

“EFFECTIVENESS OF ACADEMIC SUPPORT INTERVENTIONS FOR ACADEMICALLY AT-RISK UNDERGRADUATE NURSING STUDENTS: A SYSTEMATIC REVIEW”

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Abstract

Background: The global nursing shortage emphasises the urgent need to minimise academic attrition in undergraduate nursing education. While numerous student support initiatives exist, evidence regarding the operational efficacy and delivery mechanics of these interventions remains fragmented.

Objective: This systematic review synthesises global research on the effectiveness of academic support interventions targeted at academically at-risk undergraduate nursing students to provide evidence-based recommendations for student retention.

Methods: Following PRISMA 2020 guidelines, systematic searches were conducted in PubMed and ERIC, supplemented by Google Scholar for empirical intervention studies published in English from 2009 to 2026. Methodological quality was rated using the Joanna Briggs Institute (JBI) and Mixed Methods Appraisal Tool (MMAT) instruments.

Results: Eleven primary empirical studies spanning diverse global cohorts met the strict inclusion criteria. Given the methodological diversity of the literature, a robust qualitative thematic synthesis was conducted. Three major meta-themes emerged: (1) Predictive screening and early reading comprehension diagnostics are crucial for proactive risk identification over reactive digital tracking alerts; (2) individualised, theory-guided cognitive remediation produces significant, mathematically significant improvements in exam scores (e.g., up to +17.3 percentage points, $p < 0.0001$) and course pass rates; and (3) a crucial "relational barrier" determines student engagement. Automated outreach was associated with lower engagement in some studies, up to an 83% non-response rate (with only 17% responding to initial digital contact). Conversely one-on-one, high-touch mentorship performed by familiar, trusted faculty or peer coaches is heavily associated with student retention.

Keywords: Academic Support Interventions; At-Risk Students; Remediation; Systematic Review; Student Retention; Undergraduate Nursing.

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Introduction

For higher education institutions around the world, helping students who struggle academically continues to be a major problem. In nursing education, this difficulty is particularly relevant because nursing programmes are academically challenging, clinically demanding, and require students to integrate theoretical knowledge with practice. competence. Students are expected to demonstrate solid clinical reasoning, develop competency in practical skills, and successfully complete both academic and clinical requirements. We need to ensure an adequate supply of competent students completing the programme and an adequate supply of competent graduates for certified nursing. Strategies that help nursing students throughout their studies are becoming more and more important due to the growing demand for healthcare professionals. The World Health Organization has emphasised the continuing shortages within the global nursing profession, underscoring the need for educating, maintaining, and graduating competent nurses capable of addressing current and future healthcare

needs. Consequently, eliminating unnecessary academic failure has been a focus for nursing educators, higher education institutions, and legislators. Academically at-risk undergraduate nursing students form a varied group confronting many challenges. These interrelated difficulties can hinder academic progress. These obstacles include inadequate academic preparation, ineffective study practices, poor time management, psychological anguish, limited social support, and difficulty adapting to the demands of higher education. ². If these students are not identified quickly and given the right academic help, they are more likely to fail tests over and over again, lose confidence in their studies, lose motivation, take longer to develop, and drop out of nursing school. ¹¹ To employ limited educational resources efficiently, nursing schools should provide support to students experiencing academic failure. Nursing schools should quickly identify students facing academic failure to efficiently utilise limited educational resources and provide appropriate assistance. This approach will ensure that students receive the appropriate

