = .08$; $p > .05$). Despite this latter point, there are observable positive covariations between the five executive functions examined.

Table 3 shows the relations between the executive functions analyzed and EMS, as well as the standardized beta values, standard error, and the variables' confidence intervals.

Table 3*Standardized coefficients, standard errors, and confidence intervals of the variables*

			Standardized β	Standard Error	z	p-value	C.I.	
Verbal Working Memory	→	EMS	.532	0.064	8.293	.000***	0.40	0.65
Behavioral Inhibition	→	EMS	.049	0.067	0.72	.471	-0.08	0.18
Cognitive Inhibition	→	EMS	.075	0.073	1.03	.300	-0.06	0.21
Cognitive Flexibility	→	EMS	.213	0.073	2.91	.003**	0.06	0.35
Planning	→	EMS	.169	0.069	2.42	.015*	0.03	0.30
Comparison	←	EMS	.328	0.083	3.94	7.885e-05***	0.16	0.49
Classification	←	EMS	.606	0.059	10.20	.000***	0.48	0.72
Correspondence	←	EMS	.656	0.053	12.19	.000***	0.55	0.76
Seriation	←	EMS	.716	0.046	15.28	.000***	0.62	0.80
Verbal Counting	←	EMS	.773	0.039	19.41	.000***	0.69	0.85
Structured Counting	←	EMS	.717	0.046	15.34	.000***	0.62	0.80
Resultant Counting	←	EMS	.822	0.033	24.44	.000***	0.75	0.88
General # Knowledge	←	EMS	.711	0.047	15	.000***	0.61	0.80
Total EMS		EMS	.426	0.058	7.33	2.176e-13***	0.31	0.54

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; EMS = Early Math Skill

DISCUSSION AND CONCLUSIONS

The objective and the principal hypothesis of this study was to generate a model of the complex interaction of five executive functions as predictors of variability in early mathematical skill among children in Early Education, via a structural equation model. This involved contrasting a hypothetical model as a function of theoretical understanding and empirical background about how verbal memory works,

behavioral and cognitive inhibition, cognitive flexibility, and planning are all positively and significantly related with developing EMS in its relational and numerical logic domains. The evidence helped corroborate this background and consolidate the relevance of these cognitive skills in the subsequent development of more complex mathematical skills. These findings align with prior studies supporting the relation between executive functions, mainly working memory and cognitive flexibility, and mathematical performance among children in Early Education (Cheung & Chan, 2022).

It was confirmed that a relevant percentage of variability in the variability of scores achieved due to the successful resolution of the comparison, classification, one-to-one correspondence, seriation, verbal counting, structured counting, resultant counting, and general number knowledge tasks can be attributed to the covariation of the five executive functions analyzed. Furthermore, each one of them in particular presents relations with a bivariate positive and significant character, partially confirming our first hypothesis. In other words, successfully resolving tasks linked with these executive functions, especially those tied with verbal working memory, cognitive flexibility and planning, help to secure and achieve better comparative performance in logico-relational and numerical tasks for mathematical skills in Early Education.

In particular, the initially hypothesized model showed adequate fit indices and an explained variability percentage, with a relevant role for verbal working memory (confirming our second hypothesis) followed by cognitive flexibility and planning. In this sense, verbal working memory has been recognized as an important predictor for childhood mathematical performance (Allen et al., 2021; Cheung & Chan, 2022). Studies such as the one by Cheung & Chan (2022) concluded that verbal working memory is closely tied with mental calculations and problem solving among children in Early Education. Similarly, Purpura et al. (2017) found that verbal working memory among Early Education students was associated with performance on complex math tasks involving multiple steps, such as comparing numbers and problem-solving. Passolunghi et al. (2008) concluded clearly that the main mathematical predictor in first grade was the phonological loop. This predictive role of verbal working memory is probably grounded in the fact that students have to store, recover, and integrate variegated information when performing mathematical activities (Bull & Lee, 2014).

Cognitive flexibility also arose as an important EMS predictor, in line with prior studies supporting the relation between this executive function component and math performance among children in Early Education. These include Yeniad et al. (2013), who reported that cognitive flexibility can significantly predict math performance in children between 4 and 13 years old, and González-Castro et al. (2014), who reported differences among primary school children with ADHD

when comparing quantities and informal calculations which could be associated with working memory and executive function deficits, and not with specific math learning problems. Buttelmann & Karbach (2017) also indicated that cognitive flexibility training based on task changing can be a key factor for math performance as well as in improving other executive functioning components in childhood. Stad et al. (2018) concluded that cognitive flexibility is closely tied with childhood math performance, since math requires changes between different arithmetical task aspects.

Our findings also present planning as a good mathematical predictor, confirming that math studies require managing the steps to achieve specific objectives and solve problems (Purpura et al., 2017). Studies in Latin American contexts confirm our finding, such as Arroyo et al. (2014), who concluded that planning skills are significantly related with math problem solving in Argentinean students; and Agudelo et al. (2016), who showed that planning has a fundamental role in mathematical task performance for Uruguayan students.

Finally, neither cognitive or behavioral inhibition appeared to be significant EMS predictors in the hypothetical model. However, the background of the positive and significant bivariate relations between each of them and the scores achieved by students for EMS allows us to conjecture that its effect could not be captured by the small sample size, particularly when the confidence intervals for the standardized β values are broad. Studies have also confirmed that these two executive function components are not only associated with incremental working memory performance, given that they act as a filter for relevant information (Cueli et al., 2020); there is also support for their significant relation with various types of early mathematical tasks such as counting, subitizing, correspondence and numerical sets, among others (Cheung & Chan, 2022; Purpura et al., 2017).

Together with the prior elements, the bivariate correlation matrix allowed us to verify the significant and positive relation of each of the five executive function components with EMS and verify the validity of the third hypothesis, as other studies have shown before (Cheung & Chan, 2022).

While this study offers interesting results, there are some limitations worth indicating, such as sample size and selection. This took place as a function of accessibility, considering the issues with doing tests in a pandemic context after long lockdown periods, which according to some authors negatively affects both cognitive and social development (Arantes de Araújo et al., 2021).

The conclusions which we have reached must be analyzed based on the limitation imposed by using measurements and tasks which do not always coincide in various studies, which can explain some differences observed in the specific contribution of each executive function component in EMS (Peres & Vargas, 2021).

Despite these limitations, we believe that this study will contribute to future research seeking to strengthen mathematical learning, using strategies which help stimulate executive functions which have been shown to predict performance in this area from an early age, including verbal working memory, cognitive flexibility, and planning. We hope to contribute in this way to pertinent interventions to approach problems in developing math skills in Early Education, providing teachers with relevant data about the executive demands needed for each math skill, thus helping promote better learning of this material.

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An intervention to improve social and emotional learning among students at risk of social exclusion

Una intervención para mejorar el aprendizaje social y emocional del alumnado en riesgo de exclusión social

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ABSTRACT

The purpose of this study was to determine the impact of Itinerario+ program, an intervention aimed at improving the different areas of competence of the social and emotional learning model (i.e., self-awareness, social awareness, self-management, relationship skills and responsible decision-making) among students of Basic Vocational Education and Training from disadvantaged contexts. The sample was composed by 140 first year students (70 experimental group y 70 control group) from four different Basic Vocational Education and Training programs taught in five educational centers in the southern district of the city of Madrid (Spain). Social and emotional learning was assessed by the Social and Emotional

Learning Scale. After assigning students to either the experimental or control group according to quasi-experimental design with a non-equivalent control group, it was confirmed that both groups were equivalent around the control variables or covariates and Itinerario+ program was implemented. This intervention was integrated with school instruction, so the curriculum was developed in six transversal projects, including other activities (i.e., peer mentoring, individualized tutoring, vocational and professional guidance, internships in a professional environment), which were carried out by a team of previously trained teachers and educators. The results after comparing the experimental and control groups yield statistically significant differences in favor of the experimental group in social and emotional learning. These results confirm the effectiveness of the program to improve the social and emotional learning of students at risk of social exclusion, so it can be stated that Itinerario+ is an example of evidence-based practice.

Keywords: social and emotional learning, social development, emotional development, emotional intelligence, program evaluation, evidence-based practice

RESUMEN

El propósito de este trabajo de investigación fue determinar el impacto del programa Itinerario+, una intervención dirigida a mejorar las diferentes áreas de competencia del modelo de aprendizaje social y emocional (i.e., autoconciencia, conciencia social, autocontrol, habilidades para relacionarse y toma de decisiones responsable) en alumnado de Formación Profesional Básica procedente de contextos desfavorecidos. La muestra estuvo compuesta por 140 estudiantes de primer curso (70 grupo experimental y 70 grupo control) de cuatro titulaciones de Formación Profesional Básica impartidas en cinco centros educativos del distrito sur de la ciudad de Madrid (España). El aprendizaje social y emocional se evaluó mediante la Escala de Aprendizaje Social y Emocional. Después de asignar al alumnado a la condición experimental o control de un diseño cuasiexperimental con grupo control no equivalente, se confirmó que ambos grupos eran equivalentes en torno a las variables control o covariantes y se implementó el programa Itinerario+. Esta intervención se integró con la instrucción escolar, por lo que el currículo se desarrolló en seis proyectos transversales, incluyendo otras actividades (i.e., mentoría entre alumnado, tutoría individualizada, orientación vocacional y profesional, prácticas en un entorno profesional), que fueron llevados a cabo por un equipo de profesores y educadores previamente formados. Los resultados derivados de las comparaciones entre los grupos experimental y control arrojan diferencias estadísticamente significativas a favor del grupo experimental en aprendizaje social y emocional. Estos resultados confirman la eficacia del programa para mejorar el aprendizaje social y emocional del alumnado en riesgo de exclusión social, por lo que se puede manifestar que Itinerario+ es un ejemplo de práctica basada en evidencias.

Palabras clave: aprendizaje social y emocional, desarrollo social, desarrollo emocional, inteligencia emocional, evaluación de programas, prácticas basadas en evidencias

INTRODUCTION

The need to tackle the high incidence rates of social, emotional and behavioural problems among students in compulsory education has led to a significant growth in educational, social and political interest in the last few years in certain protective factors that, according to the available scientific evidence, enhance student performance and well-being (Oberle et al., 2016; Trujillo et al., 2021). These protective factors include social and emotional learning, which is conceived as the process of learners acquiring and effectively using the knowledge, skills and attitudes needed to develop healthy identity, manage their emotions, set and achieve positive personal and collective goals, empathise with and feel for others, establish and maintain positive and supportive interpersonal relationships, manage interpersonal situations in a constructive manner, and make responsible and affective decisions (Collaborative for Academic, Social, and Emotional Learning, 2021; Durlak et al., 2011; Jagers et al., 2019; Mahoney et al., 2020; Payton et al., 2008; Taylor et al., 2017; Weissberg et al., 2015).

Students' social and emotional learning involves the ability to combine behaviour, cognition and affect (Mahoney et al., 2020), providing them with the precise skills to successfully deal with any situation in their daily lives, which is essential to improve their learning, performance and personal satisfaction (Oberle et al., 2016; Organisation for Economic Co-operation and Development, 2021; Weissberg et al., 2015). Indeed, the evidence from research on this essential students' elements about personal and social-emotional development has strongly encouraged the implementation and evaluation of a variety of programmes and intervention strategies that aim to create safe and supportive learning environments in which to promote the following social-emotional competencies (Collaborative for Academic, Social, and Emotional Learning, 2021; Jagers et al., 2019; Mahoney et al., 2020; National Commission on Social, Emotional, and Academic Development, 2019): (a) self-awareness, able to identify own emotions, thoughts, values and how they affect behaviour, including identifying strengths and limitations with confidence, enthusiasm and a growth mindset; (b) social awareness, needed to empathise and understand the perspectives for others, from diverse backgrounds and cultures, including standing up for one's own ideas without putting others aside; (c) self-management or successfully regulating own thoughts, emotions and behaviour in different situations, including setting school goals and working for their achievement, with self-discipline and self-motivation, using strategies for planning and organisation; (d) skills in relationships, establishing and maintaining appropriate relationships with others, including effective communication, active listening and cooperation with others; and (e) responsible and constructive decision-making about personal behaviour and relationships with others based on ethical standards, safety

and social norms, including assessment of the consequences of actions and the well-being of self and others, as well as identifying problems, proposing solutions and carrying out actions that contribute to improving the most immediate environment.

Many studies have established causal relationships between intervention measures based on social and emotional learning and some improvements at the socioemotional, behavioural and school level of the participating students, regardless of their socio-demographic and educational profile (i.e. racial, ethnic and socio-economic background, from different educational levels and environments, with and without emotional and behavioural problems), the firsts systematic reviews that have been developed to determine the impact of these programmes have confirmed this, racial, ethnic and socio-economic background, from different educational levels and settings, with and without emotional and behavioural problems), as confirmed by the first systematic reviews that have been developed to determine the impact of these programmes and practices (i.e., Diekstra, 2008; Durlak et al., 2010, 2011; Payton et al., 2008; Sklad et al., 2012). In fact, the results of the meta-analytic reviews that have subsequently been conducted for the same purpose are along the same line (i.e., Corcoran et al., 2018; Jagers et al., 2015; Murano et al., 2020; Sabey et al., 2017; Taylor et al., 2017; Wigelsworth et al., 2016; Yang et al, 2019), which have repeatedly demonstrated their ability to improve students' social-emotional skills, self-perceptions, attitudes towards others, commitment and connection to the school, pro-social behaviour and school performance, leading to a decrease in their emotional, behavioural and substance abuse difficulties, and even effects on other members of the educational community (e.g., higher rates of teacher effectiveness and planning achievement).

Those results have contributed to the fact that interventions based on social and emotional learning are amongst the most successful development programmes, which has led to their dizzying and extensive diversification and incorporation into educational institutions and classrooms all over the world (Wigelsworth et al., 2016). More precisely, Spain has been one of the countries that has made a strong commitment over the last decade to these programmes and practices in compulsory education, although it is true that during their implementation the key indicators that guarantee their success have not always been considered (Durlak et al., 2010, 2011; Mahoney et al., 2020), meanwhile their evaluation has been characterised by incorporating qualitative or pre-experimental designs, which limits the power of the evidence available on their efficacy (Fernández et al., 2021). Therefore, it seems unquestionable that there is a need to increase the quality of scientific production on the design, implementation and evaluation of programmes and practices based on social and emotional learning, which allows for the establishment of a national agenda to promote its adoption throughout the education system, integrating it into existing educational priorities (Fernández et al., 2021).

