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# Factors influencing the development and completion of university theses: A systematic literature review

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## Abstract

One of the most demanding academic tasks in university and postgraduate education is thesis writing. This systematic literature review examined the factors associated with the development and completion of university theses. The review followed PRISMA guidelines and used Scopus as the main database. Search filters included studies published between 2015 and 2025 in English, Spanish, and Portuguese. Initially, 395 records were identified; after applying the selection criteria, 32 studies were included in the final analysis. The information was examined through descriptive and thematic analysis. The findings show that thesis completion cannot be explained by a single factor, since personal, academic, supervisory, and institutional aspects interact throughout the process. Academic advising was one of the most relevant issues: lack of advisor subject expertise represented 71.4%, while insufficient methodological background reached 64%. Other frequent barriers included limited research training in academic programs (42.9%), emotional and mental pressure during thesis development (40.8%), and lack of time (28.6%). In practical terms, universities should strengthen research training from the early stages, improve curriculum design, and provide more consistent supervision. These actions may help reduce delays and support students in completing their theses more effectively.

**Keywords:** Academic supervision, Higher education, Institutional factors, Methodological skills, Research barriers, Thesis completion, Thesis development.

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## Contents

**Contribution of this paper to the literature**

This review integrates international evidence on thesis development and completion and shows that delays are driven mainly by supervision quality, weak methodological training, and limited institutional support. It also distinguishes undergraduate from postgraduate challenges, offering a concise framework for supervision, curriculum, and policy improvement.

## 1. Introduction

Given the low completion rates in higher education and postgraduate programs, it is necessary to pay attention to the key requirement of thesis development. Since this is a common requirement, we must analyse why many students encounter difficulties in both the development and completion of their theses. By analysing various studies on this common topic across several countries, we found some interconnected factors, which include personal, academic, institutional, motivational, and supervisory aspects.

However, many of the articles examined also identify certain attitudes related to research, institutional barriers, university policies, supervision and control by the advisor, and access to updated academic resources. From this, we understand that the efficient completion of a thesis depends on a combination of several factors that enable the student to successfully meet this academic requirement, such as adequate guidance from the advisor, a supportive academic environment according to the subject area, and critical thinking (Clark, 1998). Unfortunately, not all students have access to the same opportunities, as other personal factors also play a role, including lack of time, lack of motivation, insufficient knowledge of research methodologies, poor advisor–student relationships, and limited institutional support (Catama & Tejada, 2025; Gebremariam & Gadisa, 2021; Sarhan et al., 2025).

In addition, current research shows that motivation and research skills are strengthened by early involvement in research, continuous pedagogical support, and mentoring models (Conner, Benson, & Boyer, 2024; Islam & Weimer, 2018). However, to date, there is no comprehensive review that systematically integrates which factors are repeated across disciplines, countries, and educational levels. This gap is important because, without a broad overview, it is difficult to develop policies and intervention programs that truly address students' needs.

In this sense, it is proposed that the determining factors in student research do not operate in isolation but interact, generating cumulative effects on the progress and completion of theses. Understanding these factors is important because it will allow higher education institutions to develop better strategies to strengthen formative research, improve supervision, make better use of resources, and reduce dropout rates or delays in thesis completion. The present study is also of interest to faculty members, program directors, academic authorities, and decision-makers, as it provides empirical evidence for the development of policies that promote more inclusive, efficient, and sustainable research environments.

## 2. Methodology

This study was conducted as a systematic literature review aimed at identifying and synthesizing the factors that influence the development and completion of university theses at the undergraduate and postgraduate levels. The review adhered to the PRISMA framework to guarantee transparency in the procedures of identification, screening, eligibility assessment, and study selection. The research question, criteria for inclusion and exclusion, search strategy, and extraction variables were predetermined to enhance consistency and methodological rigor. The initial search in Scopus identified 395 records. After the selection process, 32 studies published between 2015 and 2025 met the inclusion criteria and were selected for analysis. Data were first extracted from the studies, including participants' demographic information, educational level, country, thesis-related interventions, and the identification of factors influencing thesis development and completion. To assess the *Risk of Bias in Study Reporting*, the URSEC framework was applied to determine the quality of the information. This framework considered underpinning, resources, setting, educational methods, and content. The analysis revealed a consistent trend in the context examined, while resources, educational methods, and content were described with less precision.

### *2.1. Objectives and Research Questions*

Table 1 presents the specific objectives and research questions that guided the review, providing the framework for the identification, analysis, comparison, and synthesis of the evidence related to factors influencing university thesis development and completion.

**Table 1.** Main objectives.

| Specific objectives | Research questions (RQ) |
|---|---|
| 1. To identify and classify the personal, academic, institutional, supervisory, and resource-based factors that affect the development and completion of university theses. | RQ1. What are the main personal, academic, institutional, supervisory, and resource-related factors reported as determinants of thesis development? |
| 2. To quantify, through a descriptive synthesis of the included studies, how frequently the main barriers to thesis development and completion are reported. | RQ2. What is the combined incidence of the most frequent factors in the difficulty of completing university theses? |
| 3. To compare the identified factors according to educational level (undergraduate vs. postgraduate) and disciplinary area (health sciences, engineering, social sciences, education, etc.). | RQ3. Are there significant differences in the factors conditioning thesis development based on educational level (undergraduate/postgraduate) and disciplinary areas? |
| 4. To synthesize the recommendations and strategies proposed by studies to improve the process of thesis development and completion. | RQ4. What strategies or recommendations do studies propose to reduce barriers and promote the timely completion of university theses? |

### 2.2. Search Strategy

The bibliographic search strategy was carried out in the Scopus database, considering publications from 2015 to 2025. For this purpose, a Boolean search string was developed using keywords related to theses, barriers, challenges, and conditioning factors, and publications in English, Spanish, and Portuguese were included.

Search strategy (Scopus): ("Thesis completion" OR "thesis writing" OR "thesis development" OR "undergraduate thesis" OR "research thesis" OR "degree thesis" OR "tesis universitaria" OR "elaboración de tesis") AND ("Factors" OR "barriers" OR "challenges" OR "determinants" OR "constraints" OR "dificultades" OR "factores condicionantes").

Research disseminated in English, Spanish, and Portuguese was evaluated. There were no limits on country or academic field, so that the review could show a wide and comparative view of the thesis process in different higher education settings.

### 2.3. Inclusion and Exclusion Criteria

Eligibility criteria were established in advance to ensure that the selected studies were relevant to the review objective, conceptually aligned with the topic, and provided sufficient information for analysis. Empirical studies published between 2015 and 2025 were included, available in full text and written in English, Spanish, or Portuguese, that specifically addressed problems, obstacles, determinants, or difficulties in the process of developing and completing undergraduate and/or postgraduate theses. Qualitative, quantitative, and mixed-methods studies reporting empirical findings and analyzing factors related to personal, academic, institutional, supervisory, or resource dimensions in higher education were included.