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assistance they need.¹¹ To address these problems, nursing schools have adopted a number of student-centred academic assistance programmes. Common solutions include peer tutoring, peer mentoring, organised remediation programmes, academic coaching, and embedded learning assistance. These interventions include counselling services, study skills seminars, orientation programmes, early-alert systems, and comprehensive student retention campaigns. The overarching goal of these interventions is to promote academic knowledge, improve learning processes, enhance confidence and self-efficacy, and enable effective progression through nursing curricula. While the past two decades have seen numerous studies exploring academic assistance treatments, a critical operational disconnect is evident as one examines the historical evolution of these strategies. During the earlier part of this review's timeframe (circa 2009-2015), institutional interventions were heavily reliant on localised, resource-intensive face-to-face tutoring and unstructured remedial counselling [1, 11]. While these early approaches were highly personalised, they suffered from low scalability and poor tracking capabilities. To overcome these constraints, institutions began implementing integrated solutions in the middle of the 2010s. Early-alert software, automated digital tracking pipelines, and predictive institutional data analytics were put in place to improve student support. Yet, new data emerging through 2026 show that such technology has created “an unanticipated friction point: a profound psychological and administrative ‘relational barrier’”. While automated platforms became highly efficient at flagging academic risk, they separated interventions from trusted faculty-student relationships, leading to a significant decline in student intent and engagement due to impersonal electronic outreach. Consequently, the available evidence remains highly fragmented. Significant differences in intervention design, implementation metrics, and risk criteria hinder direct comparisons between historical, face-to-face frameworks and contemporary, algorithmically driven pipelines. Recent studies suggest that the increasing adoption of predictive learning analytics has created new implementation challenges related to student engagement.^{8,10} This systematic review addresses this gap by synthesising the available information on the effectiveness of academic support programmes for academically at-risk undergraduate nursing students. The study aims to synthesize the results of primary research to identify successful techniques that can guide evidence-based educational practices, broaden student support services, increase academic achievement and improve retention in undergraduate nursing programmes.

Methodology Review Design

This systematic review was conducted to synthesise evidence on the effectiveness of academic support interventions for academically at-risk undergraduate nursing students. The review was developed and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement.

Review Question

The review was guided by the following research question: What is the effectiveness of academic support interventions in improving academic outcomes among academically at-risk undergraduate nursing students?

Table 1 presents the PICO Framework for the review question.

PICO Component	Description
Population	Academically at-risk undergraduate nursing students
Intervention	Academic support interventions (e.g., tutoring, mentoring, remediation, supplemental instruction, academic coaching, study skills training, academic advising)
Comparison	No intervention, usual education, standard curriculum, or alternative intervention
Outcome	Academic performance, GPA, examination scores, pass rates, retention, progression, academic success, programme completion

Eligibility Criteria

Studies were selected according to predefined inclusion and exclusion criteria.

Inclusion Criteria

Studies were included if they met the following criteria:

- Were original intervention studies (randomised controlled trials, quasi-experimental studies, pre-post intervention studies, or other intervention-based educational research).
- Included undergraduate or prelicensure nursing students.
- Evaluated one or more academic support interventions for students identified as academically at risk or experiencing academic difficulty.

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- Reported educational outcomes such as academic performance, examination scores, course grades, retention, progression, programme completion, or related academic outcomes.

- Were published in English between 2009 and 2026.

Exclusion Criteria:

Studies were excluded if they met any of the following conditions:

- Were systematic reviews, scoping reviews, literature reviews, editorials, conference abstracts, or opinion papers.
- Included non-nursing student populations.
- Did not evaluate an academic support intervention.
- Focused exclusively on clinical skills training without an academic support component.

Information Sources and Search Strategy

A systematic literature search was conducted for 4 weeks. PubMed and ERIC were selected as the primary electronic indexing databases to capture the precise intersection of clinical medical education (PubMed) and structured pedagogical frameworks (ERIC). This database matrix was deliberately chosen to prioritise high-yield, peer-reviewed educational interventions rather than broad allied health observational surveys. To ensure comprehensive coverage, this primary indexing was supplemented with targeted iterative screening via Google Scholar and manual reference list cross-referencing of all eligible papers. A search strategy was used with combinations of keywords and Boolean operators, adapted to the particular databases, with a focus on undergraduate nursing groups, academic risk stratification and the mechanisms of remediation. The specific search string was ("nursing students" OR "undergraduate nursing") AND ("academic support" OR "remediation" OR "intervention") AND ("at-risk" OR "academic risk" OR "struggling" OR "failure").

Search Constraints and Bias Management

The literature search was strictly limited to studies published in the English language between 2009 and 2026. While restricting a systematic review to English-language publications introduces an acknowledged risk of linguistic and geographic bias; this boundary was operationally necessary to ensure absolute accuracy in translating complex educational structures, institutional policy terminology, and qualitative thematic transcripts. Studies originating in non-Anglophone regions (e.g., Spain, Iran, and South Korea) were fully included provided the primary authors had published their peer-reviewed findings and data matrices in English, thereby minimising the exclusion of geographically diverse evidence bases while maintaining linguistic fidelity during data extraction.