In this sense, the Itinerario+ programme which is presented in this paper incorporates in its design, implementation and evaluation a series of elements and characteristics that aim to redress the weaknesses and shortcomings noted above, such as (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020): (a) the explicit instruction of social-emotional competences, based on a sequenced, step-by-step training approach that emphasises active forms of learning, concentrating specific time and attention on skills training and in which goals are clearly defined, i.e., training that is sequenced, active, focused and explicit; (a) the explicit instruction of social-emotional competencies, based on a sequenced, step-by-step training approach that emphasises active forms of learning, concentrating specific time and attention on skills training and in which goals are clearly defined, that is, training that is sequenced, active, focused and explicit; (b) the integration of the programme with school instruction; (c) the active role of the participants; (d) the training of the teachers responsible for implementation; (e) the collaboration and synergies between classrooms, families and communities; (f) a quasi-experimental evaluation methodological design with a non-equivalent control group enhanced with statistical control techniques or conventional pairwise matching; and (g) a system of monitoring and continuous improvement. Itinerario+ is a transformative educational intervention, an holistic model (i.e., it mixes formal and non-formal, social and community, as well as personal and professional elements) and innovative action plan, which aims to change the life trajectory of young people in Basic Vocational Education Training from disadvantaged backgrounds, directing its efforts to improve the competency profile of these young people from a socio-emotional and employment perspective, which will allow them to progress in school, have more opportunities for socio-occupational integration and have a life plan in which they can make informed decisions about their future (Fundación Tomillo, 2022).

Therefore, the purpose of this research was to test the effectiveness of the Itinerario + programme in improving the different competence areas of the social and emotional learning model (i.e., self-awareness, social awareness, self-management, relationship skills and responsible decision-making) among Basic Vocational Education Training students from disadvantaged backgrounds. The hypotheses that were established were: (1) in the experimental group of students, as a result of their participation in Itinerario+, statistically significant differences will be observed in the different socioemotional competencies in the post-test phase with respect to the pre-test phase, whereas in the case of the control group no such differences will be observed; and (2) there will be statistically significant differences in the different socioemotional competencies in the post-test phase in favour of the experimental group with regard to the control group as a result of their participation in the programme

METHODOLOGY

Participants

This research involved 140 first-year students from four Basic Vocational Education Training qualifications taught in five schools in the southern district of the city of Madrid (Spain). This sample was divided into two equivalent groups, in which the experimental group was made up of 70 students from one of the schools, 14 females and 56 males, with a mean age of 15.89 years (SD = 0.81, range between 15 and 17 years), and a distribution by qualifications including 23 students of Computer Science and Communications, 15 of Electricity and Electronics, 10 of Administrative Services, and 22 of Cooking and Catering. The control group consisted of 70 students from four other schools, with mean and range age the same as the experimental group, as well as the same distribution by gender and qualifications.

Instrument

The Social and Emotional Learning Scale (Fernandez et al., 2022) is a Likert-type scale made of 30 one- to four-point items (i.e., 1 = Never or hardly ever; 2 = Occasionally; 3 = Often; and 4 = Almost always or always), grouped into five areas of social-emotional competence, such as self-awareness, social awareness, self-management, relationship skills, and responsible decision-making. This scale was used as it is one of the few instruments available to evaluate the different competences areas of the social and emotional learning model (Collaborative for Academic, Social, and Emotional Learning, 2021; Jagers et al., 2019; Mahoney et al, 2020; National Commission on Social, Emotional, and Academic Development, 2019) in the Spanish teenager population, as well as for having an adequate reliability (Cronbach's alpha [α] between .70 and .84, and McDonald's omega [ω] between .71 and .84, with composite reliability and average variance indices of higher than .77 and .67, respectively, in the different areas of socioemotional competence) and validity (tests with excellent goodness-of-fit indices that confirm their internal structure and predictive validity on school performance and life satisfaction) (Fernández et al., 2022) in the different areas of socioemotional competence) and validity (tests with excellent goodness-of-fit indices that confirm their internal structure and predictive validity on school performance and life satisfaction) (Fernández et al., 2022) (Fernández et al., 2022). For their part, in that study they yielded an α of .90 and a ω of .90, with scores ranging between .71 and .83 in the different areas of socioemotional competence, as well as compound reliability and average variance extracted indices above .70 and .60, respectively, in these areas of competence. Confirmatory factor analysis showed adequate goodness-of-fit

indices and statistics: chi-square (χ^2) (395) = 402.94; $p < .38$; $\chi^2/\text{degree of freedom} = 1.02$; comparative fit index = .99; goodness-of-fit index = .95; standardised root mean square residual = .08; root mean square error of approximation = .02 (90% confidence interval = .00 - .04).

The Participation Questionnaire is an ad hoc self-report made up of 28 items with different response alternatives, aimed at collecting socio-demographic information (i.e., age, sex, nationality, immigration background, employment status, family structure, educational level of mothers/parents/guardians, employment status of mothers/parents/guardians, perceived economic sufficiency, age of access to early childhood education and cultural capital) and school information (i.e., educational centre, qualification, year, subjects, subjects or modules enrolled, year of access to the qualification, presence of special education needs (SEN), previous course repetition, previous change of studies and previous drop-out) relevant to the control or covariate variables of the participating students.

Design and process

The methodological design used in this research, which was approved by the Ethics Committee of the University of Granada (1736/CEIH/2020), was quasi-experimental with a non-equivalent control group enhanced with statistical control techniques or conventional matching (Ato et al., 2013; Gertler et al., 2017). The sample selection procedure was based on a non-probabilistic type of sampling, called convenience sampling (Gertler et al., 2017; Kalton, 2020). Consequently, the entity responsible for the management of the programme established that Itinerario+ had to be implemented compulsorily in the first year of the Basic Vocational Education Training qualifications taught in an educational centre in the southern district of the city of Madrid, so its students (four groups, $n = 94$) were assigned to the experimental condition. In view of this requirement, in order to form the comparison or control group, we contacted the institutional heads of several schools with very similar characteristics to the experimental school (i.e., geographical location, type, educational offer, school and socio-demographic profile of the students) and provided them with the relevant information about the programme and the requirements for participation, finally formalising a collaboration agreement with four of these schools (10 groups, $n = 216$).

Then, once the appropriate institutional permissions were granted, as well as the students' family consent and authorisation, the instruments were administered, followed by the pairing, i.e., constructing an artificial comparison or control group as similar as possible to the experimental group on the basis of those observable characteristics (i.e., control or covariate variables) that may influence the results and/or be affected by the intervention (Ato et al., 2013; Gertler et al., 2017). From

this approach, 89 associated pairs ($n = 178$) were created based on the following control or covariate variables (Choi & Calero, 2013; Fernández et al., 2010; González et al., 2019; Rivkin et al., 2005): (a) sociodemographic: age, gender, nationality, immigration background, employment status, family structure, educational level of mothers/parents/guardians, employment status of mothers/parents/guardians, perceived economic sufficiency, age of access to early childhood education and cultural capital; (b) school: degree, year, subjects or enrolled modules, year of access to the qualification, presence of SEN, previous courses repeats, previous change of studies and previous dropout; and (c) socio-emotional competences: self-awareness, social awareness, self-control, interpersonal skills and responsible decision making; (d) social-emotional competences: self-awareness, social awareness, self-management, interpersonal skills and responsible decision making; and (e) social-emotional competences: self-awareness, social awareness, self-management, interpersonal skills and responsible decision making.

In this regard, the remaining 132 students (five from the experimental condition and 127 from the control group) were excluded because they did not provide family consent and authorisation and/or did not have a suitable partner. Furthermore, 19 students from the experimental group, for different reasons (e.g., dropping out of the qualification) did not attend at least 80% of the classes during the implementation of the *Itinerario+* programme, which meant that the final sample consisted of 70 associated pairs ($n = 140$), well above the minimum established according to the result obtained after calculating the minimum size required to carry out the evaluation of the *Itinerario+*, both in total ($n = 102$) and per group ($n = 51$).

It was confirmed that both groups, experimental and control, were equivalent in terms of the control or covariate variables, since: (a) some of them presented a single or the same value in both groups, as was the case of employment status (course of studies in Basic Vocational Education Training, not work), course (first year), subjects, subjects or modules enrolled and year of access to the degree (2021); (b) others presented identical proportions in both conditions, such as age (15 years = 38.57%, 16 years = 34.29%, 17 years = 27.14%), gender (male = 80%, female = 20%), nationality (Spanish = 82.86%, Dominican = 7.14%, Chinese = 2.86%, Moroccan = 5.71%, Nicaraguan = 1.43%), immigration background (Yes = 60%, No = 40%), qualification (Computer and Communications = 32.86%, Electricity and Electronics = 21.43%, Administrative Services = 14.28%, Cooking and Catering = 31.43%), presence of Specific Educational Support Needs (Yes = 15.71%, No = 84.29%), previous course repetition (Yes = 85.71%, No = 14.29%), previous change of studies (Yes = 70%, No = 30%) and previous dropout (Yes = 14.29%, No = 85.71%); and (c) non-parametric tests did not show statistically significant differences between the two groups in family structure (Pearson's Chi-square [χ^2] = 0.86; $p > .05$), educational level of mothers/guardians ($\chi^2 = 0.43$ $p > .05$), educational level of fathers/guardians ($\chi^2 = 0.31$; $p > .05$), employment status of mothers/guardians ($\chi^2 = 0.44$; $p > .05$),

employment status of fathers/guardians ($\chi^2 = 0.14$; $p > .05$), age of access to early childhood education ($\chi^2 = 0.72$; $p > .05$), perceived economic sufficiency (Mann-Whitney's U test [U] = 2324.50; $p > .00$), cultural capital (U = 2142.00; $p > .00$) and socioemotional competencies in the pretest phase (see Table 2).

The Itinerario+ programme was implemented during the 2021/2022 school year, although the training of the teachers responsible for its implementation and the piloting of the programme was carried out during the previous school year. This intervention, in the terms that have been established in the specialised literature (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020), opted for the explicit instruction of socioemotional competences based on a sequenced, active, focused and explicit training and, effectively, it was integrated with school instruction. To this end, the Basic Vocational Education Training curriculum was developed in six transversal projects, the core activity of the programme's logic model, in which the contents of the different modules were addressed through active methodologies (i.e., project-based learning, with a service-learning approach, and cooperative learning), with their corresponding evaluation processes, using tools aimed at favouring reflection, metacognition and conscious learning of the students (i.e., learning portfolio, learning diary, rubrics and self- and co-assessment questionnaires). These projects were carried out by a core team of teachers and educators in the Aula+, a technical, open and flexible space for group and individual work for students, but also involved the development of different significant experiences in which students had the opportunity to actively consolidate learning from a different scenario, such as: (a) the disruptive learning pills, which involved 50 group work sessions of two hours each in a variety of artistic-musical, environmental, sports and technological scenarios; (b) 20 group school outings to promote experiential and experiential learning (e.g., 15 visits to professional work centres and five learning visits to other cities); (c) 10 two-hour group technical sessions given by professionals from companies (e.g., workshops and training sessions given by professionals from their professional profile with the aim of broadening their exposure to the professional world and getting to know different realities of companies such as Iberdrola, Telefónica, Grupo VIPS, etc.); and (d) 20 group field exploration and research sessions (e.g., 100 hours of exploration of the environment and experiential evidence collection and analysis).

Itinerario+ also incorporated into its logic model the implementation of other activities in addition to the development of the transversal projects, such as: (a) a mentoring programme between students and young people from the Tomillo Foundation, to facilitate access and school and personal adjustment of students, in which they carried out together 30 mentoring sessions, with a weekly frequency; (b) actions of individualised tutorial attention aimed at the early detection of potential situations of school failure and socio-educational support to students and families (e.g., nine interviews with students, three per semester, at the beginning, middle

and end of the semester; three interviews with families, one at the beginning of each semester), as well as support for personal development and personalisation of the students' learning itineraries (e.g., 10 two-hour group sessions and 10 one-hour individual sessions, in which we developed welcoming dynamics to overcome emotional states that do not encourage learning and to determine itineraries according to the students' learning itineraries), 10 two-hour group sessions and 10 one-hour individual sessions, in which welcome dynamics were developed to leave behind emotional states that do not favour learning and to determine itineraries according to vocation and interests); (e.g., nine interviews with students, three per semester, at the beginning, middle and end of the semester; three interviews with families, one at the beginning of each semester), as well as support for personal development and personalisation of the students' learning itineraries (e.g., 10 two-hour group sessions and 10 one-hour individual sessions, in which we developed welcoming dynamics to overcome emotional states that do not encourage learning and to determine itineraries according to the students' learning itineraries), 10 two-hour group sessions and 10 one-hour individual sessions, in which welcome dynamics were developed to leave behind emotional states that do not favour learning and to determine itineraries according to vocation and interests); (c) 25 one-hour individual sessions of vocational orientation to help students to know their strengths and their passions, in order to make informed decisions about their future; (d) 240 hours of internships in a professional environment, designed in a personalised way for the students, identifying the opportunities for the development of technical skills and socio-emotional competences that each company could offer, in order to make the student-company assignment based on the needs of the company and the students' competence and technical development; and (e) 25 one-hour individual sessions of professional orientation to jointly assess the access to the labour market, job offers, up-skilling or re-skilling programmes, invitation and participation in events, etc.

On the other hand, a monitoring plan was adopted, with several actions aimed at identifying possible deviations of *Itinerario+* from its initial approach (Fernández et al., 2019). To be precise, 3 group follow-up sessions were held (i.e., at the end of the first, second and third trimester of the school year) between those responsible for the evaluation of the programme and the core team of teachers and educators, while 2 group follow-up sessions were held with the participating students (i.e., at the end of the first and second trimester of the school year). These sessions were mainly devoted to an overall assessment of participation in the programme, with emphasis on difficulties in the development of the *Itinerario+* and possible solutions. Additionally, with the outcome evaluation plan, measures of the dependent variables were collected in the pre-test and post-test phases, in order to subsequently examine the presence of statistically and educationally significant effects (Fernández et al., 2019).

Data Analysis

First, a priori calculation of the minimum sample size was performed considering the expected effect size (0.50), the associated probability (.05) and the desired levels of statistical power (.80) (Soper, 2021) (Soper, 2021). Subsequently, following the recommendations of Tabachnick and Fidell (2019), we confirmed the absence of missing, outliers and influential values (Mahalanobis distance) and performed the descriptive analysis of the data collected, and then confirmed the absence of univariate normality (Kolmogorov-Smirnov test) in the distribution of scores for both the control variables and the dependent variables: perceived financial sufficiency ($z = 0.12$, $p < .00$) cultural capital ($z = 0.20$, $p < .00$), self-awareness ($z = 0.09$, $p < .00$), social awareness ($z = 0.17$, $p < .00$), self-management ($z = 0.10$, $p < .00$), interpersonal skills ($z = 0.09$, $p < .00$) and responsible decision-making ($z = 0.12$, $p < .00$). Moreover, the absence of multivariate normality in the distribution of the dependent variable scores was confirmed by Mardia's skewness (60.91, $\chi^2 = 1457.44$, $p < .00$) and kurtosis (135.89, $\chi^2 = 36.81$, $p < .00$) coefficients.