Theoretical articles, conceptual essays, editorials, letters to the editor, narrative reviews, and documents that did not present first-hand empirical evidence were excluded. Studies that focused only on other types of academic work or on non-university educational levels were also excluded. Likewise, studies that discussed student research in general rather than the specific thesis process were discarded, as well as those that did not explicitly identify factors related to the difficulties or determinants of thesis completion.

The identification, selection, and eligibility of studies were carried out following the PRISMA guidelines for scoping reviews, which allowed for a transparent and reproducible selection of the evidence. The flow of records identified, screened, and included in the review is illustrated in Figure 1, following the PRISMA diagram for scoping reviews, summarizing the stages of screening, exclusion, and final selection of the reviewed studies.

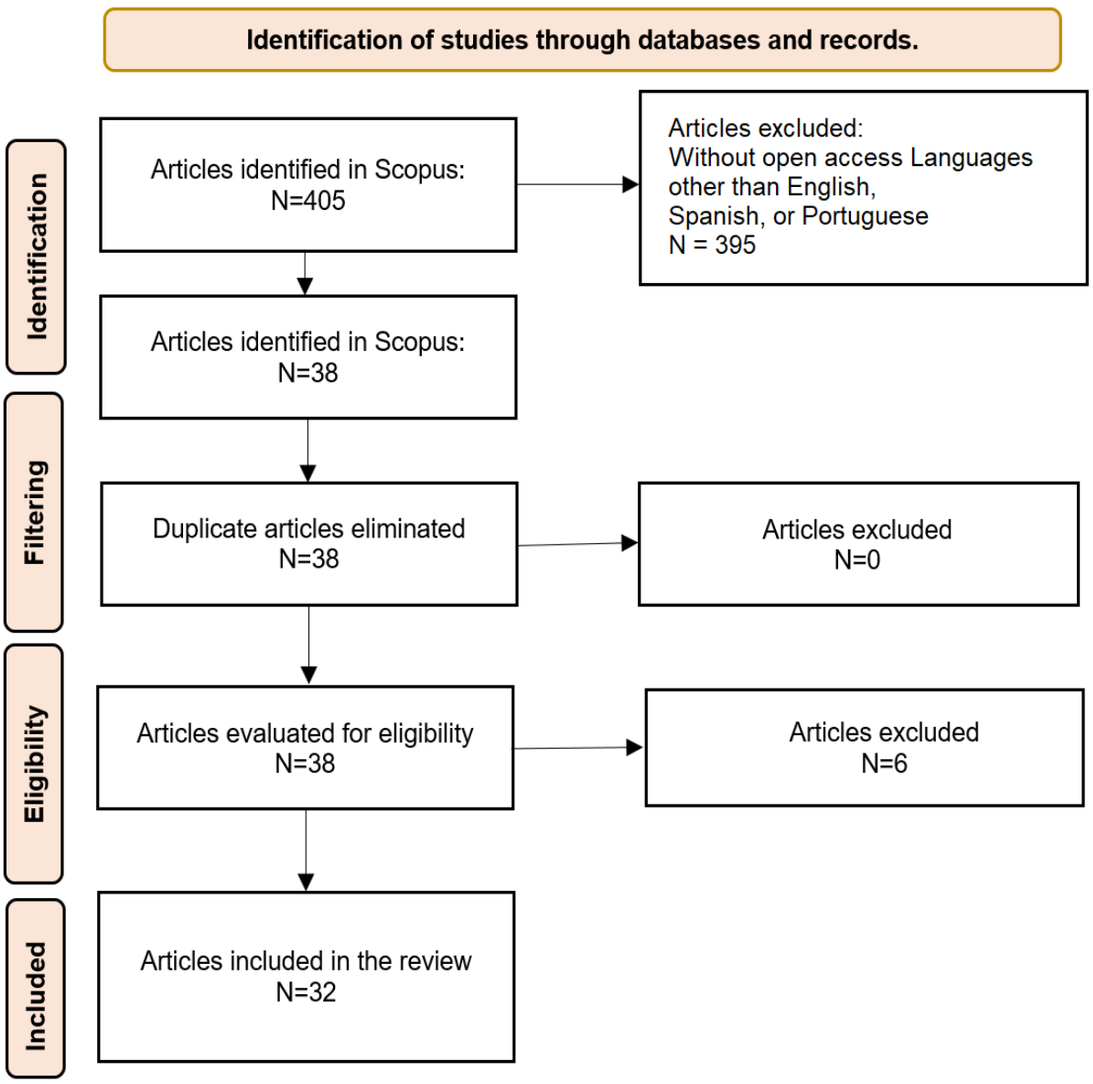


**Figure 1**. PRISMA diagram for the scoping review.

The investigations selected according to the systematic exploratory review are shown below in Table 2.