Study Selection

The study selection process followed the PRISMA 2020 guidelines. A total of 146 records were

identified through the literature search. All retrieved records were imported into the reference management software Zotero. After removing 5 duplicate records, 141 titles and abstracts were screened for relevance. 100 records were excluded because they were review articles, involved non-nursing populations, or did not evaluate academic support interventions. 41 reports were sought for retrieval and assessed for eligibility, of which 30 full-text reports were excluded for failing to meet the predefined PICO criteria (e.g., wrong target population, irrelevant intervention focus, or lacking descriptive academic outcomes).

The rigorous application of the predefined PICO criteria deliberately filtered out broad, non-empirical student support strategies, allowing for the isolation of high-impact academic interventions. The final synthesis pool of 11 core papers exhibits high structural density and geographic variance, including studies from the US, UK, Spain, and Iran. Cohorts ensure a highly valid, multi-dimensional framework for evaluation. Finally, 11 original intervention studies were included in the review.

Data Extraction

Data were extracted using a standardised data extraction form developed for this review. The following information was extracted from each study:

1. Author and year of publication
2. Country
3. Study design
4. Sample size
5. Intervention Tool
6. Duration
7. Major Findings
8. Study Limitations

Limitations Quality Assessment and Outcome Measures

Strength of evidence

Although the overall findings consistently favour academic support interventions, the certainty of the evidence remains moderate rather than high. Most of the included studies employed quasi-experimental, quality improvement, descriptive, or mixed methods and qualitative designs that provide useful information about students' experiences but offer limited methodological designs, while only a limited number of randomised controlled trials were identified. While these designs provide valuable real-world educational evidence, they are inherently more susceptible to selection bias, confounding, and institutional influences than randomised trials. Consequently, the overall conclusions should be interpreted as demonstrating promising rather than definitive effectiveness. The heterogeneity of study designs is also a strength and limitation of the review. Randomised controlled trials provide the strongest evidence for intervention effectiveness by reducing bias. Quasi-experimental studies provide important evidence where randomisation is not

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feasible, but are still subject to confounding variables and historical effects. Quality improvement projects demonstrate practical feasibility within educational contexts but often lack comparison groups. Descriptive, mixed methods and qualitative designs provide important insight into students' experiences and add depth to understanding of implementation processes, student experiences and contextual factors, but cannot establish causality. Synthesising evidence from these complementary methodologies allows for a more complete understanding of academic support interventions, while considering different levels of evidence. The table presents a quality assessment of included studies using a variety of appraisal tools based on each study design. The appraisal tools used include the JBI RCT for randomised controlled trials, the JBI Cross-Sectional for psychometric validation and cross-sectional studies and the MMAT (Mixed Methods Appraisal Tool) with specific modules for qualitative, non-randomised and mixed methods studies.

Quality Assessment Summary

Studies were assessed against 5 key questions (Q1–Q5) and responses recorded as Yes (Y), No (N), Unclear (U) or Cannot Determine (C). Total scores are variable, reported as a fraction out of 5 or a decimal (e.g., 0.8) indicating the extent to which criteria are satisfied. All studies are included based on criteria being met at minimum quality thresholds, with some studies receiving lower scores (e.g., Guerra-Martín (2017) (2/5)).

Outcome Measures

The presence of diverse study designs (RCTs, cohort, mixed methods, quasi-experimental, and psychometric validation) suggests a thorough evaluation of evidence. Quality scores are used to determine the quality and strength of the evidence, with higher total scores (e.g., Kramlich (2020), Donnell (2018), and Walker (2011)) reflecting greater methodological rigour. Lower scoring studies (e.g. Guerra-Martín (2017)) may require cautious interpretation due to potential biases or incomplete reporting. The assessment framework ensures that only studies meeting established quality criteria are included in the overall analysis, increasing the robustness of conclusions drawn from the evidence base.

RESULTS:

PRISMA Flow Diagram Data Summary

1. Identification Phase

Total records identified from databases (n=146): PubMed (n=126), ERIC (n=14), Google Scholar (n=6) Records removed before screening (n=5): Duplicate records removed (n=5)

2. Screening & Eligibility

Phase Records screened via title and abstract (n=141). Records excluded during title/abstract screening (n=100). Full-text

reports assessed for eligibility (n=41). Full-text reports excluded based on PICO criteria (n=30).

3. Inclusion Phase:

Final primary studies included in systematic review synthesis (n=11).