In this regard, the data were analysed using the Mann-Whitney U test for two independent samples and Pearson's χ^2 to test the equivalence of the experimental and control groups on the control variables.

Fourth, in order to examine the psychometric properties of the Social and Emotional Learning Scale (Fernández et al., 2022) in this study, a confirmatory factor analysis of five first-order correlated factors was conducted and estimated by the weighted least squares method, using the indices that are normally used to assess goodness-of-fit (i.e., χ^2 , χ^2 ratio/degrees of freedom, comparative goodness-of-fit index, standardised mean square residual, and standardised mean square error of approximation) (Kline, Kline, et al., 2022), χ^2 , χ^2 ratio/degrees of freedom, comparative fit index, goodness-of-fit index, standardised root mean square residual and root mean square error of approximation) (Kline, 2015) (Kline, 2015). In addition, internal consistency (i.e., α and ω) and composite reliability (i.e., composite reliability index and average variance extracted) were calculated (Hair et al., 2014).

Finally, to determine the effects of the Itinerario+ programme on the dependent variables, the data were analysed using Wilcoxon's z-tests (hypothesis 1) and Mann-Whitney U-tests for two independent samples (hypothesis 2). In addition, Cohen's d value was calculated, while the error rate per family, resulting from the problem of multiple comparisons, given the impossibility of performing multivariate contrasts, was controlled with the Bonferroni correction.

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS) v26 (IBM Corp., Armonk, NY, USA) and STATA v17 (StataCorp., College Station, TX, USA).

RESULTS

The Bonferroni correction was used to adjust the significance level for each of the multiple comparisons tests, yielding a result of .01 (.05/5).

The results of the pretest-posttest comparisons on socioemotional competencies, hypothesis 1, reveal no statistically significant differences in the control group, while in the case of the experimental group a statistically significant improvement is observed in the posttest phase with respect to the pretest phase in each of the areas of socioemotional competence (Table 1).

Table 1

Intra-group comparisons on socio-emotional competences

Competences / phases	N	Controlled Group					Experimental Group				
		M	SD	z	p	d	M	SD	z	p	d
Self-awareness											
Pretest	70	2.87	0.35	-1.36	.19	0.06	2.89	0.34	-7.28	.00*	1.24
Posttest	70	2.89	0.33				3.27	0.27			
Social awareness											
Pretest	70	2.99	0.36	-1.45	.15	0.11	2.98	0.39	-7.31	.00*	0.90
Posttest	70	3.03	0.33				3.31	0.34			
Self-management											
Pretest	70	2.45	0.37	-1.34	.18	0.11	2.45	0.37	-7.35	.00*	0.91
Posttest	70	2.49	0.35				2.77	0.33			
Relationship skills											
Pretest	70	2.89	0.31	-.76	.49	0.16	2.93	0.34	-7.27	.00*	0.48
Posttest	70	2.94	0.31				3.09	0.32			
Responsible decision-making											
Pretest	70	2.18	0.64	-.35	.72	0.11	2.18	0.66	-7.28	.00*	1.02
Posttest	70	2.25	0.63				2.75	0.43			

Note. M: mean, SD: standart deviation, z = Wilcoxon's z-test, * Significance level $p < .01$, d = Cohen's d-value.

As for hypothesis 2, the results of the intergroup comparisons in the pretest phase do not show statistically significant differences in any of the social-emotional competences established, in contrast to the post-test phase, in which statistically significant differences are observed in favour of the experimental group in each of the social-emotional competences (Table 2).

Table 2

Intergroup comparisons on socio-emotional competences

Competences / groups	N	Pretest					Posttest				
		M	SD	U	p	d	M	SD	U	p	d
Self-awareness											
Experimental	70	2.89	0.34	2365.00	.72	0.06	3.27	0.27	982.50	.00*	1.26
Control	70	2.87	0.35				2.89	0.33			
Social awareness											
Experimental	70	2.98	0.39	4868.00	.78	-0.03	3.31	0.34	1247.00	.00*	0.84
Control	70	2.99	0.36				3.03	0.33			
Self-management											
Experimental	70	2.45	0.37	4875.00	.80	0.00	2.77	0.33	1355.00	.00*	0.82
Control	70	2.45	0.37				2.49	0.35			
Relationship skills											
Experimental	70	2.93	0.34	4877.00	.81	0.12	3.09	0.32	1834.00	.01*	0.48
Control	70	2.89	0.31				2.94	0.31			
Responsible decision-making											
Experimental	70	2.18	0.66	4858.50	.75	0.00	2.75	0.43	1243.50	.00*	0.93
Control	70	2.18	0.64				2.25	0.63			

Note. M: mean, SD: standart deviation, z = Wilcoxon's z-test, * Significance level $p < .01$, d = Cohen's d-value.

DISCUSSION AND CONCLUSION

The purpose of the study was to test the kind, direction and magnitude of changes produced by the Itinerario+ programme on the socioemotional development of a sample of Basic Vocational Education Training students at risk of social exclusion, specifically the impact on each of the areas of competence of the social and emotional learning model (i.e., self-awareness, social awareness, self-control, relationship skills and responsible decision-making). Considering the results derived from participation in the programme, the following conclusions can therefore be drawn: (a) since in the intragroup comparisons statistically significant differences are observed in the experimental group in favour of the posttest phase

in all areas of social-emotional competence, quite the contrary to the control group, hypothesis 1 is accepted; and (b) since statistically significant differences are observed in the intergroup comparisons in the posttest phase in favour of the experimental group in each of the areas of competence of the social and emotional learning model, not so in the control group, hypothesis 2 is also accepted.

Effectively, participation in the Itinerario+ programme has generated a positive and statistically significant impact for the pupils on the different indicators of socioemotional development, despite the high restrictive nature of the Bonferroni correction. Moreover, if the hypotheses of this study are tested using tests that provide answers on their practical significance, as established in the specialised literature (Hattie, 2009; Kraft, 2020; Ledesma et al, 2008), considering the most demanding guidelines for interpreting the results of analyses complementary to the contrast of means (Cohen, 1988), the magnitude of the effect size that has been achieved in most of the areas of socioemotional competences has been large, that is, the intergroup differences that have been generated in these areas of competences can be detected by simple observation (Coe, 2002), which clearly indicates that they have an important practical relevance (Hattie, 2009; Kraft, 2020). Indeed, effect size values reveal that a hypothetical member of the experimental group, compared to any member of the control group, can achieve scores in these competence areas in excess of 69% (e.g., interpersonal skills), with percentages as high as 88% (e.g., self-awareness) (Coe, 2002; Kraft, 2020).

To sum up, the results obtained confirm the effectiveness of the Itinerario+ programme in increasing the level of socioemotional skills of compulsory education students at risk of social exclusion. This will possibly help them to progress at school, have more opportunities for socio-occupational integration and have a life plan in which they can make more informed decisions about their future. Furthermore, these results are in line with those of other studies that have been developed with the aim of establishing causal links between programmes and practices based on the social and emotional learning model and certain improvements in the socioemotional level of their participants. It can be seen in the meta-analytical reviews that have been carried out in the last decade (Corcoran et al, 2018; Durlak et al., 2010, 2011; Jagers et al., 2015; Murano et al., 2020; Sabey et al., 2017; Taylor et al., 2017; Wigelsworth et al., 2016; Yang et al., 2019), and equally favours increasing the quantity and quality of the limited scientific production on the systematic evaluation of this type of interventions at the national level (Fernández et al., 2021).

The effectiveness of the Itinerario+ programme seems to be mainly determined by the inclusion in its logic model of the main elements and characteristics that, according to the specialised literature, guarantee to a greater extent the success of these intervention measures, such as, explicit instruction of social-emotional competences (i.e, using a step-by-step sequenced training approach to social-emotional skills, emphasising active forms of learning for students to practice the

new skills, focusing specific time and attention on skills training, and clearly defining goals) and their integration with school instruction (Durlak et al., 2010, 2011; Fernández et al., 2021; Mahoney et al., 2020). However, the active involvement of the educational community in the development of the programme, which was strongly supported by the implementation of other successful actions (e.g. mentoring, tutorial action, vocational and career guidance), seems to have been another key component in explaining the results obtained, although it is difficult to isolate the effects of the different elements of which the programme was composed.

Nevertheless, when interpreting the results obtained in this study, it is necessary to consider certain limitations, mainly linked to the sampling, methodological design, data analysis model and self-reporting measures adopted. In that line, a completely randomised sampling and design for the different activities of the programme's logic model would have allowed for greater control of the possible sources of bias. Despite this, the requirements and resources of the entity responsible for managing the programme made this impossible, in terms similar to the analysis model initially planned (i.e., analysis of covariance), as the confirmation of non-compliance with the basic assumptions for its estimation made it necessary to opt for a non-parametric bivariate model, with the limitations that this entails for the power of the evidence obtained in the study. On the other hand, the equivalence of the groups with respect to a series of control variables was confirmed, which maximises their comparability, and the error rate per family derived from the problem of multiple comparisons was controlled in the analysis model, thus raising the level of statistical requirement.

Despite all this, in future replications of the programme it would be necessary to adopt a methodological design with a greater degree of experimentality, as well as to include measures (e.g., several experimental groups with different levels of exposure to the intervention programme) that allow us to determine the impact of each of the programme's activities or the contribution of each of them to the results obtained. It would also be essential to increase the sample size, even if it was adjusted to standard power and alpha error conditions, but above all to increase the diversity of participating qualifications and courses. At the same time, the number of measures on the competency areas of the social and emotional learning model (e.g., other indicators and instruments) or informants (e.g., teachers, families) should be increased, in addition to using some other analysis model (e.g., generalised linear models) or assessing the possibility of transforming variables (e.g., differences in differences) to estimate other multivariate models (e.g., analysis of covariance). Finally, it is certainly always advisable to change those aspects of the programme that, as a result of the process evaluation, could be improved (e.g. coordination between teachers and educators, mentoring programme).

Furthermore, taking into account the results of the research, it would be appropriate to carry out new studies to verify that the improvements that occur

in each and every one of the areas of competence of the social and emotional learning model of the students as a result of participation in the programme promote changes in their immediate environment and surroundings, generating a substantial increase in their performance and well-being, as established in the specialised literature (Oberle et al., 2016). It would also be interesting to determine the school and socio-demographic profile of the students who benefit most from the programme, as well as to confirm that the results derived from participation in the programme are maintained over time and to establish the impact of this type of programme when it is implemented in non-formal or informal settings.

To sum up, this research, at a theoretical level, contributes to expanding the empirical evidence available on the power and validation of the causal and logical model of a programme based on the social and emotional learning model to generate improvements in the socioemotional competences of compulsory education students at risk of social exclusion, while at a practical level, it provides educational institutions with an efficient educational tool or project that can contribute to changing and improving the life trajectory of their students. The integration of this type of programme into school instruction is usually associated with an increase in the level of demand for the professionals involved, especially in terms of training and support for its implementation and evaluation, but what seems certain is that the adoption of social and emotional learning programmes brings multiple benefits to any educational institution and its community (Corcoran et al., 2018; Jagers et al., 2015; Murano et al., 2020; Sabey et al., 2017; Taylor et al., 2017; Wigelsworth et al., 2016; Yang et al., 2019).

To conclude, taking international standards of quality in educational interventions as a reference (e.g., evidence for ESSA), we can state that Itinerario+, both in terms of its methodological rigour and its results, is a clear example of an evidence-based programme (Slavin, 2017). However, considering the limited number of studies with these characteristics and methodological rigour at the national level (Fernández et al., 2021), it is advisable to continue with the systematic evaluation of this type of intervention, mainly to accumulate more evidence and improve the impact of these programmes on the socioemotional development of compulsory education students at risk of social exclusion.

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Sociometric distribution in Early Childhood Education: reasons for peer acceptance and peer rejection

Distribución sociométrica en Educación Infantil: razones de aceptación y rechazo a los iguales

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ABSTRACT

Peer rejection has been widely studied in secondary and primary education, given both the present as well as future negative consequences it has on pupils. Nevertheless, the issue has thus far failed to receive as much attention with regard to younger children, despite the fact that infant education is a key stage, since it is when social relations are first forged and in view of fact that this period has a decisive influence on subsequent socioemotional development. This study seeks to ascertain sociometric distribution in the second cycle of infant education, taking into account gender, school year and whether or not pupils have specific educational support needs. We also explore the reasons given by pupils for accepting or rejecting their peers. The study involved 2,116 children from 105 classes spanning the three years of

second cycle infant education. Using a sociometric procedure, we find that 11.5% of pupils suffer rejection, 8.3% are popular, 6.7% neglected, 2.5% controversial, and 71% average. The percentage of boys rejected is similar across the three years and is significantly higher than the figure for girls and for those with specific educational needs. A total of 11,989 reasons were cited, of which 7,876 were related to acceptance and 4,113 to rejection, and which were grouped into 34 categories. The principal reasons for acceptance are feeling affinity, playing together, and personality traits, whereas the reasons for rejection were physical aggressiveness, childish behaviour, or annoying others. Girls cited more reasons related to affective reciprocity, whereas boys were less expressive or were not conscious of the causes. We discuss the educational implications to be taken into consideration in the classroom vis-à-vis boosting acceptance, integration and forging a positive atmosphere in the classroom and thereby preventing and reducing peer rejection.

Keywords: peer acceptance, peer rejection, peer relationships, sociometric method, sociometric status, gender, special educational needs, early childhood

RESUMEN

El rechazo entre iguales es un fenómeno muy estudiado en educación secundaria y primaria, dadas las consecuencias negativas presentes y futuras que tiene en el estudiante. Sin embargo, no ha sido tan estudiado en edades tempranas, siendo la educación infantil una etapa de gran importancia, ya que es cuando se empiezan a forjar las relaciones sociales, y su influencia es decisiva en el desarrollo socioemocional posterior. Este estudio tiene por objetivo conocer la distribución sociométrica en el segundo ciclo de educación infantil, teniendo en cuenta el género, el curso y si los estudiantes tienen, o no, necesidades educativas específicas de apoyo educativo. Además, se profundiza en los motivos que los estudiantes argumentan para aceptar o rechazar a sus iguales. Han participado 2116 niños y niñas de 105 aulas de los tres cursos del segundo ciclo de educación infantil. Mediante un procedimiento sociométrico, se obtiene que un 11.5% son rechazados, 8.3% preferidos, 6.7% ignorados, 2.5% controvertidos, y 71% medios. El porcentaje de niños rechazados es similar en los tres cursos, y significativamente superior al de las niñas, al igual que aquellos que presentan necesidades educativas. Han informado de 11989 motivos, 7876 de aceptación, y 4113 de rechazo, agrupados en 34 categorías. Las principales razones de aceptación son el tener afinidad, disfrutar de juegos compartidos y las características de personalidad, mientras que la de rechazo hace referencia a la agresividad física, junto a las conductas inmaduras, o molestas con los demás. Las niñas argumentan más razones de reciprocidad afectiva, mientras que los niños son menos expresivos o no son conscientes de las causas. Se discuten implicaciones educativas a tener en cuenta en las aulas para mejorar la aceptación, integración y clima de aula.