**Table 2.** Summary of included studies: citation, year of publication, and main factors.

| N° | Citation | Main factors examined |
|---|---|---|
| 1 | Adewale and Ndwandwe (2026) | Gender, technology acceptance, facilitating conditions, performance expectations, and perceived effort. |
| 2 | Sarhan et al. (2025) | Insufficient knowledge, lack of time, lack of resources, schedule misalignment, delayed responses, and lack of guidance. |
| 3 | Catama and Tejada (2025) | Demotivation, work and family overload, rigid policies, insufficient institutional support, and psychological factors. |
| 4 | Doren, Acuña, and Castellón (2025) | Student personal characteristics, supervision quality, membership in research teams, academic support, and motivation. |
| 5 | Gritsay, Karpenko, Shvatchkina, Mogilevskaya, and Kotlyarov (2025) | Research competencies, cognitive motivation, participation in projects, contests, publications, and "startup-as-thesis" models. |
| 6 | Singh, Bankston, and McDowell (2025) | Research skills training, mentoring, career development, work-life balance, mental well-being, and working conditions. |
| 7 | Castro-Rodríguez (2025) | Advisor quality, subject mastery, advisor pressure, received motivation, support, perceived autonomy, and overall satisfaction. |
| 8 | Rich (2024) | Research-employability link, industry projects, structure and supervision, practical experience, and interaction with employers. |
| 9 | Conner et al. (2024) | Motivation, sense of belonging, career expectations, working in research teams, and interaction with graduates. |
| 10 | Mokresh et al. (2024) | Knowledge, positive attitude, limited project participation, lack of time, funding, mentors, laboratories, and facilities. |
| 11 | Bhadoria et al. (2024) | Self-perception of research ability, the necessity of mandatory projects, workshops, methodology courses, and academic incentives. |
| 12 | Miller, Drewery, Waliczek, Contreras, and Kubota (2023) | Lack of methodological knowledge, limited preparation, scarce teaching resources, support for underrepresented groups, and motivation. |
| 13 | Solvason et al. (2023) | Commitment, motivation, research ethics, methodological decisions, and barriers in the student-research process. |
| 14 | Duche-Pérez and Quispe (2022) | Scientific competencies, work habits, personal qualities (responsibility, organization), and deficiencies in databases and software. |
| 15 | Abubakar et al. (2022) | Perceived competence, research confidence, satisfaction with supervision, and lack of time as the primary obstacles. |
| 16 | Azab, Hasaneen, Reda, Asous, and Azzam (2021) | Lack of research training, absence of mentoring, marital status, publication delays, and institutional support. |
| 17 | Thi Nguyen (2021) | Research methods, time management, problems with supervisors, lack of motivation, and institutional factors. |
| 18 | Gebremariam and Gadisa (2021) | Knowledge gaps, low motivation, lack of student–advisor communication, economic problems, lack of experienced advisors, and insufficient infrastructure. |
| 19 | El Achi et al. (2020) | Positive attitude, high perception, limited practice, lack of mentoring and guidance, and lack of awareness regarding research programs. |
| 20 | Ramachandra (2020) | Research module structure, supervisor's role, conference presentations, logistical barriers, and academic workload. |
| 21 | Bayona-Oré and Bazan (2020) | Lack of continuous supervision, lack of time, economic constraints, and the advisor's methodological skills. |
| 22 | Partido and Colón (2019) | Intrinsic motivation (contributing to patient care, skill development), lack of time, funding, formal courses, and lack of interest. |
| 23 | Hermann, Novoa, Peñafiel, and Wolf (2019) | Positive attitude, motivation, lack of time, professional workload, low knowledge level, and scarce postgraduate training. |
| 24 | Moreno Jiménez, Martínez-Gómez, Gómez Rosero, and Bustamante Villagómez (2019) | Development of investigative, soft, and hard skills; personal motivation; personal and motivational resources. |
| 25 | Sinclair and Phillips (2018) | Student motivation, academic ability, language proficiency, lack of resources, rural location, and research culture. |
| 26 | Vadeboncoeur, Foster, and Townsend (2018) | Ethical and administrative barriers, recruitment restrictions, low response rates, and academic calendar logistics. |
| 27 | Personett et al. (2018) | Obstacles to completing and publishing projects, curricular structure, need for protected time, methodological and statistical support. |
| 28 | Skeith et al. (2018) | Success factors (supportive environment, time, resources, career alignment), challenges (institutional load, burnout, external deadlines). |
| 29 | Islam and Weimer (2018) | Graduate-undergraduate mentoring, research skill acquisition, motivation, leadership, and teamwork. |
| 30 | Tamariz, Vasquez, Loor, and Palacio (2017) | Research culture, structured curriculum, increased knowledge and skills, productivity (presentations/publications). |
| 31 | Mejia, Cáceres, Vera, Inga-Berrospi, and Mayta-Tristán (2016) | Motivation and free choice of advisor, publication incentives, economic costs, and general satisfaction/dissatisfaction. |
| 32 | Clancy and Posner (2015) | Mandatory research, perceived value, lack of time, occupational stress, lack of training in design and statistics, and preference for other activities. |

## 3. Results

### *3.1. RQ1. What are the Main Personal, Academic, Institutional, Supervisory, and Resource-Related Factors Reported as Determinants of Thesis Development?*

The combined analysis of the 32 included studies identified common patterns in the distribution of factors affecting the development and completion of theses. Personal factors (Figure 2) were grouped into three main elements: perceived effort (40.8%), available time (28.6%), and autonomy (8.2%). As shown in Figure 2, other personal variables, such as expectations, motivation, stress, financial limitations, language issues, and previous experience,

were reported less often, each ranging from 2% to 4%. This suggests that personal barriers were not evenly distributed across many dimensions but tended instead to cluster around two central pressures: cognitive effort and lack of time.

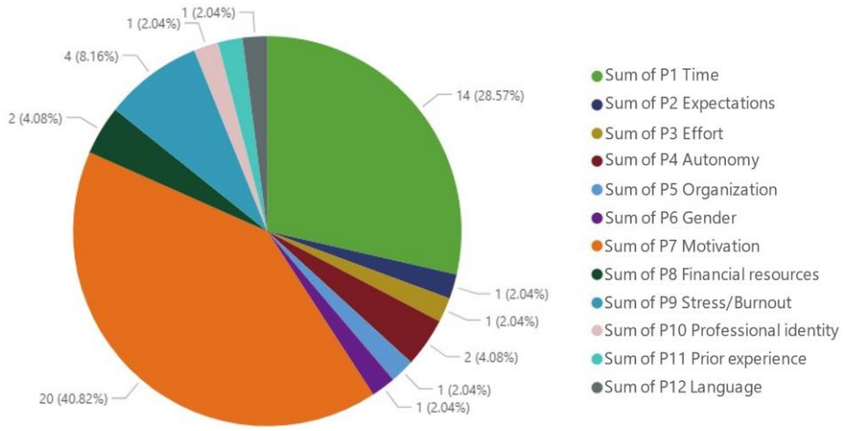


**Figure 2.** Personal factors.

Academic barriers also showed a clear pattern (Figure 3). The most frequently reported issue was insufficient methodological preparation (64%), followed by the limited presence of real-world research projects in training contexts (20%) and the perceived need for methodology courses (12%). On the other hand, problems that were only related to data analysis or scientific writing were rarely more than 4%. This pattern indicates that students' academic requirements are less focused on isolated technical skills and more on comprehending the research process in its entirety.

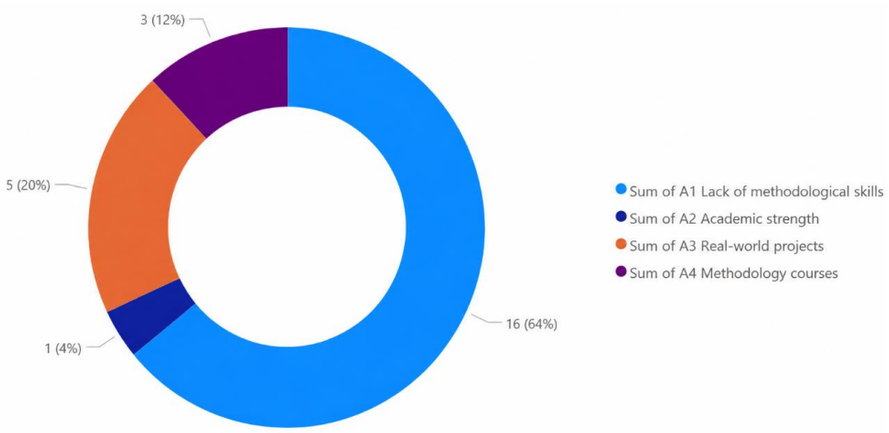


**Figure 3.** Academic factors.

Institutional conditions were also very important (Figure 4). The most common problem was a curriculum that placed insufficient emphasis on research training (42.9%). The next most common problems were strict institutional rules (31.4%) and faculty workloads that made it harder to supervise (11.4%). Other obstacles, including insufficient resources, bureaucracy, professional workload, constrained funding, and misaligned academic calendars, were less prevalent, occurring between 2% and 6% of the time. Overall, these results show that institutional arrangements have an effect on thesis development, from how the curriculum is designed to how the school runs daily.