Figure 1: PRISMA FLOW DIAGRAM

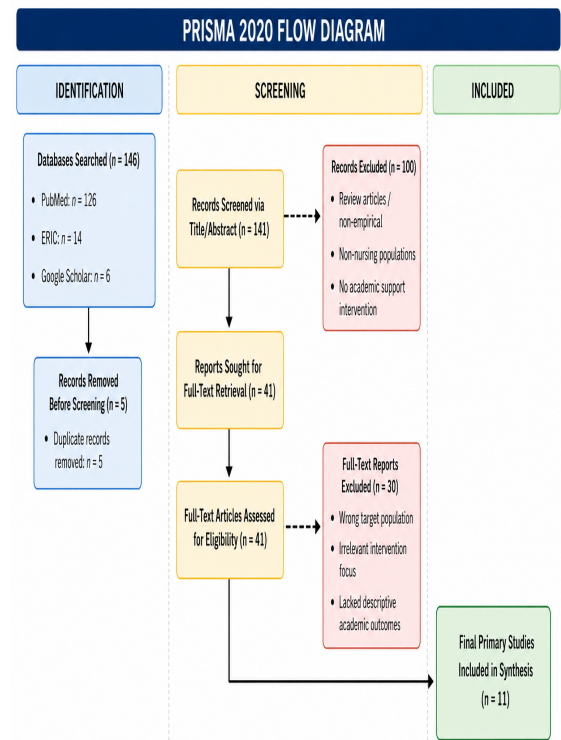


Table No. 2: Summary of Study Designs, Sample Characteristics, and Academic Support Interventions

Author & Year	Country	Study Design	Sample Size (N)	Core Intervention Type
Peyrovi et al. (2009)	Iran	Randomized Controlled Trial	N=42 BSN students	Supportive counseling programme

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M cL ai n et al. (2 01 7)	U S A	Psy cho met ric Val idat ion / Cro ss- Sec tion al	At- risk preli cense ure nurs ing stud ents	Student Success Survey (Early screening diagnostic tool)
Kr a ml ic h et al. (2 02 0)	U S A	Des crip tive Cor rela tion al	Seq uent ial ABS N coho rts	Targeted academic support interventions for modifiable risks
D on ne ll et al. (2 01 8)	U S A	Pro gra m Eva luat ion	Nurs ing stud ents acro ss 27 initi al RN prog rams	SATIN framework & Weaver Reading Program
D og gr ell & Sc ha ffe r (2 01 6)	A us tra lia	Qu asi- Ex peri men tal	N=1 792 trac king reco rds	Pharmacology academic tracking & supportive remediation

Fa irc hil d (2 02 2)	U S A	Qu alit y Im pro ve me nt	N=4 clini cal/a cade mic trac k stud ents	One-on-one faculty pilot interaction / Early remediation
Ki m et al. (2 02 1)	U S A	Qu asi- Ex peri men tal (Hi stor ical Co mp aris on)	Nurs ing coho rts vs. histo rical grou ps	Peer tutoring & faculty coaching
G eo rgi ev a et al. (2 02 5)	U K	Seq uen tial Mi xed Me tho ds	Seq uent ial mix ed met hods ; Tota l coho rt N = 1,19 8, n = 144 flag ged as at risk (bott om decil e); n = 5 com plete	Digital Analytics Package & Intervention Officer

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			d qual itati ve inter view s.	
G ue rra - M art ín et al. (2 01 7)	S pa in	RC T (Pr e- Pos t)	N=4 4 final - year nurs ing stud ents	Action-Tutoring Program (One- to-one coaching)
St or e (2 02 6)	U S A	Pro gra m Eva luat ion / Des crip tive	At- risk preli cens ure nurs ing stud ents	Theory-guided remediation strategy (Transformative Learning)
W al ke r et al. (2 01 1)	U S A	Des crip tive / Inte rve ntio nal	N=8 98 stud ents acro ss 9 prog rams	Nursingstudentsu pport.net & Faculty Coaching

Table 3: Summary of Primary Metrics and Success Rates Author & Year

A ut h or & Y ea r	Primary Metric & Key Success Rate
P ey ro vi (2 0 0 9)	Grade Improvement: Significant increase in mean grades for special courses (P=0.014) and basic/special courses (P=0.009) for male students.
M c L ai n (2 0 1 7)	Validation Efficacy: Established construct validity; proven effective diagnostic tool to target academic support needs before failure occurs.
K ra m li ch (2 0 2 0)	Risk Mitigation: Successfully isolated modifiable risk factors linked to program non progression and promoted academic success.
D o n e ll (2	Attrition Reduction: The Weaver Reading Program was the single most effective tool for reducing attrition risk among six distinct strategies.