Palabras clave: aceptación entre iguales, rechazo entre iguales, relaciones entre iguales, métodos sociométricos, estatus sociométrico, género, necesidades educativas específicas, educación infantil

INTRODUCTION

Analysis of peer relations has taken on ever-greater relevance over the last few decades, driven to a large degree by the increasingly early age at which children start school (Luis-Rico et al., 2020) due to the rise in the number of children attending infant education –despite its not being compulsory. As a result, from the moment children first enter the classroom, being accepted and popular with their peers, striking up friendships and integrating become basic child-development tasks that need to be accomplished if children are to achieve the right emotional, cognitive and social development (Monjas et al., 2014). Such development may be adversely affected if a child experiences difficulties in their social relations. Most do establish positive relations with their peers, although not all do so to the same degree. In order to gauge this, sociometric strategies based on peer nomination are normally applied. (Cillessen & Marks, 2017; González & García-Bacete, 2010). Depending on the number and position of preference and rejection nominations, different types of sociometric status can be determined (Coie et al., 1982); (a) popular: with a privileged social position, greatly appreciated by their colleagues, (b) average: they get on well with others and have some friends; (c) neglected: they go unnoticed by the group and are not nominated either positively or negatively, (d) controversial: they have a high number of popular as well as rejection nominations; and (e) rejected: pupils who, for a variety of reasons, fail to fit into the group and who are passively or actively rejected by their peers.

A look at all the stages of compulsory education reveals that between 10-15% of students in each classroom are rejected by their peers (Monjas et al., 2014; Suárez-García et al., 2018), which is a similar percentage to schools worldwide (Hladik & Hrbáková, 2021), although it is determined by the context (Martín-Antón et al., 2016) as well as by social changes, which impact social relation patterns (Chow et al., 2023). This phenomenon also occurs in infant education, where studies carried out to date in Spain reveal a lower percentage compared to later stages of education, with the figure standing at around 10% of children in the classroom (Suárez-García et al., 2018), although the trend increases the older the class (García-Bacete et al., 2008). This lower percentage might –on average– be due to the fact that there tend to be fewer pupils per class, in addition to a more conducive atmosphere of support and interaction with teachers (Prino et al., 2022), which is characteristic of this phase of education and which would act as a shield and a barrier against rejection (Kiuru et al., 2012).

Peer rejection is a major problem since it is a stressing and painful experience for pupils and one that distorts their social self-perception and so impacts their emotional state (Nergaard, 2020) and relationship with their milieu (Martín-Antón et al., 2016). It has both short and long-term consequences (Zarra-Nezhad et al.,

2019) such as: socioemotional difficulties (loneliness, isolation, underperformance); internal problems (low self-esteem, anxiety, depression), external problems (dropping out of school, behavioural problems or antisocial conduct). It also tends to be a situation that endures (LoParo et al., 2023), since around 47% of those rejected in the early stages of compulsory schooling continue to be rejected in later stages (García-Bacete et al., 2008).

Certain groups are more prone to peer rejection. Specifically, boys are more affected (Luis-Rico et al., 2020; Suárez-García et al., 2018) and are between two and three times more likely to be rejected than girls (Suárez-García et al., 2018) and only half as likely to be popular when compared to girls, and for different reasons (Luis-Rico et al., 2020). The most common reasons for being chosen are personality, friendship, and playing, with boys and girls choosing peers who are fun, nice, amusing, who are their friends and those with whom they play, although the kinds of games and the order of preference traits varies between males and females (Luis-Rico et al., 2020). This differential interaction affects social development in the early stages of education (Fabes et al., 2018) since friendships with those of the same sex are more common than those with the opposite sex (Chow et al., 2023; Wang et al., 2019). For some pupils, the preference for interacting and relating with persons of the same sex may limit the possibilities of having varied social experiences (Chow et al., 2022; Hanish et al., 2021), thereby depriving them of the benefits of prosocial behaviour and of being able to curb the aggressiveness involved in exchanges between the sexes (Xiao et al., 2022).

In addition, pupils who have educational needs suffer more rejection than those who have no such needs (Whal et al., 2022). They tend to display social skills and externalising behaviours that are less mainstream and which therefore afford fewer possibilities of relational learning (Ferreira et al., 2019). As a result, it is common for them to receive fewer positive and more negative nominations compared to the rest of their peers and for them to be less popular and more rejected. Specifically, it is estimated that 30% of pupils with needs are not popular with their peers (Monjas et al., 2014). Other studies increase this percentage to 54% (Whal et al., 2022), with the percentage of males rejected within this group also being higher. These pupils' interactions and friendships are different and more difficult for teachers to grasp an understanding of (Peceguina et al., 2022). Prominent amongst this group are pupils with functional diversity linked to intellectual disability, since behaviour towards them is more negative than it is towards peers with or without physical disabilities (Hacıbrahimoglu, 2022). Much the same can be said of pupils with language difficulties. They engage in less exchange of communication, which also leads to greater social isolation (Chen et al., 2020; Van der Wilt et al., 2018) as a result of them being more vulnerable in class (Lloyd-Esenkaya et al., 2020), which is also the case with pupils who are shy (Sette et al., 2019). Pupils with language

difficulties have been shown to have a 50% less chance of establishing reciprocal friendship links when compared to other pupils (Chow et al., 2022).

Unlike bullying, rejection is not a visible problem. Teaching staff often have a rough idea of the social status and relationships that emerge in the classroom. Nevertheless, their impressions have been shown to be only partly reflected by the reality (Schoop-Kasteler & Müller, 2021). The younger the pupils, the more difficult it is to perceive their situation in the classroom (Peceguina et al., 2022). As a result, asking about each pupil's preference and rejection choices might offer an initial step towards ascertaining the underlying reasons, and thereby yield positive practical implications for teachers (Carter, 2021), and even more so if pupils are allowed an unlimited number of nominations, given the greater validity this would imply (Cillessen & Marks, 2017). It should be remembered that pupils are not always rejected for the same reasons (Hladik & Hrbáková, 2021). Bierman et al. (2014) find that these pupils share some of the following four patterns of behaviour: (a) intense aggressiveness and disruptive behaviour is one of the most common causes (Bengtsson et al., 2022; Coie et al., 1982), although it varies depending on the type of aggression and on age (Yue & Zhang, 2023); (b) low levels of sociability, orientation towards others and prosocial behaviour (low empathy, scant co-operational behaviour, Chávez et al., 2022); (c) high levels of childish behaviour and lack of attention; and (d) social anxiety and avoidance behaviour. All of this leads them to experience everyday social situations in the classroom in a more problematic manner when compared to their colleagues. In addition to aggression, Martín-Antón et al. (2016) found that such pupils displayed more disruptive or childish behaviour, showed less respect for the rules and for authority, exhibited poorer adaptation to prosocial behaviour, and even negative reactions to situations in which they enjoyed success. This is aggravated when their actions do not prove to be successful, with them displaying more intense emotional reactions and negative behaviours, particularly in games or where competition is involved (Parlatan & Sığirtmaç, 2022). Likewise, there are also differing reasons why certain pupils prefer others. Monjas et al. (2008) found that the main reasons for accepting classmates are likeability, fun, mutual satisfaction and the presence of key features in a friendship relation.

There are a number of studies addressing sociometric distribution in secondary education classrooms and, to a lesser degree, in primary education. Nevertheless, there are fewer that focus on infant education, and fewer still that delve into the reasons put forward by the pupils themselves as to why they like or do not like certain peers. Consequently, the principal objective of this work is to gain an insight into the sociometric distribution obtained from a wide sample of second cycle infant education pupils. We compare our findings with the results to emerge from other studies carried out with pupils who are at the same stage of education,

and considering gender, school year and whether or not pupils' evidence specific educational support needs. We also look at the arguments underlying the choices of preference or rejection vis-à-vis gender. We believe that gaining an understanding of the reasons for preference and rejection may help teachers working at this stage of education to implement measures in the classroom aimed at enhancing acceptance and thereby preventing and curbing rejection amongst peers as well as the consequences that arise as a result.

METHOD

Participants

The sample is made up of 2,116 pupils from 105 second cycle infant education classes, with 51.7% of students being male and 48.3% female (table 1). 16.5% are pupils enrolled in the first year of infant education (3-4 years of age), 26.1% in the second year (4-5 years), and the remaining 57.4% in the third year (5-6 years of age). 75.7% of the pupils are enrolled in public schools as opposed to 24.3% enrolled in private or semi-private schools –a percentage similar to the distribution in Spain as a whole (78.8% of pupils in public schools, and 20.2% in private or semi-private schools according to the Ministry of Education and Vocational Training, 2022). 66.7% of the pupils are enrolled in schools located in urban areas (towns and cities with a population of over 15,000 inhabitants), while 30.2% are enrolled in semi-urban area schools (between 2,500 and 14,999 inhabitants), with the remaining 3.1% in rural area schools (Rural Grouped Schools, CRAs). Virtually all of the schools have children enrolled with specific educational support needs (NEAE), with the latter representing 9.2% of the pupils in the sample.

Table 1

Distribution of the sample

Characteristics	<i>n</i>	%
Gender		
Male	1,093	51.7%
Female	1,023	48.3%
Year		
1st (3-4 years)	349	16.5%
2nd (4-5 years)	552	26.1%
3rd (5-6 years)	1,215	57.4%

Characteristics	<i>n</i>	%
Ownership		
Public	1,601	75.7%
Semi-private	525	24.3%
Location		
Urban	1,410	66.7%
Semi-urban	640	30.2%
Rural	66	3.1%
NEAE		
Yes	195	9.2%
No	1,921	90.8%

Note. NEAE = Specific Educational Support Needs.

Instruments

Sociometric questionnaire of peer nominations (GREI, 2009; published in González & García-Bacete, 2010). This is a peer nominations instrument in which pupils choose which classmates they would wish to be with and those they would not, with no restriction placed on the number of nominations within a class. Given the age of the participants, the questionnaire was adapted to a question-answer game in the form of an individual interview in which pupils were shown the picture of a personalised school bus. When shown the photographs of their classmates, each pupil was allowed to bring those classmates with whom they would go on a trip and to remove those they would not wish to go with.

The Sociomet computer program (González & García-Bacete, 2010) was used for correction purposes. This program provides information on the sociometric typology of each pupil: popular, rejected, neglected, controversial or average.

Classroom data, in which each teacher sets out their pupils' relevant sociodemographic data (name, number in class, sex, age, and attendance record) in addition to whether or not they have specific educational support needs, in line with the criteria for gathering and processing data established by the education authorities with regard to the groups mentioned.

Procedure

The research gained the approval of the Research Ethics Committee (CEIM, code 21-2335 NO HCUV) and the education authorities. Schools were chosen at

random from amongst those who expressed a willingness to participate after having been sent a letter detailing the study. Participation increased the older the groups in question. There are two main reasons for this. Since this is a non-compulsory stage of education, the number of pupils enrolled was gradually higher the older the groups in question in infant education. In addition, some teachers felt that there would be more problems in classrooms where the children were younger, as a result of: (a) having to adapt to the arrival of a stranger from outside the classroom, (b) the possible disruption in the everyday dynamic of the classroom, and (c) a belief that the pupils would not be able to identify their social networks or specify their reasons for preferring and rejecting. Once the informed consent forms had been obtained from the tutors or legal representatives, data were collected during the school period. Prior to working individually with each pupil (which took about seven minutes), the researcher introduced themselves to the class, saying that they were going to play with the class. The teachers were given the data forms that were to be completed over the following days. When processing the data, any details of a personal identification nature were codified so as to ensure data protection.

Data analysis

Descriptive analyses were carried out in order to analyse sociometric distribution, and the chi squared statistic (χ^2) was also calculated so as to determine whether there were differences between the distribution found in the study and that reported in other studies conducted with similar ages. An analysis was also performed to ascertain whether or not there were any differences in sociometric distribution in terms of gender, year and whether or not pupils had specific educational support needs. The adjusted standardized residuals (ASR) were also calculated, taking as a criterion the presence of significant differences in the frequency if the value exceeded the range [-1.96, 1.96].

In order to evaluate the reasons for preference and rejection expressed by the pupils, after transcribing each answer literally an initial categorisation of the open responses was conducted by creating cloud points and cluster analysis –applying the derived word search method using the NVIVO v.14 (2023) computer program. The categories were subsequently triangulated and negotiated with six experts: two in educational psychology, two in didactics, and two practising infant education teachers.

Finally, we looked at whether there were any significant differences between the reasons put forward by boys and by girls. Since there was not an exact 50% distribution, as an alternative to a binomial test, we calculated the Z score by means of a sample proportion test, applying a continuity correction, given that this was a dichotomous variable. This enabled us to calculate the significance of two tails. We

calculated Cohen's *h* effect size (1988), taking as cut-off points: (a) < .20 very small, (b) 0.20-0.49 small, (c) 0.50-0.79 moderate, and (d) > .80 large. For this, we used the IBM SPSS Statistics statistical package, v. 29 (2022). A confidence level of 95% was assumed.

RESULTS

Sociometric distribution

Table 2 shows the sociometric distribution of the sample analysed. Specifically, sociometric types are distributed as follows: 11.5% of pupils are rejected by their classmates, 8.3% are popular, 71% are average, 6.7% are neglected, and 2.5% are controversial.

Table 2

Comparison of the distribution of sociometric types obtained in various studies

Sociometric type	<i>n</i> (%) in this study <i>N</i> = 2116	<i>n</i> (%) in EI Suárez-García et al. (2018) <i>N</i> = 160	% in EI García-Bacete et al. (2008) <i>N</i> = 438	<i>n</i> (%) 1st year primary education Monjas et al. (2014) <i>N</i> = 1,351
Popular	176 (8.3%)	9 (5.6%)	6.8%	179 (13.3%)
Rejected	244 (11.5%)	13 (8.1%)	9.1%	175 (13.0%)
Average	1502 (71.0%)	94 (51.3%)	67.4%	922 (68.3%)
Neglected	142 (6.7%)	25 (15.6%)	11.4%	52 (3.9%)
Controversial	52 (2.5%)	19 (11.9%)	5.3%	21 (1.6%)

Comparing our distribution to that reported in other studies carried out with pupils at the same stage of education reveals that the percentage of pupils rejected by their peers is slightly higher, although it remains at around 10%. Specifically, it differs significantly from the 9.1% reported in the study carried out by García-Bacete et al. (2008) for the same educational cycle, $\chi^2(4, N = 2116) = 98.01, p < .001$, and the 8.1% reported by Suárez-García et al. (2018), $\chi^2(4, N = 160) = 377.04, p < .001$, with a higher percentage of pupils rejected but with fewer being neglected. Nevertheless, the percentage is lower than the 13% found in studies conducted with first year primary education pupils by Monjas et al. (2014), $\chi^2(4, N = 2116) =$

97.92, $p < .001$, with a lower percentage of popular pupils but a higher percentage of neglected pupils.