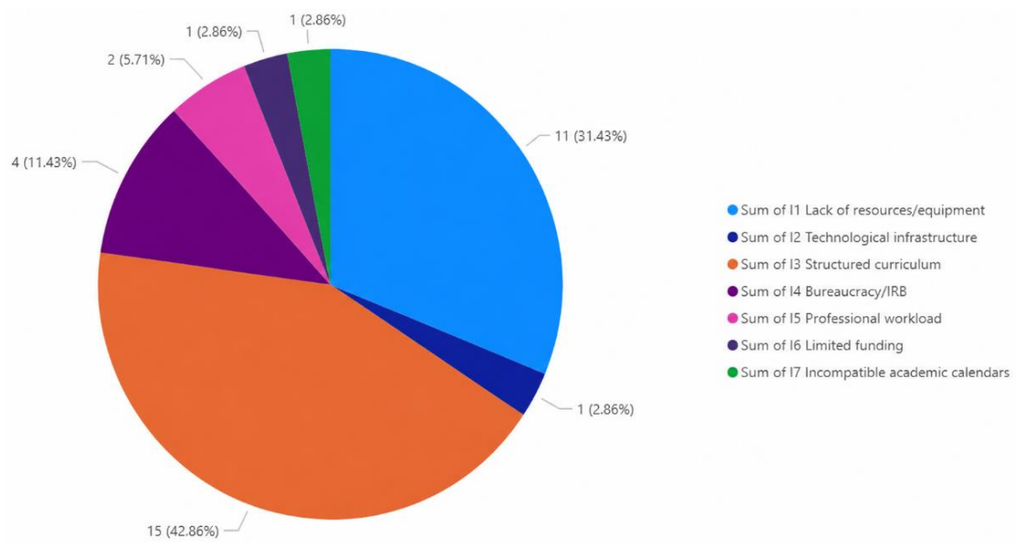


**Figure 4.** Institutional factors.

It is important to understand which aspects students use to determine the quality of service during the development of their theses. Therefore, we analyzed the supervision factor (Figure 5), where a common problem identified is the quality of guidance, as it is considered that the advisor should provide strategic support. Another issue (10.7%) is the advisor's subject mastery, and another item (7.1%) is a non-researcher advisor, since students believe that research experience on the part of the advisor is essential.

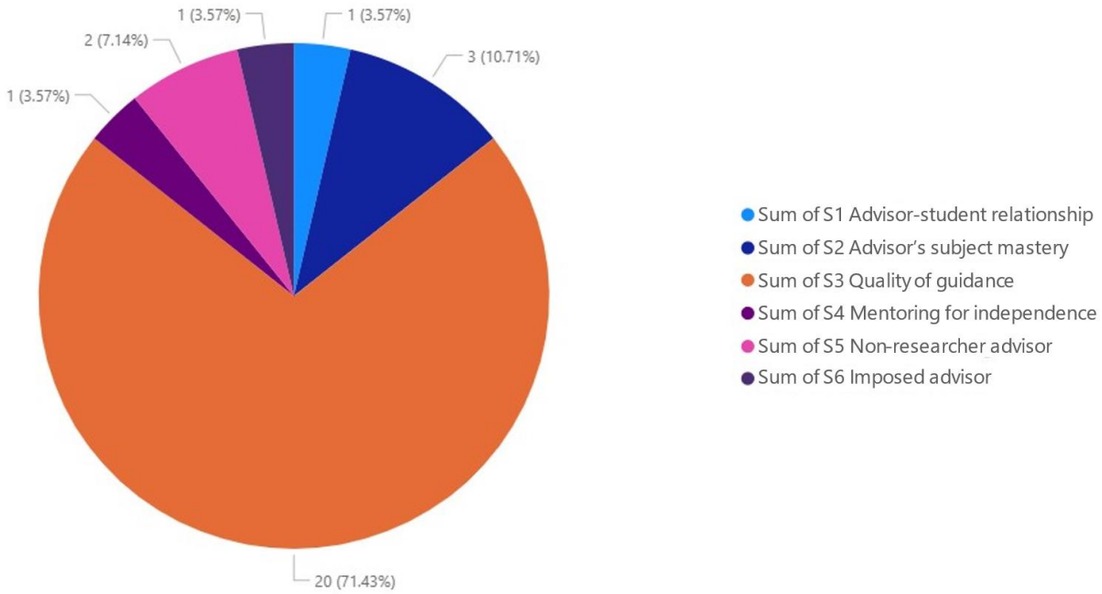


**Figure 5.** Supervisory factors.

In general, it is important to consider that at the international level, there is a common denominator among the various factors that arise during the completion of a thesis, including personal, academic, institutional, and supervisory factors.

### *3.2. RQ2. What is the Combined Incidence of the Most Frequent Factors in the Difficulty of Completing University Theses?*

The descriptive synthesis based on frequencies reported in the 32 included studies showed that the most recurring factors in the literature were supervisory problems, especially related to the advisor's subject mastery (71.4%). Additionally, a lack of methodological skills was found in 64% of the documents, compounded by an institutional curriculum with a weak research focus (42.9%), and the perceived effort and high cognitive load involved in thesis writing (40.8%). Finally, lack of time was a limitation repeated in 28.6% of the studies. These findings illustrate the most frequently identified barriers in the literature to the development and completion of university theses. According to the statistical analysis conducted, the most significant factors are supervision and academic aspects, which students identify as the main difficulties. While individual factors are indeed important, they do not show consistency across the studies.

### *3.3. RQ3. Are there Relevant Differences in the Factors Conditioning Thesis Development Based on Educational Level (Undergraduate/Postgraduate) and Disciplinary Areas?*

A comparative analysis was conducted among the selected studies (Figure 6), showing that twenty out of 32 studies (62.5%) focused on undergraduate education, and eight studies on graduate students. Only three studies (9.3%) analyzed both levels simultaneously. This result indicates that most of the information is centered on the undergraduate level; therefore, research focused on other levels of education is also required.