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018)	
D o g r e l 1 (2 0 1 6)	Failure Drop: Pharmacology withdrawal dropped from up to 18.6% down to 3.3%; failure rates dropped from 19.4% down to 5.8%.
F a i r c h i l d (2 0 2 2)	Pass Rate: Achieved a 100% course pass rate vs. 88.08% historical baseline; 85.7% saw exam score gains (Mean: +17.3 points).
K i m (2 0 2 1)	Failure Reduction: Didactic failure rate dropped to 3.47% vs. 7.02% in historical group (p=0.049); distinct dose-response effect found (p=0.002).
G e o r g i e v a (2 0 2 5)	Retention & Engagement: Final programmatic retention stood at 82%; however an 83% initial non response rate was identified, with only 17% responding to cold electronic outreach.

G u e r r a- M a r t i n (2 0 1 7)	Course Pass Rate: Experimental group passed 69% of previously failed courses vs. only 37.5% in the control group (p=.000).
St o r (2 0 2 6)	Policy Impact: Improved course exam performance and exam readiness; project adopted as standard departmental policy.
W a l k e r (2 0 2 1)	Dismissal Reduction: Grant interventions reduced programmatic dismissal rates from 10.6% down to 4.5%; average exam scores rose from 70.5 to 77.

Table 4: Quality Assessment of Included Studies Author & Year Study Design

Au tho r & Ye ar	Stu dy Desi gn	App rais al Too l	Q 1	Q 2	Q 3	Q 4	Q 5	T o t al S c o r e	In c l u s i o n
Pe y ro v i	RC T	JB I RC T	Y	Y	Y	C	U	3/ 5	In c l u d e d

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Au tho r & Ye ar	Stu dy Desi gn	App rais al Too l	Q 1	Q 2	Q 3	Q 4	Q 5	T ot al S c o r e	Inc lus ion
(20 09)									
Mc Lai n (20 17)	Psyc hom etric Vali dati on / Cros s- Sect iona l	JB I Cros s Sect iona l						3/ 5	Inc lud ed
Kr am lic h (20 20)	Des cript ive Corr elati onal	MM AT (Qu ant Des cript ive)	Y	Y	Y	C	Y	4/ 5	Inc lud ed
Do nne ll (20 18)	Mix ed Met hods	MM AT	Y	Y	Y	N	Y	4/ 5	Inc lud ed
Do ggr ell (20 16)	Qua si- Exp erim enta l	MM AT (Qu ant Non Ran dom	Y	Y	Y	N	Y	4/ 5	Inc lud ed

Au tho r & Ye ar	Stu dy Desi gn	App rais al Too l	Q 1	Q 2	Q 3	Q 4	Q 5	T ot al S c o r e	Inc lus ion
		ized)							
Fai rch ild (20 22)	Qua lity Imp rove men t	MM AT (Qu ant Non Ran dom ized)	Y	Y	Y	N	Y	4/ 5	Inc lud ed
Ki m (20 21)	Qua si- Exp erim enta l	MM AT (Qu ant Non Ran dom ized)	Y	Y	Y	U	Y	4/ 5	Inc lud ed
Ge org iev a (20 25)	Mix ed Met hods	MM AT	Y	Y	Y	Y	N	4/ 5	Inc lud ed
Gu err a- Ma rtín	RC T	JB I RC T	Y	U	Y	N	N	2/ 5	Inc lud ed

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Author & Year	Study Design	Appraisal Tool	Q1	Q2	Q3	Q4	Q5	Total Score	Inclusion
(2017)									
Store (2026)	Program Evaluation / Descriptive	MMAT (Quant Descriptive)	Y	U	Y	U	Y	3/5	Included
Walker (2011)	Non-Randomized Cohort / Descriptive	MMAT (Quant Non Randomized)	Y	Y	Y	N	Y	4/5	Included

Notes:

Y = Yes; N = No; U = Unclear; C = Cannot Determine

Total Score: a fraction out of 5 or a decimal representing the proportion of criteria met
Inclusion: ✓ indicates included studies based on quality assessment. JBI stands for the Joanna Briggs Institute, and MMAT stands for the Mixed Methods Appraisal Tool. Q1–Q5 represent specific appraisal questions relevant to each tool (details are available in respective appraisal manuals)

Synthesis of Themes

Based on the thematic synthesis of the 11 included studies, three main themes emerged. regarding the efficacy of academic support interventions.