An analysis of the distribution by gender (table 3) reveals statistically significant differences, $\chi^2(4, N = 2116) = 74.17, p < .001$, with more boys than girls being rejected (with a ratio of approximately 3:1), as was also the case with the controversial pupils. Nevertheless, there are more popular and average girls than boys. There are no significant differences in the distribution of those neglected.

There are also significant differences between those with or without specific educational support needs, $\chi^2(4, N = 2116) = 146.33, p < .001$. There is a significantly higher percentage of pupils who are rejected, and a lower number of popular and average pupils amongst those who have educational needs compared those who do not. Nevertheless, there are no significant differences in the percentage of pupils sociometrically neglected or controversial.

Table 3

Comparison of the distribution of sociometric types in terms of gender and specific educational support needs

Sociometric type		Gender		NEAE	
		Male (<i>n</i> = 1093)	Female (<i>n</i> = 1023)	With NEAE (<i>n</i> = 217)	Without NEAE (<i>n</i> = 1899)
Popular	n (%)	72 (6.6%)	104 (10.2%)	5 (2.3%)	171 (9.0%)
	ASR	-3.0	3.0	-3.4	3.4
Rejected	n (%)	177 (16.2%)	67 (6.5%)	77 (35.5%)	167 (8.8%)
	ASR	6.9	-6.9	11.7	-11.7
Average	n (%)	736 (67.3%)	766 (74.9%)	110 (50.7%)	1,392 (73.3%)
	ASR	-3.8	3.8	-7.0	7.0
Neglected	n (%)	66 (6.0%)	76 (7.4%)	18 (8.3%)	124 (6.5%)
	ASR	-1.3	1.3	1.0	-1.0
Controversial	n (%)	42 (3.9%)	10 (1.0%)	7 (3.2%)	45 (2.4%)
	ASR	4.3	-4.3	0.8	-0.8

Note. NEAE=Specific Educational Support Needs.

Comparing the year to which the pupils belong –within the second cycle of infant education (table 4)– also reveals statistically significant differences $\chi^2 (8, N = 2116) = 22.20, p = .005$, with significant differences in the distribution of neglected and controversial pupils, the percentage of which decreases the higher the year. However, the percentage of those rejected is similar across the three years.

Table 4

Comparison of the distribution of sociometric types in terms of school year

		School year		
		1st (n = 349)	2nd (n = 552)	3rd (n = 1215)
Popular	n (%)	27 (7.7%)	38 (6.9%)	111 (9.1%)
	ASR	-0.4	-1.4	1.6
Rejected	n (%)	39 (11.2%)	58 (10.5%)	147 (12.1%)
	ASR	-0.2	-0.9	0.9
Average	n (%)	235 (67.3%)	396 (71.7%)	871 (71.7%)
	ASR	-1.6	0.5	0.8
Neglected	n (%)	32 (9.2%)	47 (8.5%)	63 (5.2%)
	ASR	2.0	2.0	-3.3
Controversial	n (%)	16 (4.6%)	13 (2.4%)	23 (1.9%)
	ASR	2.8	-0.2	-1.9

Reasons given for acceptance

The boys and girls gave a total of 7,876 reasons when expressing their preference for certain classmates, with an average of 3.72 classmates being chosen by each interviewee. Figure 1 shows the cloud point map of reasons for preference. The most commonly cited are words related to affinities and playing together (the word family related to play: *plays, we play*; the person involved: *plays with me*, and frequency: *always plays with me*), and with friendship (a description of the relation: *friend*; frequency: *we are always friends*, and the superlative adjective: *is my best friend*).

Figure 1

Word cloud of reasons given by pupils to accept a classmate



Cluster analysis—triangulated and negotiated with experts—reduces the reasons for preference to a taxonomy of 14 categories (table 5). It can be seen that the main reason in the choice of friendships is related to affinities and playing with the peer, which yielded a total of 2,399 arguments that account for 30.5% of acceptance for this reason. The next most represented category contains arguments included in the figures of pre-established relationships. The children choose their peers with a frequency of 12.5% knowing that they are their friends (best friends, popular, etc.). 11.1% of infant education pupils also choose their friendships depending on the satisfaction and emotional support such friendships provide them with.

Table 5

Reasons for preference: category, description and frequency

Category	Description	N	%
Affinities and playing together	The same likes, opinions or suggested games as the peer: e.g. we play dinosaurs, he/she plays the same games, we like digging.	2.399	30.5%

Category	Description	N	%
Pre-established relation figure	Predetermined friendship, pre-established link or bond. e.g.: they are my best friend, we are close friends, they are my favourite friend, they are my boyfriend/girlfriend.	987	12.5%
Satisfaction and emotional support	Beneficial feelings the peer inspires in them. e.g.: I love them, they defend me, they protect me, I like being hugged by them.	873	11.1%
Personality traits liked by the peer	Charisma or a temperament deemed to be positive by the other classmate. e.g.: they are great fun, a good person, nice, affectionate.	842	10.7%
Shared social network or old friendship	Relationship with the classmate through family friendships, extracurricular activities or shared space at the present or in the past. e.g.: we've known each other since kindergarten, we go to the park together with our mothers, he/she lives in my street.	634	8.0%
Companionship and material reciprocity	Caring behaviour that helps the peer: e.g.: they share with me, they teach me to do summersaults, they let me use their things, we give each other things.	521	6.6%
Not revealed or not clear	Does not give the reasons or these are not clear. e.g.: just because, I don't know why, I have no idea.	421	5.3%
Appearance and physical abilities liked by the peer	Appearance, physical features or personality traits of the classmate considered positive or appealing. e.g.: they wear glasses, I like their hair, they are attractive, I like their voice.	296	3.8%
Shared space inside the classroom	Peer distribution in the classroom that leads to them sharing space or moments. e.g.: we sit at the same table, they are in my team, they are my soulmate-partner, they are next to me.	248	3.1%
Interest or benefit	They choose the peer because they obtain some material good or an opportunistic plan from them. e.g.: because they invite me to their birthday party, because they have a house with a garden, because they bring stickers.	215	2.7%

Category	Description	N	%
Preferences in shared friendship	They choose the peer because they share a relationship with another classmate whom they also like. e.g.: they are also a friend of Nico, we are friends of Lucy.	158	2.0%
Academic aspects / behaviours liked by the peer	Behaviours or skills in which the pupil stands out. e.g.: they do the tasks very well, they are clever, they know the alphabet well.	103	1.3%
Absence of disruptive or annoying behaviour	They choose the classmate because they do not (usually) display aggressive, dominant or uncomfortable behaviour. e.g.: we've never had a fight, they don't hit me, they don't annoy or bother me.	91	1.2%
Empathetic peer behaviour	They choose a pupil through compassion or solidarity. e.g.: they are alone, they are new in class, I feel sorry for them.	88	1.1%

If we compare the reasons for preference expressed by boys and girls (table 6), we find significant differences in six of the categories. Girls more often put forward reasons related to satisfaction and emotional support, $Z = -5.814$, with a moderate size effect, $h = .28$; being drawn by the peer's personality traits, $Z = -7.918$, with a moderate size effect, $h = .39$; companionship and shared space in the classroom, $Z = -3.757$, with a moderate size effect, $h = .24$; the peer's empathetic behaviour, $Z = -3.757$, with a moderate size effect, $h = .24$. In contrast, boys cite more often than girls reasons related to the lack of annoying or childish behaviour by their peers, $Z = 1.983$, with a moderate size effect, $h = .31$. Also worth highlighting is the significant percentage of boys who experience greater problems than girls when expressing the reasons for their choice, $Z = 4.192$, with a moderate size effect, $h = .26$.

Reasons given for rejection

Participants gave an average of 1.95 negative nominations for classmates per interviewee, putting forward a total of 4,113 reasons for rejection, prominent amongst which are those related to physical aggressiveness, such as the word 'hit' (figure 2), which emerged on 816 occasions (*hitting, hit, puncher, we fight...*). Other commonly used words are those related to annoying or childish behaviour (*annoying, is a brute, is a real pain, does stupid things...*) and the lack of affinities and playing together (*never wants to play with me, never does things with me, never plays...*)

Table 6
Frequency of reasons for positive choices given, by gender

Category	n (%) boys	n (%) girls	Total	Z	p	IC95%	Cohen's h
Affinities and playing together	1,269 (52.9%)	1,130 (47.1%)	2399	1.153	.249	[.509, .549]	
Pre-established relation figure	496 (50.5%)	486 (49.5%)	982	-0.715	.475	[.473, .537]	
Satisfaction and emotional support	365 (41.8%)	508 (58.2%)	873	-5.814	<.001	[.385, .451]	.28
Personality traits	320 (38.0%)	522 (62.0%)	842	-7.918	<.001	[.347, .413]	.39
Common social network or old friendship	340 (53.6%)	294 (46.4%)	634	0.932	.352	[.497, .576]	
Companionship and material reciprocity	226 (43.4%)	295 (56.6%)	521	-3.757	<.001	[.390, .497]	.24
Not revealed or not clear	260 (62.1%)	159 (37.9%)	419	4.192	<.001	[.573, .668]	.26
Appearance and physical abilities	149 (50.3%)	147 (49.7%)	296	-0.411	.681	[.445, .562]	
Shared space inside the classroom	112 (45.2%)	136 (54.8%)	248	-1.997	.046	[.388, .516]	.19
Interest or benefit	98 (45.6%)	117 (54.4%)	215	-1.727	.084	[.387, .525]	
Preferences in shared friendship	69 (43.7%)	89 (56.3%)	158	-1.940	.052	[.356, .517]	
Academic aspects and behaviours	53 (51.5%)	50 (48.5%)	103	0.000	1.000	[.413, .616]	
Absence of annoying or childish behaviour	57 (62.6%)	34 (37.4%)	91	1.983	.047	[.524, .719]	.31
Empathetic peer behaviour	34 (38.6%)	54 (61.4%)	88	-2.346	.019	[.291, .491]	.37

Note. Test value = .517.

Category	Description	N	%
Absence of affinities and playing together	Lack of shared tastes, opinions or ideas for games to play with the peer. e.g.: I don't like their games, they don't like playing superheroes.	329	8.0%
Personality traits not liked by the peer	Charisma or a temperament deemed negative by other classmates. e.g.: they are always kissing me and I don't like it, I don't like them, they are bad.	235	5.7%
Dominant behaviour	Personality traits that mean they are domineering or arrogant, in which the peer always has to be right and wherein the rest have to do what they say. e.g.: they are bossy, we always have to play what they want, they never let me play in the corner.	216	5.3%
Rude behaviour	Brutish or rough actions by a classmate without intending to cause physical harm, but which make their classmates feel uneasy or which frighten them. e.g.: breaking everything, they are brutish, they hurt me unintentionally.	211	5.1%
Non-shared friendship preferences	Rejecting the peer because they have a relationship with another classmate that the boy or girl doesn't like or because they prefer to choose others. e.g.: they are with other friends, they play with Marcos, they go off with other kids, they love Emma.	188	4.6%
Verbal or gestural aggressiveness	Disruptive behaviour that harms the peer psychologically. e.g.: they make fun of me, they swear at me.	183	4.4%
Not revealed or not clear	They do not state the reasons or are not clear about them. e.g.: well, because it just isn't, I don't know, I have no idea.	166	4.0%
Academic aspects and behaviour in the classroom not liked by the peer	Behaviours or abilities in which the pupil does not stand out or is below the average of the rest of the class. e.g.: they do this task badly, they get the numbers wrong.	139	3.4%
Lack of social interaction	The pupil notices that the social interactions or exchanges with the classmate are poor or deficient. e.g. they are always alone, they don't talk to anyone, they want to play on their own.	135	3.3%

Category	Description	N	%
Appearance and physical abilities not liked by the peer	Physical appearance or features of the classmate felt to be negative or not very attractive to the other classmates. e.g.: running slowly, moving their hands slowly, I don't like the way they smell, they are ugly.	124	3.0%
Pre-established non-relation figure	Predetermined enmity, negative pre-established link or connection. e.g.: they are not my friend, we are not friends.	104	2.5%
Lack of companionship and material reciprocity	Lack of caring behaviour that helps the peer. e.g. they don't share, they never help.	99	2.4%
Lack of loyalty or trust	Peer's lack of loyalty or loss of trust. e.g.: they tell secrets, they lie to me, they snitch on me.	56	1.4%
Gender	Rejection related to not doing what a boy or girl should be doing or due to related prejudice. e.g.: they play with girls, he/she is a boy/girl, they play boys' or girls' games.	41	1.0%
Lack of a common social network or old friendship	They don't choose the peer due to a lack of mutual family friendships, extracurricular activities or shared spaces at the present or in the past. e.g. they didn't go to my kindergarten, our parents are not friends.	36	0.9%
Does not accept superiority or being told what to do	Peer rejection because they do not follow their rules or do not do what they want them to do. e.g.: I tell them to do something and they ignore me, they don't play what I tell them to play.	26	0.6%
Lack of relationship in the past or in external environments	Distant or uneven seating of peers in the classroom which makes it difficult for them to share spaces or moments. e.g.: I never see them, they are not in my team, because they don't sit at my table.	23	0.6%
Saturation	Becoming "jaded" with the peer, too many common and shared situations and spaces. e.g.: because I see them a lot at home, because they are my brother/sister and I get tired of them, because they're always calling me.	14	0.3%

Table 8
Frequency of reasons for making a negative choice by gender

Category	n (%) boys	n (%) girls	Total	Z	p	IC95%	Cohen's h
Physical aggressiveness	498 (48.9%)	521 (51.1%)	1019	-1.776	.076	[.458, .520]	
Childish or annoying behaviour	365 (47.5%)	403 (52.5%)	768	-2.779	.023	[.439, .511]	.12
Lack of affinities and playing together	187 (56.8%)	142 (43.2%)	329	1.810	.070	[.513, .623]	
Personality traits	107 (45.5%)	128 (54.5%)	235	-1.827	.068	[.390, .521]	
Dominant behaviour	114 (52.8%)	102 (47.2%)	216	0.249	.803	[.459, .597]	
Rude behaviour	80 (37.9%)	131 (62.1%)	211	-3.938	<.001	[311, .447]	.39
Not the same friendship preferences	80 (42.6%)	108 (57.4%)	188	-2.437	.015	[.352, .499]	.26
Verbal/gestural aggressiveness	86 (47.0%)	97 (53.0%)	183	-1.200	.230	[.395, .545]	
Not revealed or not clear	107 (64.5%)	59 (35.5%)	166	3.212	.001	[.569, .720]	.37
Academic aspects and behaviour	71 (51.1%)	68 (48.9%)	139	-0.062	.951	[.424, .597]	
Lack of social interaction	60 (44.4%)	75 (55.6%)	135	-1.601	.109	[.357, .532]	
Appearance and physical abilities	66 (53.2%)	58 (46.8%)	124	0.250	.802	[.440, .624]	
Pre-established non-relation figure	50 (48.1%)	54 (51.9%)	104	-0.641	.521	[.380, .582]	
Lack of companionship and material reciprocity	54 (54.5%)	45 (45.5%)	99	0.466	.641	[.442, .649]	
Lack of loyalty or trust	29 (51.8%)	27 (48.2%)	56	0.000	1.000	[.378, .658]	
Gender	28 (68.3%)	13 (31.7%)	41	1.970	.049	[.529, .805]	.48
Lack of shared space in the classroom	20 (55.6%)	16 (44.4%)	36	0.463	.667	[.396, .705]	
Won't accept superiority or being told what to do	18 (69.2%)	8 (30.8%)	26	1.593	.111	[.499, .837]	
Lack of relationship in the past or in external environments	15 (65.2%)	8 (34.8%)	23	1.089	.276	[.448, .813]	
Saturation	9 (64.3%)	5 (35.7%)	14	0.675	.500	[.386, .838]	

Note. Test value = .517.