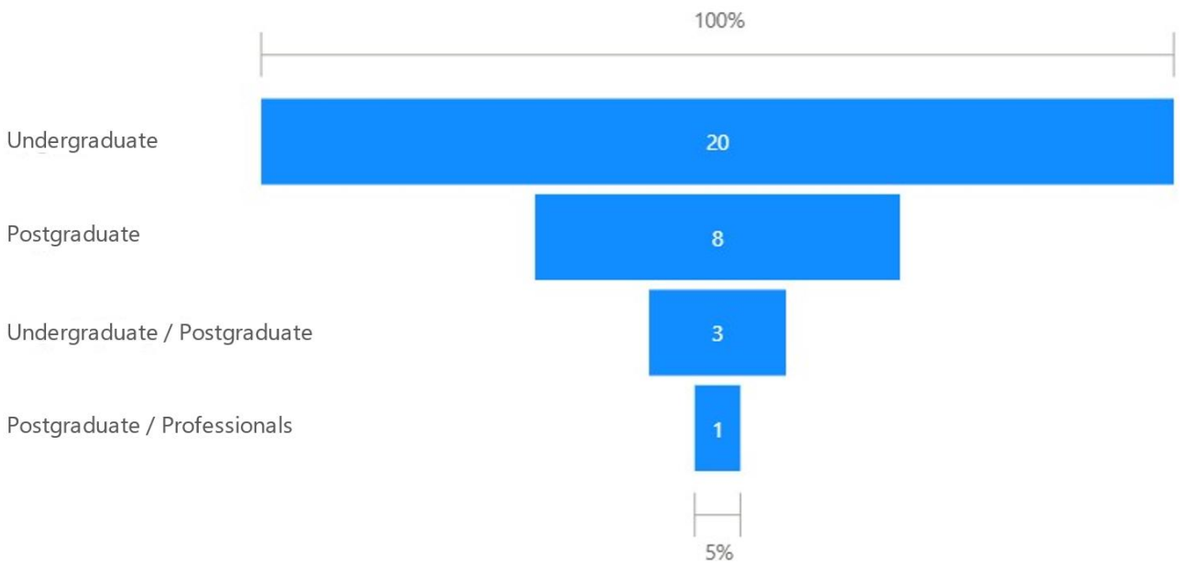


**Figure 6.** Educational level.

A similar concentration appears when disciplinary areas are considered (Figure 7). Health-related fields dominate the literature, especially Medicine (5 studies), Pharmacy (3), Dentistry (3), and Nursing (2). Multidisciplinary studies were also present (3), suggesting that some authors have attempted to examine the issue beyond a single field. By contrast, Engineering, Education, Business Administration, Veterinary Medicine, Agricultural Sciences, and Public Health were each represented by only one study. This uneven distribution indicates that evidence remains limited in several disciplines and that the current literature does not yet provide balanced coverage across fields of knowledge.

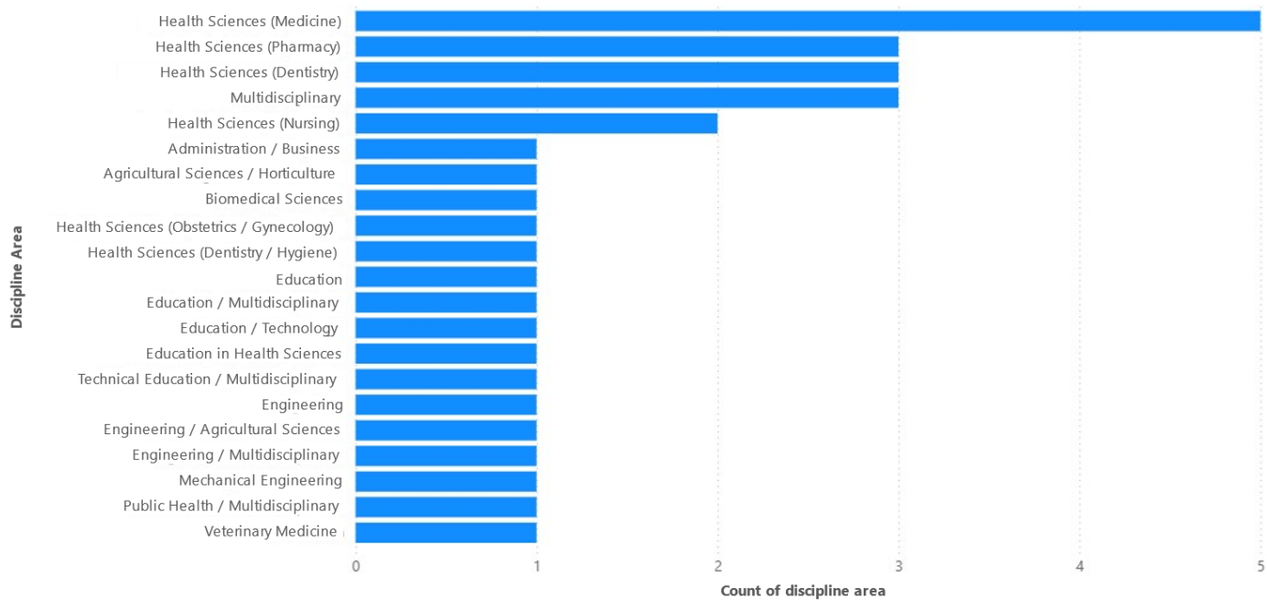


**Figure 7.** Disciplinary areas.

These results indicate that differences between educational levels and disciplines are expressed not only in frequency but also in the variety of problems recorded. At the undergraduate level, factors such as methodological skills, lack of time, limited resources, and insufficient guidance are most frequently reported. In postgraduate studies, other factors come into play, such as work responsibilities, professional workload, work-life-academia imbalance, funding, and advanced methodological complexity. Similarly, Health Science students tend to report more institutional and supervisory barriers, while Engineering and technical disciplines emphasize methodological limitations and the lack of real projects or equipment.

Taken together, these findings suggest that the barriers to developing and completing a thesis differ significantly depending on academic level and discipline, and that the existing literature does not distribute evidence evenly across fields. This highlights the need for future comparative research that expands the representation of postgraduate education and non–health-related disciplines and that further explores how disciplinary characteristics shape the challenges and requirements of the academic research process.

### *3.4. RQ4. What Strategies or Recommendations Do Studies Propose to Reduce Barriers and Promote the Timely Completion of University Theses?*

The findings synthesized in this review indicate that the strategies proposed in the literature focus on interventions primarily directed at student motivation, the quality of tutoring, methodological reinforcement, and institutional support (see Figure 8). First, motivation is one of the most recurring keywords (n = 20), indicating that many studies suggest actions to strengthen self-efficacy, purpose, and emotional support throughout the thesis process. Recommended actions include motivational tutoring, communities of practice, and the academic tracking and recognition of partial progress to reduce dropout rates and burnout.