Theme 1: Predictive Screening and Early Identification Systems

The findings of this review consistently indicate that the early identification of academically at-risk nursing students is a fundamental component of successful remediation programmes. Across the included studies, timely recognition of academic vulnerability enabled institutions to implement targeted support before students experienced substantial academic failure or programme attrition. The methods of identification of at-risk students varied, but the preponderance of evidence suggests that early screening is the basis on which effective academic support strategies are built. The reviewed studies identified both academic and demographic characteristics associated with increased risk of poor academic progression. Walker et al. (2011) identified poor baseline reading comprehension, combined with lower entry examination performance and poorer achievement in prerequisite science courses, as significant predictors of subsequent academic difficulty¹¹. Doggrell and Schaffer (2016) similarly identified that certain student populations, particularly those entering accelerated nursing programmes via non-traditional educational pathways, have higher rates of course failure and withdrawal. These findings suggest that academic risk is multifactorial rather than being attributable to one characteristic, and further support the need to implement comprehensive screening approaches that include both academic performance indicators and student background characteristics. An important finding arising from this review is the developing transition from traditional faculty-led screening to technology-supported predictive analytics. McLain et al. (2017) demonstrated that structured self-assessment tools can effectively identify students requiring early academic support by allowing faculty to recognise individual learning needs before their academic performance declines. More recently, Georgieva et al. (2025) demonstrated that machine learning algorithms using virtual learning environment engagement and library utilisation data can accurately identify students at risk of disengagement. Collectively, these studies suggest that digital learning analytics have considerable potential to enhance early identification of vulnerable students. However, the evidence also demonstrates that accurate prediction alone does not automatically translate into better educational outcomes. Despite the success of learning analytics in identifying students at greater academic risk, students' uptake of automated support was rather low. Georgieva et al.'s (2025) findings demonstrate that, despite being accurately classified as at risk, many students either ignored or rejected institution-initiated electronic outreach. This finding suggests an important difference between predictive accuracy and intervention effectiveness. While screening technologies can help to identify at-risk students, they cannot, on their own, address the behavioural, motivational and interpersonal factors

that affect students' readiness to seek academic support. The findings therefore suggest that predictive screening should be viewed as the first part of a more extensive, relationship-centred support system, rather than as an isolated intervention. Successful remediation appears to depend on the combination of early identification with timely faculty engagement, individualised academic guidance and ongoing follow-up. As such, institutions that are using predictive learning analytics should ensure that technological systems are used to support, not to replace, meaningful human interaction. Despite the consistency of the findings in support of early identification, the overall certainty of the findings remains unclear. Evidence should be interpreted cautiously. Considerable methodological heterogeneity was observed across the included studies with respect to screening methods, definitions of academic risk, outcome measures, and study design. Randomised controlled trials provide stronger evidence for evaluating structured educational interventions, but many studies examining screening approaches used descriptive, psychometric or observational methodologies, which are inherently limited in their ability to establish causal relationships. In addition, academic risk was defined inconsistently across studies using examination performance, admission characteristics, self-assessment measures or digital engagement indicators, making direct comparison difficult. While all included studies reported positive outcomes for early identification, the magnitude of benefit varied considerably across educational settings. This consistency may partly reflect publication bias, whereby educational interventions demonstrating positive outcomes are more likely to be published than programmes that report neutral or unsuccessful results. Consequently, while the available evidence strongly supports the importance of early identification, the optimal screening strategy remains uncertain. Overall, the evidence indicates that early identification is a necessary—but not sufficient—condition for improving academic success among at-risk nursing students. Maximum educational benefits were realized through the combination of predictive screening with individualized academic support, faculty mentoring, and ongoing student engagement. Future multicenter studies using standardized definitions of academic risk and common outcome measures are needed to identify the most effective and scalable screening strategies across various nursing education environments.