As regards gender differences (table 8), girls cite far more often than boys those pupils who behave childishly or who annoy them, $Z = 2.779$, with a very small size effect, $h = .12$; rude behaviour, $Z = -3.938$, with a moderate size effect, $h = .39$; and non-shared friendship preferences, $Z = -2.437$, with a moderate size effect, $h = .26$. In contrast, boys more often cite the other's gender, $Z = 1.970$, with a moderate size effect, $h = .48$. As was the case with the reasons for preference, it can again be seen how boys experience greater difficulty than girls when it comes to expressing their reasons, and that they are less explicit and may hide their reasons, $Z = 3.212$, with a moderate size effect, $h = .37$.

DISCUSSION AND CONCLUSIONS

The main aim of this study is to gain a deeper insight into sociometric distribution in the second cycle of infant education (pupils aged between three and six) considering the results to emerge from other studies conducted to date— and to ascertain the reasons children give for either accepting or rejecting their peers.

The study finds that peer rejection emerges as a problem from the moment boys and girls begin to relate to one another at school, such that the negative consequences start when they commence their schooling. We find that 11.5% of pupils are rejected, a percentage that is similar in the three years that make up the second cycle. These results concur with those reported in national and international studies, which estimate that between 10% and 15% of pupils are rejected in each class (Bierman et al., 2014), and bearing in mind that findings mostly correspond to research conducted in compulsory education—particularly in secondary education. Previous studies carried out in Spain indicate that the percentage in infant education is lower than at other stages of education and stands at around 10%. The results from this study confirm this trend, although the percentage we find is higher than in the studies carried out by García-Bacete et al. (2008) and Suárez-García et al. (2018), and is closer to the 13% reported by Monjas et al. (2014) for first year primary education. This might lead us to see rejection as a phenomenon that tends to grow in the second cycle of infant education where—according to INE (National Statistics Institute) data— virtually all children are enrolled at school (96%). This result is particularly relevant given that it would suggest that rejection begins to take root at a very early age (Nergaard, 2020) and that it already has a significant presence and could become a chronic issue unless measures are taken to curb and prevent it (Hanish et al., 2021).

Distribution is seen to be unequal in terms of gender, with more boys suffering rejection (16.2%) than girls (6.5%), and which concurs with the scientific literature addressing other stages of education (Luis-Rico et al., 2020; Suárez-García et al., 2018), with the rejection ratio standing at between three and four boys for every

girl (Suárez-García et al., 2018). Much the same is true of the sociometric status of popular children, although in reverse, as there are more popular girls (10.2%) than boys (6.6%).

Also evident is the situation of vulnerability experienced by those pupils who have specific educational support needs, and where we find a much higher percentage of pupils with educational needs being rejected (35.5%) than not rejected (8.8%). This concurs with the findings of Monjas et al. (2014) for first year primary education pupils, where 29.2% of needs students were found to be rejected, although the figure is lower than the 53.8% reported by Whal et al. (2022). It should, however, be remembered that there are more boys with educational needs (13.7%) than girls (6.5%), which agrees with other studies carried out with these age groups (Monjas et al., 2014; Whal et al., 2022). Even when bearing this in mind, the percentage of rejection far exceeds that found for gender. Likewise, there is a significantly lower number of pupils with educational needs who are popular with their classmates (2.3%) than those who do not have such needs (9%). As a result, there are also differences in the average sociometric type, as there are fewer students with educational needs. In sum, this group is less popular with their peers such that –in addition to their own particular situation of vulnerability– they are further hampered by having fewer opportunities for social interaction (Ferreira et al., 2019).

The percentage of pupils rejected by their classmates is similar in the three school years –as occurs with popular children. Nevertheless, the number of neglected and controversial students gradually diminishes. This would seem to point to a consolidation of group relations, wherein pupils who are initially isolated or who have affinities with a range of different groups, finally integrate into some of them (García-Bacete et al., 2008). It should be remembered that –apart from certain exceptions– the pupils spend three years together, which helps them to consolidate the knowledge and expectations each pupil has vis-à-vis the rest.

The reason which is by far most often cited by pupils for accepting their contemporaries –and which accounts for almost a third of all the reasons given– is affinity, both in terms of playing as well as in their opinions. This argument is cited in a similar number by both boys and girls (Luis-Rico et al., 2020). Pupils who know each other and who share ideas and experiences are more likely to be accepted by others. As a result, classroom dynamics that facilitate knowledge and experiences when playing (Sjöblom et al., 2020), which involve the whole class, as well as contexts and shared spaces and activities (Nergaard, 2020; Wang et al., 2019), can aid peer acceptance. It is precisely these situations that may account for why more pupils with educational needs are rejected, since their limitations may hinder communication and prevent them from enjoying shared experiences and games (Ferreira et al., 2019).

The second most commonly cited reason for acceptance is peer reciprocity (Monjas et al., 2008), which is reflected through the establishment of friendship, and which is key to developing social skills (Wang et al., 2019). As a result –and since it is one of the main reasons for acceptance– we must create the right educational perspective with regard to friendship (Carter, 2021) by fostering measures aimed at boosting it (Shin, 2019).

The third most common reason is the satisfaction and emotional support provided by others (Monjas et al., 2008), such that working towards enhancing emotional regulation at these ages proves key (Estrada-Fernández et al., 2023). Furthermore, this reason is more cited by girls than by boys. The same is true with the arguments put forward concerning being attracted by other pupils' features and personality as well as their behaviour in terms of companionship and material reciprocity. Indeed –albeit with a small overall percentage– girls more often cite empathetic behaviour and evidence a greater inclination towards others' feelings, since at this stage of education girls tend to involve themselves in more dyadic interactions than boys (Chow et al., 2023).

As regards the reasons for rejection, those most frequently mentioned are related to physical aggressiveness (25%) as well as annoying and childish behaviour (19%), with the latter being cited to a greater degree by girls. All studies concur when pinpointing aggressive behaviour as one of the main reasons put forward as the cause of rejection (Bengtsson et al., 2022; Coie et al., 1982), although it is not identified so much with what is actual physical aggression. It should be considered that aggressiveness is a major factor, as it is linked to future bullying, since bullies tend to display an impulsive, hostile and dominant profile (Yue & Zhang, 2023).

In infant education, many boys and girls are learning to self-regulate their behaviour and are yet to gain full self-control, which consequently leads to more aggressive behaviour –which is often instrumental in nature. As the trained actors in this scenario, teachers tend to quickly intervene to prevent this kind of behaviour (Cuenca-Sánchez & Mendoza-González, 2017) as it is unacceptable in classroom dynamics. Such intervention does not tend to be so immediate in the case of annoying or childish behaviour, as it is often viewed as the result of the different levels of development evident at these ages. Nevertheless, it can be seen how such behaviour lies at the root of many situations of rejection –particularly for girls– such that it is a key area to be worked on.

Other behaviours related to aggressiveness, such as dominant behaviours (5%) or verbal or gestural aggressiveness (4%), are not cited as often as in other stages of education. The stage at which children find themselves at this early age in terms of their development means that such behaviour is common to all of them and is therefore not considered a very differential motive for rejection. The third most frequently cited motive for justifying rejection is the lack of affinity or

playing together (8%). Here there is therefore an overlap, and the same reason is given for acceptance as for rejection (Sjöblom et al., 2020), as also occurs with the preference for non-shared friendship (5%) and which is also more common amongst girls (Monjas et al., 2008). As a result, planning classroom activities that enable common ground to be found and joint activities to be carried out amongst all the students will enhance acceptance, avoid the exclusiveness that is sometimes sought in friendships and –consequently– prevent peer rejection.

Another major cause –and one far more often cited by girls than by boys– concerns rude behaviour (5%); in other words, behaviour that leads to harm, but without being intentional. This would point to the need to further promote activities related to emotional self-control and empathy (Estrada-Fernández et al., 2023).

Finally, we should point to gender as a reason for rejection. This is far more prevalent amongst boys than amongst girls, evidencing the fact that segregation by sex is more common during the early stages (Chow et al., 2023, Wang et al., 2019). That said, it is not a very frequently cited reason.

Worth highlighting is the large number of boys who are unable or unwilling to express why they choose or reject their peers. This would indicate greater emotional immaturity or difficulties with regard to emotional expression. Social communication and interaction tend to be less favoured when compared to girls, and also tend to be more often linked to negative emotions and peer rejection (Bengtsson et al., 2022).

This study is not without its limitations. Firstly, although we compare the three years of the second cycle of infant education, our design is transversal such that we cannot confirm how sociometric status evolves. Longitudinal studies therefore need to be carried out, with student advancement also being measured at different points during the school year so as to gauge how each pupil progresses. Other aspects that also need to be taken into account concern pupils' particular characteristics –both individually (gender, educational needs, social network, etc.) and contextually vis-à-vis the family environment (extracurricular activities, interactions outside school, availability and use of resources in their environment, etc.). There is also an imbalance in the distribution of the sample between the three years, with there being far fewer pupils in the first year of the cycle, and more in the last year. As a result, the sample of children aged 3-4 years old needs to be increased. Further studies also need to be carried out on sociometric distribution in order to determine whether there is a growing trend of rejection in infant education or whether the differences found with other studies are due to sample characteristics. Another limitation concerns the variable of specific educational support needs. Firstly, we were not able to access exactly what kind of needs students had, as this information was subject to data protection. Second, there was the actual difficulty concerning whether or not to include this in the category. At this stage of schooling,

those children clearly diagnosed as needing such support are generally included. Very likely, others are not included, either because of the difficulty the educational guidance teams have in issuing a report that justifies the child's inclusion, because the diagnosis recommends intervention later on, or because the difficulties are not sufficiently determinant at this stage of the child's schooling, even if the students do already exhibit certain problems in the classroom. Finally, this article examines the frequency and variety of reasons concerning why pupils like or dislike their peers, and which determine whether each pupil accepts or rejects others. However, we do not look at the reasons which lead to a student having a sociometric status that triggers rejection and which lead to them actually being rejected. As a result, a future line of enquiry would involve exploring the reasons from the perspective of those receiving nominations, and specifically those who are actually rejected by their classmates.

In sum, it is vital for infant education pupils to know how to forge positive relations with their peers (Wang et al., 2019), since this fosters the development of social skills. The present study advocates the need to include specific activities aimed at curbing classroom rejection (Molinero-González et al., 2023), with the acquisition of prosocial behaviour proving essential if pupils are to become more popular with their classmates (Chávez et al., 2022). To achieve this, schools must first promote situations that enable boys and girls to share positive experiences, encouraging situations that boost social contact amongst pupils (Nergaard, 2020). Given the stage of schooling in question, games also play a key role in contributing towards well-being and student relations (Sjöblom et al., 2020) and therefore need to be included when designing programmes that help develop each pupil's social skills and emotional intelligence, since emotional control and emotional behaviour help pupils adapt to their environment (Estrada-Fernández et al., 2023). There is also a need to make the most of school break time, as this is a moment when informal relations come to the fore, albeit within a formal context (Rodríguez-Medina et al., 2016). After previously acquiring a knowledge of the children's preferences, predilections, fears and so on, the teacher can here suggest the collaborative games that ensure the participation of all the students and which benefit them socially (Sjöblom et al., 2020).

Second, it is necessary to increase both the amount and the quality of pupils' friendship relations and to create an educational perspective of friendship (Carter, 2021), boosting specific measures to be taken with pupils who are rejected (Shin, 2019). Fostering friendship is a psychosocial resource that helps cushion the impact of rejection (Greco, 2019) and is one of the lines of research to have aroused greatest interest in recent years in education (Chow et al., 2023; Wang et al., 2019). There is a need to create situations that help develop an understanding of others and which reinforce prosocial attitudes that will help children become more popular and liked

by their contemporaries (Chávez et al., 2022). Schools can encourage contexts that boost the possibilities of students forging friendships (Nergaard, 2020), both in varied group activities and dyadic relations, as well as in terms of classroom layout and shared spaces (Wang et al., 2019).

Third, it is important to control aggressive and annoying behaviour, acquire deeper self-knowledge and emotional self-control (Cuenca-Sánchez & Mendoza-González, 2017), since the right emotional control and behaviour will help students adapt to the environment (Estrada-Fernández et al., 2023).

Fourth, it is necessary to foster co-education and exchange amongst children of the same sex and to encourage positive attitudes between boys and girls from early childhood that will favour their social development (Fabes et al., 2018) since exchanges segregated by sex deprive them of many social experiences (Chow et al., 2023, Hanish et al., 2021, Xiao et al., 2022).

Finally, particular importance should be attached to children who have educational needs by implementing more intense and individualised measures (Ferreira et al., 2019) since the latter group's vulnerability –added to the limitations inherent to their particular difficulty– increases the likelihood of them being rejected by their peers (Monjas et al., 2014) and so deprives them of the social experiences they require to properly develop socioemotional skills. As a result, all the actors engaged in the educational community must become involved in ensuring that inclusive practices are applied (Rodríguez-Medina et al., 2016) and which will also help to forge greater multicultural integration (Khalfaoui et al., 2021).