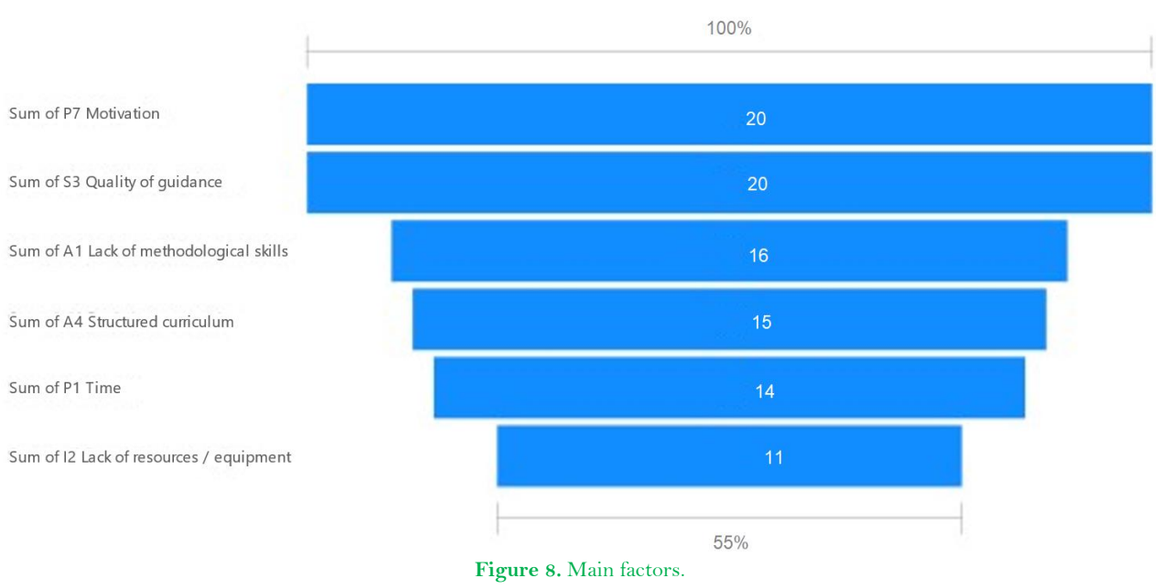


**Figure 8.** Main factors.

Furthermore, the quality of advisor guidance is widely recognized as a key strategy for timely graduation (n = 20). Therefore, it is necessary to ensure a better selection of advisors according to their area of specialization and to establish minimum requirements in research experience. Likewise, the development of a supervision and monitoring model is needed for tracking students working on their theses, providing deadlines for feedback, and scheduling virtual or in-person meetings so that students feel confident and committed to completing their theses. Another aspect to be evaluated is the lack of methodological skills (n = 16) among students. For this reason, it is necessary to implement research skills courses from the beginning of the academic curriculum for their professional careers, through scientific writing workshops, data analytics training, use of academic databases, and statistics. Consequently, the research skills acquired during their professional training will enable them to be more efficient in the development of their theses.

## 4. Discussion

The results of this review indicate that thesis development and completion are influenced by the interaction of personal, academic, institutional, and supervisory factors. Among all the factors analyzed, supervision is the most important, especially when advisors lack sufficient knowledge of the thesis topic. On this issue, Castro-Rodríguez (2025) and Mejia et al. (2016) agree, identifying subject-matter expertise and solid methodological guidance as essential factors to avoid delays, frustration, and demotivation. A high incidence of inadequate methodological preparation (64%) was also identified, corroborating the conclusions of Duche-Pérez and Quispe (2022) and Abubakar et al. (2022), who point to difficulties in managing databases, statistics, and academic writing as the main obstacles to progress. In addition, the limited emphasis on research in university courses (42.9%) shows that the problem is not only individual but also systemic.

This study also addresses the impact that thesis work can have on students' mental and emotional well-being. A significant proportion (40.8%) experience high mental effort and emotional exhaustion, which, according to Catama and Tejada (2025), are associated with thesis-related challenges, academic pressure, perfectionism, and lower self-efficacy in research. This situation worsens with time constraints (28.6%), a persistent problem across various fields (Hermann et al., 2019; Thi Nguyen, 2021). This reveals that delays in thesis submission are often linked not only to technical limitations but also to broader pressures related to workload, expectations, and the academic environment.

The review also reveals certain gaps, as most studies focus on undergraduate students and health-related disciplines, resulting in a relative lack of research on postgraduate contexts and other academic fields. Furthermore, knowledge remains limited regarding how these different barriers interact over time, for example, how supervisory models and institutional policies might improve student performance. Much of the available research remains descriptive, identifying problems but not exploring in depth how these factors are interconnected or which have the greatest impact in specific situations. This makes it difficult to achieve a more comprehensive understanding of the thesis process.

It is also important to consider some limitations of this study. The review followed a systematic approach using the Scopus database and included studies in three languages (English, Spanish, and Portuguese), but did not incorporate relevant studies from other sources such as Web of Science or ERIC. In addition, the studies analyzed show considerable methodological diversity, with many being qualitative or cross-sectional, which may limit the possibility of establishing causal relationships and complicate direct comparisons. The use of the URSEC framework also revealed inconsistencies in how information was reported. While the educational context was generally described more clearly, theoretical foundations, resources, teaching methods, and content were often presented with little detail, and the absence of standardized quantitative indicators across studies hindered more precise estimates of the relative importance of each factor.

Despite these limitations, the review has clear implications for universities. The evidence points to the need to improve methodological training from the beginning of academic programs, establish more explicit criteria for advisor selection, refine feedback and progress-evaluation mechanisms, and reduce academic and professional obligations that hinder research activities. Universities must also ensure access to adequate resources, including software, databases, laboratories, and statistical support. Implementing these improvements would mean that thesis completion should be considered a shared institutional responsibility, rather than solely an individual student's problem.

## 5. Conclusions

This review demonstrates that the development and completion of a university thesis is significantly affected by academic and institutional conditions, which reveal insufficient research training. The results also indicate that the difficulties in completing a thesis should not be considered merely as indicators of students' personal deficiencies, but rather stem from a network of interconnected barriers, such as poor supervision, inadequate methodological preparation, rigid curricula, limited institutional resources, and excessive academic or professional workload. This situation explains why some students take longer to graduate or even abandon the degree process.

The evidence also shows that students are easily demotivated and feel insecure about their thesis work when they do not receive methodological support or when they work with advisors lacking subject knowledge or effective supervision. However, the study also reveals situations where institutions overload advisors with tasks, some receive minimal recognition for their supervisory role, and they operate within frameworks that lack defined methods for evaluating the quality of supervision. In this sense, supervision problems should be considered organizational and structural challenges.

The review indicates persistent institutional deficiencies across various disciplines. Research training is often incorporated too late into the curriculum; methodological instruction and access to infrastructure, databases, software, and statistical support remain restricted. These problems are particularly evident among graduate students, who often must balance thesis obligations with demanding professional and family responsibilities. In such situations, students have less time and energy for research, increasing levels of mental and emotional stress.

The results suggest that improving thesis completion requires a profound institutional transformation. Universities must recognize the thesis as an academic development effort. This implies strengthening supervision

systems, setting clearer criteria for the selection and preparation of advisors, progressively embedding research training across the curriculum, reducing workloads that hinder thesis work, and ensuring access to the resources needed for research. From this perspective, the review offers an integrative basis for rethinking research training and graduation policies in higher education.

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Appendix 1 presents the included studies and their URSEC risk of bias assessment, summarizing key information such as authors, year, title, journal, participant type, educational stage, country, intervention or development approach, main results, and reporting quality criteria.