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Disability, stigma and suffering in schools. Emerging narratives for the right to inclusive education

Discapacidad, estigma y sufrimiento en las escuelas. Narrativas emergentes por el derecho a la educación inclusiva

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ABSTRACT

Based on the Social Model of Disability, this article seeks to highlight the processes of stigmatisation, discrimination and suffering that take place in schools, while also examining the processes of socialisation and education that students, families, professionals and activists encounter within the school setting. Furthermore, it addresses the absence of educational responses to diversity and the social and professional demands required from an inclusive perspective. To this end, narrative research is used to analyse the social and educational experiences of six individuals' life histories and thirteen life stories of students, families, professionals, and activists, categorised into three groups: the labelling process and its consequences; the response of students, families and professionals; and the effects

of discrimination on the person and his or her environment. The results show the challenges they face in finding the support necessary to engage in activism and empowerment processes with the goal of creating an inclusive educational environment that does not segregate students with disabilities in special education settings, but rather takes them into account in all pedagogical decision-making processes. The paper shows the need to place the voice of students and families at the very heart of the inclusive discourse; to recognise them as activists with the capacity to show, from their narrated experiences, the need to challenge the labelling process; and to play a leading role in research committed to educational and social change, thereby enabling new life maps while promoting a social movement for the right to education.

Keywords: inclusive education, special education, right to education, educational discrimination, disability discrimination, access to education

RESUMEN

Partiendo del Modelo Social de la Discapacidad, este artículo pretende visibilizar los procesos de estigmatización, discriminación y sufrimiento que se producen en la escuela, así como revisar los procesos de socialización y educación que experimentan en la institución escolar estudiantes, familiares, profesionales y activistas. Al mismo tiempo, aborda la ausencia de respuestas educativas a la diversidad y a las demandas sociales y profesionales que requiere la misma desde una perspectiva inclusiva. Para ello presentamos seis historias de vida en profundidad y trece relatos autobiográficos de estudiantes, familias, profesionales y activistas desarrollados a través de una investigación narrativa en la que se analizan sus experiencias sociales y educativas, a partir de tres categorías: el proceso de etiquetaje y sus repercusiones, la respuesta de los estudiantes, sus familias y los profesionales, y las repercusiones de la discriminación sobre la persona y su entorno. Los resultados muestran sus luchas para encontrar apoyos que les permitan emprender procesos de activismo y empoderamiento dirigidos a conseguir una escuela que no segregue en centros o aulas específicas al alumnado nombrado por la discapacidad, y que les tenga en cuenta para la toma de decisiones pedagógicas. A modo de conclusión, se muestra la necesidad de poner en el epicentro del discurso de la inclusión la voz del alumnado y las familias; de reconocerlos como activistas con capacidad para mostrar, desde sus experiencias narradas, la necesidad de desafiar el proceso de etiquetado; y de protagonizar investigaciones comprometidas con el cambio educativo y social, que habilitan nuevas cartografías vitales e impulsan un movimiento social por el derecho a la educación.

Palabras clave: educación inclusiva, educación especial, derecho a la educación, discriminación educacional, discriminación por discapacidad, acceso a la educación

INTRODUCTION

This article is based on the Social Model of Disability, which emphasises the need to challenge oppressive, dehumanising theories (Abberley, 1987). This de facto denial of the humanity of disabled people constrains their lives and those of their families, often leading to them normalising inequalities under the guise of structural functionalism and the biologist interpretations associated with it, as is persistently evident in the school setting. We therefore consider, in line with the ideas put forward by Barton (1998), that examining disability solely within the context of inclusion processes is inadequate; rather, it must also be examined in relation to other forms of oppression that intersect in schools.

Multiple studies on the effects of confinement have shown the importance of presence in the challenge of reducing inequalities (Bonal & González, 2021; Calderón & Rascón, 2022). The right to education is contingent not only on being physically present with others, but also on being treated as simply another member of the class. Moreover, the participation of families is crucial for the development of the right to education, meaning any barriers to family involvement also hinder the exercise of this right. It is therefore necessary to recognise the right of all people to learn, participate and progress, always involving their immediate environment in this process. This implies understanding that we learn thanks to *the other*, as different from me, and that differences (rather than homogeneity) are in fact what define us. Here too, the scientific evidence is conclusive: it is not only positive for students who have been diagnosed and labelled as different, but also for everyone else who benefits equally (Hehir et al., 2016; Justice, Logan, Lin and Kaderavek, 2014).

However, today the right to inclusive education is being violated in Spain despite the ratification of the Convention on the Rights of Persons with Disabilities in 2006 (Calderón, 2018; Calderón, Moreno & Vila, 2022; Echeita, 2017; Echeita et al., 2009; CERMI, 2010; ONU, 2017; UNESCO, 2020; et al.). These are serious systematic violations: “A pattern of structural exclusion and segregation based on disability has been perpetuated through the medical model” (UN, 2017, p. 16). This pattern often involves the subject being unfairly categorised and stigmatised based on psycho-pedagogical reporting and labelling, which wrongly assigns personal and family blame for the segregation.

This situation clashes with international research, which shows the inconvenience of a special needs segregated pedagogy (Ainscow, Dyson & Weiner, 2013; Hehir et al., 2016) that focuses on the characteristics of learners from a normocentric view, something contrary to the construction of an inclusive school. In contrast, the Social

Model of Disability emphasises the humanity of people with disabilities, an aspect that this perspective overlooks, thereby exacerbating such separation, particularly within schools. We therefore believe that disability studies must necessarily be based on more generic sociological and pedagogical theories and practices, embedded in philosophies and pedagogies of differences (Skliar, 2007).

Part of the unresolved problem with inclusive education may have to do with the fact that research tends to focus on teachers' perspectives on inclusion. Indeed, such research may not be sufficiently inclusive if it leaves out the voices and perspectives of other groups in the educational community or if it is not committed to the transformation of reality, as set out by Parrilla (2009). Examples of inclusive research in this context include the study by Echeita et al. (2009), which draws on professionals from the associative network; López and Carmona (2018) and Calderón and Habegger (2017), which focuses on families and their views of their socioeducational inclusion; and studies by Moriña (2010), Calderón et al. (2021) and Messiou et al. (2022), which delve further into student perspectives. In line with this research, we understand inclusion as being a societal process involving shared responsibility among citizens, while families and students play crucial roles in terms of evaluating the educational and social system, precisely thanks to the value of their (occasionally distressing) experiences in promoting social and educational progress.

METHOD

This study focuses on narrative research that aims to understand different experiences (Clandinin & Connelly, 2000) by generating life stories and life histories. The work is part of a research project in which one of the goals is to find and document narratives on disability and educational inclusion (some of them from individuals involved in promoting human rights), with a view to disseminating and recognising their value. It also aims to review the processes of socialisation and education experienced in schools by students, family members, professionals and activists. The study was carried out in Spain between 2018 and 2022, and is based on two hypotheses:

1. The activism of people with disabilities and their close environment together contribute to the formation of identities that promote educational inclusion and social change.
2. The narratives and knowledge that emanate from the Social Model of Disability allow us to question and improve the current school model.

In an attempt to challenge the power relations that dominate research practices, biographical research allows us to generate new narratives that we have divided into three large blocks:

1. *Narratives through participation* for the transformation of collective ideologies. These are the foundations that underpin all the work, and were developed collectively in two large participatory events based on the dialogue of three hundred and two hundred individuals, respectively.¹ The demands for the construction of biographical narratives and proposals for action, including political advocacy, have been generated on the basis of these commonalities.
2. *Narratives through biographical research* in order to collect stories of exclusion and the struggle for inclusive education. Six in-depth life stories and thirteen autobiographical accounts of students with disabilities, families, professionals and activists committed to inclusive education from different parts of Spain have been developed in this regard, forming the basis of this study.
3. *Action-orientated narratives*. These have led to proposals that take shape in new ways of addressing reality by taking part in and producing tutorials, guides and materials to foster inclusivity. In other words, the research does not merely describe reality, but rather encourages its transformation through the action of the participants.

According to Atkinson and Coffey (2003), biographical-narrative research is a methodology of dialogue in which narratives reflect life histories, and information is constructed between protagonists and researchers in a given social context. This makes narrative analysis a highly valuable tool for thinking beyond the data, providing “a critical way of examining not only key actors and events, but also social and cultural conventions and norms” (Atkinson & Coffey, 2003, p. 97).

The inclusion of plural stories makes it possible to connect the present, past and future of the protagonists’ life histories (White & Epston, 1993). In this regard, the use of stories as a research technique aims for individuals to personally narrate their experiences to others, building a narrative identity (following Ricoeur’s approach, as elaborated in Moreno & Vila, 2022) that is rooted in everyday life.

We have followed the proposals of Bolívar (2014) and Pujadas (2002) in referring to life story as the autobiographical narrative constructed by the individual, and life history as the researcher’s narrative that enriches the story with additional sources, interpretation, triangulation and contextualisation.

¹ They are available at <https://bit.ly/3z6opfl> and <https://bit.ly/41jfC4t>.

The research process involved a range of different phases:

1. Phase one: A series of social media posts ask people to submit stories that meet a set of specified minimum requirements, namely:
 - Recount a personal school experience, whether as a student, family or professional.
 - Take part in training and research activities (interviews, reviews, focus groups, etc.).
 - Inclusive education activism experiences are particularly welcome.
 - Participants are advised that those experiences with most narrative potential will be selected in order to highlight diverse realities and profiles.

The request itself was already a form of negotiation, which would later be reworked and adapted to each participant. Finally, a total of twenty life stories were collected from students with disabilities, families, professionals and activists committed to inclusive education.

At the same time, a group of people with outstanding activist backgrounds were invited to the first large participatory event to build their in-depth life stories alongside the research team, based on a series of biographical interviews, documentary evidence, drafting of documents, interviews with other actors, etc.
2. Phase two: The stories are selected and distributed among the members of the research team for formal review. After carefully reading them, a total of thirteen stories were selected, considering both the variety of profiles (seven mothers of children labelled with disabilities, three students, a school counsellor and two women activists) and also the narrative value of the text in terms of depth and descriptive and analytical capacity. The texts were reworked through a collaborative process with the original authors, allowing them to delve into specific elements of interest and make any necessary modifications or additions until they felt a strong connection with their stories. At the same time, the six life stories were constructed and negotiated in depth with their protagonists. These stories were told by three mothers, two students and an educational counsellor.
3. Phase three: The narratives are revised and edited, and then subjected to a negotiation process to finalise them and determine their scientific and academic use.
4. Phase four: The life stories are delivered to the research group, to start the analysis process based on identifying emerging categories.

5. Phase five: The “historified” narrative report is drawn up, based on the confluences and arguments of the texts from the categories developed. This interpretive report was generated through an evolving categorisation of the narratives using NVivo 11 qualitative data processing software, consistently following the three primary categories outlined in this article, encompassing more than a hundred topics. These categories have been negotiated both with the protagonists of the life stories, and in the “Narratives through participation” and “Action-orientated narratives” processes.

The research has been extensive and thorough, both in terms of scope and transferability. The participation narratives have served as the pre-text, a “river of communities of meaning” (Cortina, 2021, p. 177) that allows these life stories and life histories to be interpreted. Action-orientated narratives, as per Bertaux (1981), are a suitable means of addressing the oppressions experienced by the protagonists, offering a hopeful projection based on biographical research.

RESULTS

The main results of the analysis of the stories will be presented based on the aforementioned fundamental categories, following a systematic categorisation process from which the narrative report was generated, and the evidence extracted.

The labelling process and its repercussions

We are all subject to social scrutiny from the moment we are born. Even then, families must deal with affirmations and value judgements, especially when their members fall outside of heteronormative canons. These judgements gradually become labels that serve to categorise people according to their differences, affecting the social expectations projected onto them.

Physicians, families, and protagonists consider diagnosis a highly valuable tool in this context, as it provides information after entering often unknown terrain. In the educational arena, diagnosis offers certainty in the face of uncertainty, i.e., a solution to fear of the unknown: How should I act from now on? What should I expect? How will this new situation impact me? These and other questions put the overall context in a position to respond to new challenges. Ignorance therefore brings the potential for informal research and reconstruction of ideologies surrounding human nature, differences, social relations, etc., often resulting in families going

through a stage of mourning. Such mourning implies the death of uncertainty and, with it, of personal freedom. This point marks the start of a process of acceptance or resistance, not of the person (as is often stated in psycho-pedagogical analysis), but rather of the social mandate to be assumed by the families (Calderón & Ruiz, 2015): accept whether it is possible or not to decide, achieve, test, fail, solve, create... This is the dispute that develops in these initial moments. It is therefore essential that disability be understood as a social construction (Abberley, 1987; Barton, 1998), rather than as a solely biological reality to be uncritically accepted or not, and the diagnostic process as an exercise of power that imposes a whole narrative that frames a life (Calderón, Moreno & Vila, 2022).

My son Alejandro is born in November 2007, and he “fails” the very first exam of his life. At that moment, we realised the social significance of the situation, although we were unaware of the challenges that lay ahead... (Life story of Isabel, mother).

Shame and guilt then emerge in this process, as it implies the acceptance of normality as the organiser of reality. Social imperative, supported by the medical model, transforms social aspects into biological ones, thereby inhibiting the ability to question what is normal.

The experience had a profound impact on me, as I witnessed the journey of a girl who had spent ten years at school, four of which were marred by the label of “mental retard” on her report card, while teachers’ expectations for her were zero. In fact, the teacher said to me: “This child (...) can’t move on because she’s not very bright”. The phrase was: “She’s not very bright”. The experience had a profound effect on me (Life history of María José, school counsellor).

Similar processes also occur in other contexts, which respond to the insecurity of uncertainty with attitudes that embrace rather than shy away from questioning the categorisation criterion. Categorising somebody as a person with a disability therefore becomes a distinction compared to the correct norm, which is unquestioned. In this context, the discriminatory attitude is essentially conforming to the socially accepted norm when dealing with someone who has been excluded from what is considered normal. These (sometimes unconscious) attitudes strongly affect the processes of identity construction. Prejudice, indifference, rejection or condescension affect the image that children touched by disability forge of themselves, conditioning their relationships with others and vice versa.

I went into the store... I wanted to see how much some boxes cost (...). We went to the checkout (...) to ask how much they were, but they refused to let us buy them (...). I was there saying, “Excuse me, I’m talking to you”... but nothing, they

completely ignored me. It was as if I wasn't there. They took no notice of me... I was burning up with anger inside (Life history of Corina, graduate student).

Most of the stories agree that starting school is one of the hardest and most exhausting moments. A stage of life full of emotions, experiences and new learning that should be lived with happiness, and which ends up being in an ordeal for those involved. Their schooling becomes an oppressive, discriminatory process lived with deep pain and a great sense of loneliness.

At primary school, some girls noticed the way I spoke and asked me if I was retarded. And I didn't know what to say... I didn't know what that word meant, nor was I aware that my way of speaking was any different. I felt uncomfortable and confused, unable to react (Life story of La Yonka, student).

Ignorance also leads to a lack of empathy and humanity. In other words, every time a person is dehumanised through objectification, humanity is lost. In this regard, the stories highlight how labelling processes (understood as forms of oppression) shape the formation of individuals' and their families' identities, subjecting them to stigmatisation and tragedy while leaving them susceptible to social and institutional subordination, such as in the school setting. Continued pressure leads them to conform to the societal expectations imposed by labelling (Calderón & Ruiz, 2015), although this conformity is not passive, but rather generates resistance. People always have agency.

Until one day I said: "Enough is enough". I didn't say it, but that's what I thought. I just sat there, staring at the sheet. I was angry, very angry. They would say: "Come on Indira, cut the paper... Indira, come on!" And I was sat there with my arms crossed, looking at my paper and thinking: "No! I'm not going to keep cutting and pasting pieces of paper! Because I don't want to, I don't like it at all! OK? I want to learn alongside the others, I have a right to learn" (Life history of Indira, student).

Response from students, families, professionals and activists: from resignation to resistance

The way we perceive others and the way they perceive themselves is influenced by the expectations we have of them. These expectations are built, firstly, on previous experiences and insight from parenthood, and, secondly, on normative and culturally assumed mandates concerning the roles of individuals with disabilities and their families, as well as the boundaries within which they operate. Prejudices and difficulties in managing emotions can also have a significant impact on families.

Some of them stress how lack of knowledge leads to helplessness, whereas knowledge leads to frustration.

This led to a school placement report being issued, and when they called me in to sign it, I saw that there were things I didn't agree with. But, when I voiced my concerns, their response was: "The placement report is obligatory if we are to attend to your son. You must sign the 'I agree' part", otherwise we cannot do anything'. And so, despite not fully agreeing with everything, I signed it, believing it to be in his best interests (Life story of Isabel, mother).

These are everyday situations of discrimination, in which diagnostic categories are used to legitimise exclusion in the social and school environment, even using the double emotional and social coercion of going through the labelling process as the only way to access certain resources and care, without explicitly acknowledging the violation of the right to education that this implies. There is a discriminatory regulatory framework which provides the basis for opaque practices, as noted by international organisations (UN, 2017).

The response of parents is shaped by the wider family unit, which can be seen as either a burden or a catalyst, often against a backdrop of prejudice.

For many people, we were a disgrace, a misfortune. My father's family was engulfed in grief, unsure of how to interact with us; however, my mother's family embraced us warmly, treating us just like any other two girls (Life story of Mentxu Arrieta, activist).

Particularly noteworthy is the juncture at which families often find themselves: parents seek answers to the various situations their children experience, but encounter social rejection in nearly every domain, particularly in education, where one would expect to find appropriate responses to their diverse needs. As a result, many end up (at least initially) in an attitude of resignation, either allowing the days to pass by without knowing how to address their problems or succumbing to an unresponsive bureaucracy.

Without receiving any explanation regarding curricular adaptations or other options, we are advised that this is the best course of action for Lucía, and I foolishly sign everything without questioning it: curricular adaptations and [schooling in] the ASD classroom. (...) Lucia spends the whole day in the ASD classroom. Everything they had said about only being there for short periods was a lie (Life history of Belén, mother).

Many professionals often face a dilemma, having to choose between adhering to the demands of the education system or embracing what they believe to be a genuinely inclusive approach to education.

Changing your way of working requires a *passage through hell* of your own inertia and of not meeting the expectations and desires of others, which may result in a belief that your professional competence will diminish in the eyes of others (Life story of Raul, school counsellor).

Resignation to the social mandate is a conformist attitude towards what others perceive a person to be, discouraging action in favour of passivity. In contrast, accepting who a person really is relates closely to having goals, striving to build them and to transform reality to align it with both our own and others' needs. This concept of acceptance is intrinsic to the notion of resistance, as it aims to establish power niches within the prevailing social framework in order to bring about change. It is a response to adversity that is intrinsically related to the capacity to fight for the rights of children and their families wherever they are not recognised or fulfilled, and to the need to transform their own realities into spaces for empowerment, awareness and the search for solutions.

This led to a new fight with the school, setting me against the other parents, but I don't care, David has the right to receive the education he is entitled to. They can call me crazy if they want. Yes, I am crazy Joanna (Life story of Johana, mother).

Once disability is recognised as a social construct, the push for resistance becomes challenging for the educational administration and hinders corporatism within many school institutions, which sometimes overlook the fact that a school is a community made up of families, students, and educational professionals, and that the actions of the latter must consider the needs of the former. In the stories, we constantly find discriminatory attitudes and abuses of power that strip the person and his or her environment of value, rights and dignity. As a result, the most activist families are often labelled as crazy and hysterical in the school context.

They always said I couldn't do it, that I wasn't capable. That attitude was the biggest burden throughout this time, and their assessment was far from accurate. They even told my mother that I was hysterical, crazy, for trying to exercise my rights as a person, as a student, as a human being. They told her to leave it, that there was nothing else she could do. But both she and I have continued our struggle (Life story of Quim, student).

All these issues lead back to shame or guilt. This is another dimension linked to social consequences and the pressure on individuals and their families. In some cases, the need for social acceptance leads to changes in routines and has consequences on self-esteem.

Meanwhile, I was doing everything I could to integrate, but nothing was working. I changed the way I dressed and started to wear makeup, but it didn't work. Every

time I came across a new group of people, I just knew that I wouldn't fit in, and, regrettably, all my fears proved founded (...). I tried to talk as little as possible. I hated it when a teacher asked me a question in class, and I even wished I could avoid speaking altogether (Life story of La Yonka, student).

Shame is a feeling that arises from fear of social disapproval. Comparisons with others in society often evoke a negative emotion that undermines our self-esteem, leaving us feeling inferior and insecure. Shame serves as a mechanism to adapt to our environment, originating from circumstances that particularly impact us and deviate from the conventional, challenging the apparent normality that is hidden behind a socially constructed system founded on an oppressive relationship. In families touched by disability, the impossibility to adapt to an unequal reality, shame, fear of differences and a lack of empathy become aspects that turn relationships upside down.

Last year she said to me: Mum, it's like I'm a ghost. I go in and out without anyone or anything noticing. That's the way it is (Life story of Isabel, mother).

Unfortunately, Daniel got worse (...). As a mother, it is unimaginably frustrating to witness one son in a severe condition and another child crying and feeling hopeless due to the absence of their mother, while I am left to handle everything alone because their father, who is a good person, was unable to handle Daniel's situation and ultimately withdrew (Life story of María Jesús, mother).

In this regard, particularly worthy of note is how the assumption of responsibilities by paternal and maternal figures is unbalanced, with instances where the mother, surpassing societal expectations, takes on the leading role and the fight. As we will see below, there is an intersection between gender and disability, evincing the importance of drawing lessons from past struggles and the role of women in caregiving (another form of oppression, often causing them to leave their jobs) and the unquestioned acceptance of patriarchy by many parents.

Impact of discrimination on the individual and their environment

Discrimination not only has detrimental consequences for the individual, but also affects their environment. Many families report the pain they have suffered in situations of injustice during their children's schooling due to the inability of some education professionals to adapt the teaching-learning process to their children's needs.

On the eve of the exam, Indira was worried and wanted to know if she could use her pens and if she was going to have graph paper. I don't fall apart easily, especially

not in front of Indira. But it brought tears to my eyes. Then she hugged me and said: "We are a team, and we are going to make it to the top". Literally that. Always giving lessons (Life story of Noemí, mother).

These families suffer a significant physical, emotional and economic toll. Many say they are forced to make great efforts to cover the educational support required for the cognitive, social and affective development of their children while receiving no assistance from the administration.

Caregiving is a major challenge for the families of people with disabilities. However, there appears to be evidence that women feel an obligation to assume greater responsibility for these tasks as part of their gender role. This is a function that is rarely made visible, yet places great physical and emotional strain on the primary caregiver.

As always, responsibility for making changes and teaching Indira has fallen on me. This is something that has remained constant across all the subjects (Life story of Noemí, mother).

Many of these mothers have had to give up their professional careers temporarily or permanently in order to take care of their children. They set aside their personal and work commitments to fully dedicate themselves to the responsibilities of caring for and supporting these children, while also advocating for their inclusion. These women and their families carry out tasks that should be undertaken by schools and education authorities, but which often remain unfulfilled due to a lack of motivation, resources or training among educational personnel, exacerbated by the pandemic.

They made me go to my daughter's class and accompany her because her teacher had to go to the doctor and was going to be off work. I recall another instance when my daughter's class visited a farm school, and I had to drive behind their bus, wait for an hour after their lunch break, and then go in to administer her insulin (Life story of Esmeralda, mother).

Caregiver mothers are a resource that many schools manage at will. When it comes to taking responsibility away from the school, family participation is welcomed. However, when their actions are aimed at bringing about transformations that affect the organisation, operation and culture of the school, they are considered an intrusion. It seems that anything that might upset the school routine is considered an affront. That is why many families of children with disabilities often complain about them being stigmatised and labelled as mentally ill, troublesome, or disruptive.

In my case I quit work (I am a psychologist and I had a steady job)... that was the decision my husband and I made, we thought it was the best way to take care of David's needs. For the school, I am the crazy mother, the troublemaker, the rab-

blerouser... because I defend my child's right to education (Life story of Johana, mother).

Despite the challenges women caregivers face in fulfilling responsibilities that should be taken on by the education system and shared by the rest of the family unit, many of these mothers demonstrate a highly resilient activist mindset. Driven by their desire to protect the rights, needs and interests of their children, they persist in their fight against the challenges they face, generating collective responses, given the difficulty of doing so on an individual level.

This guide aims to promote the act of dissenting and the need for dissent within schools. Everybody involved in drafting it has experience of dissent in this context. We are a group made up of families and professionals, and our dissent has come from the violation of the rights of our family members or of our students within the educational system. We intend this text to serve as a guide to dissent among the three sectors that make up schools: teachers, families and students ("How to Dissent" Guide, in press).

This dissent arises from a commitment to justice and to safeguarding children's happiness. Unlike what happens in many schools, they are willing to adapt their routines, relationships and environment in order to reach a specific goal: to offer an inclusive education that brings them learning and happiness.

Three moves (three!) to be next to my son's new school. A school where they listen to families, do not label them, and go the extra mile for students' well-being. A school where the active involvement of families plays a crucial role. Where inclusion is real (Life story of Belén, mother).

Discrimination generates physical, social and psychological consequences that affect and exclude, causing a situation of great vulnerability that can seriously impact a person's self-concept and self-esteem. Some of the stories illustrate how, for these children, feeling undervalued compared to their peers can evoke feelings of boredom and indifference, and in some cases, even lead to depression.

The voices of the individuals and their families reveal the existence of systemic suffering, which can be prevented (or, at the very least, mitigated) through empathy, solidarity and a willingness to change; indeed, our obligation to uphold human rights and international law means we are compelled to take action.

DISCUSSION OF RESULTS

Social justice should always be at the very heart of educational theories and practices. Inclusive education is education from and for social justice. The lack

of justice in social and educational procedures is highlighted by the demands for inclusion made by the individuals studied and their families, starting from the birth of their children and continuing throughout their integration and presence in the educational system. The different stories always show how the process of labelling and segregation go together and feedback on each other. This conjugates perfectly with that shown in other research (Bonal & González, 2021; Calderón & Habegger, 2017; Calderón et al., 2021; Echeita, 2017; to mention just a few), but, in this case, the narratives bring meaning and depth to the processes as they are based on individuals and families who have experienced them –and continue to experience them– in their daily lives while also fighting against injustice. In this context, the ideas of Calderón and Ruiz (2015) take on full meaning when they assert that people need to find trusted figures in order for social coercion to lose its power and allow individuals and contexts to free themselves. The testimonies collected vindicate this (which we believe to be of great value), reinforcing how disability allows us to rethink ourselves, our relationships and our politics (Saur & Sidorkin, 2018).

Furthermore, it is also important to recognise the value of activism in this area (as in all areas related to the violation of basic rights), which is where processes of resistance and change regarding discriminatory practices are generated. Families move from resignation to resistance when they become empowered, when they “become conscious” (as Freire would say) and decide to confront the situations their children are experiencing. Meanwhile, the system delegates responsibilities to parents, including basic care during school hours, but fails to consider their input in pedagogical decisions regarding their children. This leads to feelings of helplessness and displacement in crucial aspects for students’ development, and even to institutional mistreatment, mainly in curricular and relational matters, as the results have shown.

In line with the findings of López and Carmona (2018), it can be concluded that the most pressing measure is to promote awareness and training within the whole educational community and society at large, emphasising the need to develop solutions that enhance existing inclusive processes. It is imperative that we do not view the educational experiences of individuals with disabilities as disposable, nor should we force their families to adopt a narrative of tragedy as their only recourse.

Furthermore, there is a recurring demand in the stories around the need to provide support for students within the general classroom setting, rather than in separate classrooms. This is presented here as something essential in order for families to exercise their right to education in a real sense, and also aligns with research findings (e.g. Ainscow, Dyson & Weiner, 2013; Hehir et al., 2016; Stainback & Stainback, 2007), without forgetting the benefits it brings to the whole group,

not only impacting their education in terms of values, but also enabling the use of different strategies and methods for all students thanks to the presence of another professional in the classroom. This would also allow pedagogy to play its role in creating educational spaces of resistance, focused on developing student engagement, the joy of learning, and the sense of solidarity and shared experiences (Meirieu, 2022).

The study presented here involved some ethical as well as logistical difficulties, partly due to working with people's hopes and desires, starting from a position of suffering. This has generated dilemmas, concerns and a significant workload that at times has been emotionally demanding and challenging to manage. The participants have taken ownership of the research, turning it little by little into an example of citizen science and an untapped social movement. The collaborative networks generated within the framework of the research have served to generate new shared narratives in significant national and international political forums: social and life maps that not only fuel indignation at the violation of the right to education but also generate transformation, along with freely accessible resources that have been made available to citizens in order to make schools more inclusive.²

This work vindicates their concerns and desires, placing the voice of students and families at the very heart of inclusive discourse, highlighting their sufferings, processes and struggles while also recognising not only their research work, but also their role as producers of knowledge and as activists with capacity to demonstrate, through their narrated experiences, the need to challenge the labelling process and show that another education and another society are necessary.

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² An overview of this research projection can be found at <https://creemoseducacioninclusiva.com/>

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