**Appendix 1.** Included studies and URSEC risk of bias in study reporting.

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| Singh et al. (2025) | 2025 | Career transitions: actionable recommendations by graduate students and postdoctoral scholars on achieving research independence in biomedical sciences | Frontiers in Education | Graduate students and postdoctoral scholars in biomedical sciences | 123 | Doctoral/ postdoctoral | United States and Japan | Multi-site workshops asked PhD students and postdocs to identify barriers and solutions to research independence. | Six domains emerged: intellectual contribution, mentoring, career progression, compensation, work-life balance/mental health, and visas; the paper recommends system-level reforms. | U=I; R=I; S=B; E=I; C=I |
| Castro-Rodríguez (2025) | 2025 | Satisfaction with the supervision (advice) of the thesis by undergraduate students | Revista Medica Electronica | Undergraduate dentistry students preparing theses | 108 | Undergraduate | Peru | Cross-sectional survey and open-ended questions assessed satisfaction with thesis supervision in undergraduate dentistry. | Most students were dissatisfied; disagreement was highest when supervisors lacked subject mastery, lacked a research profile, or were assigned rather than chosen. | U=A; R=A; S=B; E=I; C=I |
| Rich (2024) | 2024 | Teaching Research in an Employability-Focused Undergraduate Curriculum | Proceedings of the European Conference on Research Methods in Business and Management Studies | Final-year undergraduate business students | NR | Undergraduate | United Kingdom | Employability-focused redesign of undergraduate research projects using employer-linked tasks and tighter supervision. | The paper reports a practical model for linking independent research with employability, but no formal outcome evaluation is presented. | U=I; R=I; S=B; E=I; C=I |
| Conner et al. (2024) | 2024 | Examining the Motivations and Experiences of Transfer Students Participating in an | ASEE Annual Conference and Exposition, Conference Proceedings | Transfer students in the engineering/computing scholarship course | 16 survey; 1,174 comparison | Undergraduate | United States | Mandatory 1-credit course placed transfer students in team-based undergraduate | Students reported strong belonging and career-oriented motivation; interviews emphasized the value of graduate- | U=I; R=I; S=B; E=I; C=A |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Undergraduate Research Course | | | | | | research projects within the SPECTRA program. | student mentoring and professional skill development. | |
| Mokresh et al. (2024) | 2024 | Knowledge, Attitudes, and Barriers Toward Research Among Medical Students: A Cross-sectional Study in Turkey | Medical Science Educator | Medical students | 487 | Undergraduate | Turkey | An online cross-sectional survey measured research knowledge, attitudes, prior experience, and perceived barriers among medical students. | Attitudes were generally positive, but knowledge was low; major barriers were time, funding, mentoring, laboratories, and facilities. | U=A; R=I; S=I; E=A; C=A |
| Bhadoria et al. (2024) | 2024 | Perceptions of Medical Students on Research Curriculum: A Cross-sectional Study | Indian Journal of Community Health | Medical interns and postgraduate trainees | 218 analyzed (544 invited) | Internship/ postgraduate | India | An online cross-sectional survey examined perceptions of the research curriculum and self-perceived ability to perform research tasks. | Postgraduates reported higher self-perceived research ability than interns; respondents requested guided projects, workshops, credits, incentives, and stronger support. | U=I; R=A; S=B; E=A; C=A |
| Miller et al. (2023) | 2023 | Engaging Undergraduate Students in Research | HortTechnology | Undergraduate students (focus) and workshop contributors | NR | Undergraduate | United States | Workshop-based synthesis described strategies to involve undergraduates in research through formal and course-based experiences. | The paper highlights benefits and recurring barriers—time, supervision, equipment, and access and offers practical implementation recommendations. | U=I; R=B; S=B; E=I; C=I |
| Solvason et al. (2023) | 2023 | Lessons learned from researching, writing, and publishing with undergraduate students in Higher Education | Research in Post-Compulsory Education | Second-year BA Early Childhood students as co-researchers | 8 | Undergraduate | United Kingdom | Collaborative project engaged students as co-researchers who designed a survey and reflected on ethics and positionality. | Survey uptake was limited, but the project generated rich learning about student-staff research collaboration, writing, and publication. | U=I; R=I; S=B; E=B; C=I |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| Duche-Pérez and Quispe (2022) | 2022 | Investigative skills, work habits, and personal qualities for research development in university students | RISTI - Revista Iberica de Sistemas e Tecnologias de Informacao | University students | 53 | Undergraduate | Peru | A descriptive-correlational questionnaire examined research skills, work habits, and personal qualities in university students. | Students showed stronger scientific-intellectual skills, work habits, and personal qualities than technical-instrumental research skills. | U=A; R=A; S=I; E=A; C=I |
| Abubakar et al. (2022) | 2022 | Impact of a 'Research in pharmacy' course on students' self-reported competence and confidence to conduct research: Findings from a Malaysian university | Pharmacy Education | Third-year pharmacy undergraduates | 109 enrolled; 69 pre; 62 post | Undergraduate | Malaysia | A 14-week course combined lectures, tutorials, practical sessions, and a supervised group project; outcomes were measured pre/post. | Self-reported competence and confidence increased significantly after the course; satisfaction with online supervision was good, and time was the main challenge. | U=I; R=I; S=I; E=B; C=I |
| Azab et al. (2021) | 2021 | Individual and institutional factors preventing completion of research by medical graduate students at Cairo University: Questionnaire study | JMIR Medical Education | Medical graduate students/master's researchers | 130 | Postgraduate | Egypt | A web-based questionnaire explored individual and institutional reasons medical graduate students did not complete or publish their research. | Lack of training, weak mentorship, and lack of funding were major barriers; stronger supervisory and institutional support was recommended. | U=A; R=B; S=B; E=A; C=I |
| Thi Nguyen (2021) | 2021 | Factors Affecting Students' Conducting Research Projects: A Case Study at A College in Vietnam | ACM International Conference Proceeding Series | Graduates who completed a graduation research project | 215 | Undergraduate | Vietnam | Structured questionnaire examined student, supervisor, and institutional factors affecting completion of a graduation research project course. | Students reported difficulties with research methods, time allocation, supervisory issues, and motivation; institutional improvements were recommended. | U=I; R=I; S=B; E=B; C=I |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| Gebremariam and Gadisa (2021) | 2021 | Factors affecting the quality of undergraduate pharmacy students' research in Ambo University, Ethiopia: A qualitative study from advisors' perspective | Advances in Medical Education and Practice | Pharmacy research supervisors (faculty informants) | 15 | Undergraduate projects (supervisor perspective) | Ethiopia | Qualitative interviews with supervisors explored factors affecting the quality of undergraduate pharmacy research projects. | Supervisors identified methodological skill gaps, low motivation, weak communication, plagiarism, and limited infrastructure/funding as core problems. | U=I; R=B; S=B; E=A; C=I |
| El Achi et al. (2020) | 2020 | Perception, attitude, practice, and barriers towards medical research among undergraduate students | BMC Medical Education | Undergraduate students | 523 | Undergraduate | Lebanon | A cross-sectional survey assessed perception, attitude, practice, and barriers toward medical research among undergraduates. | Students valued research and recognized its importance, but a lack of mentoring/guidance was the main barrier; the undergraduate research program should be actively monitored. | U=I; R=A; S=B; E=A; C=I |
| Ramachandra (2020) | 2020 | A Comprehensive Template for Inclusion of Research in the Undergraduate Dental Curriculum | Health Professions Education | Undergraduate dental students | NR | Undergraduate | Malaysia | Commentary proposed a constructively aligned, cohort-based research module embedded across the undergraduate dental curriculum. | The paper presents a transferable curricular template rather than a formal effectiveness trial; it reports conference presentations and some publications. | U=I; R=I; S=B; E=I; C=I |
| Bayona-Oré and Bazan (2020) | 2020 | Why Do Students Find It Difficult to Finish Their Theses? | Journal of Turkish Science Education | Degree candidates who had not finished their theses | 129 | Undergraduate/ postgraduate degree completion | Peru | A mixed-method study examined barriers that prevent degree candidates from finishing their theses in a private Peruvian university. | Insufficient supervision, time constraints, and financial limitations were identified as the main barriers; supervisors were expected to guide the transition to independent research. | U=I; R=A; S=B; E=I; C=I |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| Partido and Colón (2019) | 2019 | Motivations and Challenges Towards Research Activities Among Undergraduate Dental Hygiene Students | Journal of Dental Hygiene | Final-year undergraduate dental hygiene students | 313 analyzed | Undergraduate | United States | A cross-sectional electronic survey examined motivations and barriers to research among final-year dental hygiene students. | Students were motivated by patient care, transferable skills, and academic development; major barriers were time, funding, limited coursework, and low interest. | U=A; R=A; S=B; E=A; C=A |
| Hermann et al. (2019) | 2019 | Facilitating factors and barriers for clinical research by nurses in Santiago, Chile | Education Medica | Clinical nurses | 71 | Professional/clinical practice | Chile | A cross-sectional survey of clinical nurses examined facilitators and barriers to conducting research in clinical settings. | Positive attitudes and motivation supported research, but time pressure, care burden, and limited research preparation constrained participation. | U=A; R=A; S=I; E=A; C=A |
| Moreno Jiménez et al. (2019) | 2019 | Behavioral effects on the participation of students in research projects in the area of mechanical engineering | Espacios | Project managers, teachers, undergraduate and graduate engineering students | 27 total; 76% response rate | Undergraduate and postgraduate | Ecuador | A survey-based exploratory study examined the academic and behavioral effects of participating in ongoing mechanical engineering research projects. | Participation was associated with positive effects on research skills, soft and hard skills, motivation, and broader professional development. | U=A; R=I; S=I; E=I; C=I |
| Sinclair and Phillips (2018) | 2018 | Recruiting research higher degree students into veterinary science | Journal of Veterinary Medical Education | Veterinary academic research supervisors | 21 survey; 13 interviews | Postgraduate (research higher degree) | Australia | A mixed-method institutional study explored how veterinary schools recruit research higher degree students and what constrains that process. | Supervisors prioritized student motivation, academic strength, and English proficiency; funding shortages and rural-campus context were the main challenges. | U=I; R=I; S=B; E=I; C=I |
| Vadeboncoeur et al. (2018) | 2018 | Challenges of research recruitment in a university setting in England | Health Promotion International | First-year university students | 1,026 baseline; 599 T2; 497 T3 | Undergraduate | United Kingdom | A longitudinal multi-university recruitment study documented procedures and | Recruitment was heavily constrained by ethics, permissions, communication restrictions, and | U=I; R=B; S=B; E=I; C=I |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | barriers in enrolling first-year students into research. | attrition; only a minority of universities allowed study advertisements. | |
| Personett et al. (2018) | 2018 | Road Map for Research Training in the Residency Learning Experience | Journal of Pharmacy Practice | Pharmacy residents/residency programs | NR | Residency/ postgraduate | United States | Practice-oriented roadmap describes how residency programs can structure longitudinal research training and supervision. | The article offers a deliberate curriculum model intended to improve completion and publication of resident research projects, but does not report empirical participant outcomes. | U=I; R=I; S=A; E=I; C=I |
| Skeith et al. (2018) | 2018 | Exploring the thesis experience of Master of Health Professions Education graduates: a qualitative study | International Journal of Medical Education | Master of Health Professions Education graduates | 20 survey; 10 interviews | Master's / postgraduate | United States | A qualitative case study explored the thesis experiences of recent MHPE graduates using survey and interview data. | Completion was supported by time management, supportive environments, resources, coursework, and limited-scope projects; institutional and personal pressures complicated completion despite clear benefits. | U=A; R=A; S=A; E=A; C=A |
| Islam and Weimer (2018) | 2018 | Outcomes of the Student Mentoring and Research Training (SMART) program | Proceedings of the ASME 2018 International Mechanical Engineering Congress and Exposition | Undergraduate student mentees and graduate student mentors | NR | Undergraduate with graduate mentors | United States | SMART created triadic teams of faculty mentors, graduate assistants, and undergraduate students, plus mentor-development workshops. | The program was designed to expand undergraduate research opportunities and graduate-student mentoring; first-year findings are reported as positive but are only summarized briefly in the accessible record. | U=I; R=I; S=A; E=I; C=I |
| Tamariz et al. (2017) | 2017 | Successful adaptation of a research methods course in South America | Medical Education Online | University students and faculty members | 50 students; 10 faculty | Undergraduate / higher education | Ecuador | Adapted an active-learning, flipped research methods curriculum with faculty-led theme groups and six | Knowledge and perceived competence increased, and 50% of groups achieved presentation or publication; qualitative data identified weak | U=I; R=I; S=B; E=I; C=I |

| Author (APA 7) | Year | Title | Journal | Participant type | No. | Educational stage | Country | Development / intervention (brief) | Results and conclusions (brief) | URSEC risk of bias |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | months of follow-up. | research culture and curriculum as barriers. | |
| Mejia et al. (2016) | 2016 | Perception and factors associated with dissatisfaction that physicians and recent graduates have about their thesis advisors, Lima-Peru | Revista Cubana de Educación Médica Superior | Physicians and recent medical graduates involved in degree-thesis processes | 97 | Graduation / early postgraduate transition | Peru | A cross-sectional survey examined dissatisfaction with thesis advisors among recent medical graduates in Lima. | Dissatisfaction decreased when advisors were recognized researchers, chosen by students, motivating, and supportive of publication; charging fees increased dissatisfaction. | U=A; R=A; S=B; E=I; C=I |
| Clancy and Posner (2015) | 2015 | Attitudes toward research during residency: A survey of Canadian residents in obstetrics and gynecology | Journal of Surgical Education | Canadian Ob/ Gyn residents | 175 | Residency/ postgraduate | Canada | A national online survey examined attitudes toward research during residency and perceived barriers to participation. | Many residents participated only because research was required; the main barriers were a lack of time and limited statistical/design support. | U=A; R=A; S=B; E=I; C=A |

**Note**: NR = Not reported.