Theme 2: Tailored Remediation and Exam Rebound Metrics

Once academic or demographic vulnerability is detected, the literature is clear that individualized remediation is far more effective than generic academic support in improving student progression. Rather than the use of broad institutional

recommendations, successful interventions target specific cognitive, academic, and learning deficits through the use of structured, evidence-informed strategies. Donnell et al. (2018), in a statewide evaluation of 27 initial RN licensure programmes in Texas, found that among six intervention strategies implemented through the SATIN framework, a structured reading-focused curriculum (the Weaver Reading Program) produced the greatest reduction in attrition risk. Likewise, Store (2026) reported that a remediation programme grounded in transformative learning theory significantly improved examination performance and readiness among at-risk nursing students, leading to its adoption as departmental policy. Supporting this finding, Kramlich et al. (2020) demonstrated that remediation strategies designed around modifiable risk factors successfully reduced non-progression across multiple accelerated bachelor's of Science in Nursing (ABSN) cohorts. Together these studies support the idea that remediation is most effective when it is focused on identified learning needs via targeted, theory-informed interventions rather than standardised academic support. The effectiveness of these targeted measures show consistent improvements, but note that the magnitude of the improvement varied depending on the study design. In a quality improvement pilot, Fairchild (2022) reported that 85.7% of students who initially failed a unit examination demonstrated significant academic recovery on the final examination. Participants achieved a mean examination score increase of 17.3 percentage points (95% CI: 13.3–20.9; $p < .0001$), with a 100% course pass rate compared with the institution's historical pass rate of 88.08% ($d = 0.604$). Similar findings: quasi-experimental studies and longitudinal cohort studies reported improvements in examination performance and progression. Walker et al. (2011) observed that students referred for academic support increased their mean examination scores from 70.5 to 77 following the intervention, which contributed to a reduction in programme dismissals from 10.6% to 4.5%. Kim et al. (2021) provided additional evidence for a dose-response relationship, finding that while attendees of peer tutoring scored lower on baseline exams than non-attendees, those who regularly attended had significantly higher final exam scores, with students who attended two or more tutoring sessions per semester gaining about five points and students who did not participate showing no measurable improvement. Similarly, Doggrell and Schaffer (2016) reported that systematic monitoring with targeted remediation significantly lowered pharmacology withdrawal rates among academically vulnerable accelerated students from 18.6% to 3.3%, and course failure rates fell from 19.4% to 5.8%, reducing the performance gap between at-risk students and traditional cohorts⁵

Although the direction of evidence is highly consistent, the methodological quality of the supporting studies varies considerably. Improvements in examination performance and progression were reported across quasi-experimental studies, longitudinal cohort studies, quality improvement projects, and programme evaluations, strengthening confidence that individualized remediation can positively influence academic outcomes. However, much of the evidence originates from single-institution studies employing relatively small samples, convenience sampling, or historical comparison groups, thereby limiting generalisability and increasing the potential for selection and institutional biases. Consequently, while the overall effectiveness of tailored remediation is well supported, the magnitude of its impact should be interpreted cautiously. An additional limitation across the literature is the substantial heterogeneity of intervention designs. Programmes ranged from prolonged one-on-one faculty mentoring and theory-based remediation frameworks to peer tutoring, structured reading curricula, and brief academic workshops. Intervention duration, frequency, intensity, and implementation fidelity differed markedly between studies, making direct comparisons difficult and preventing identification of the most powerful intervention components. Future research should therefore focus on multicentre studies that use standardised intervention protocols to establish the optimal type, timing and intensity of remediation required to maximise academic success among at-risk nursing students.

Theme 3: Personal Mentoring, Peer Tutoring and Relational Barriers

This theme identifies interpersonal mechanisms for academic support interventions, emphasising the value of personalised mentoring, peer tutoring and trusted faculty relationships in facilitating academic success among at-risk nursing students. Interventions characterised by sustained human interaction are consistently found to be more effective than generic or impersonal support approaches across the literature. Donnell et al. (2018) found that structured one-to-one mentoring, consistent faculty engagement, and an ongoing institutional commitment to student support were factors linked to improved student retention within 27 initial RN licensure programmes in Texas. Similarly, Guerra-Martín et al. (2017) found that students involved in a structured action-tutoring programme led by experienced faculty attained a 69% pass rate in previously failed courses, significantly higher than students receiving usual academic support (37.5%, $p < .001$). Fairchild (2022) similarly found that students attributed their academic progress not only to academic guidance, but also to the emotional support, accountability, and confidence that resulted from regular interactions

with faculty mentors. Collectively, these findings suggest that the quality of interpersonal relationships is an essential component of successful remediation programmes. Beyond the availability of academic support, recent evidence indicates that the effectiveness of interventions depends heavily on students' willingness to engage with them. Georgieva et al. (2025) identified "relational barriers" as a significant obstacle to intervention uptake. Using a mixed-methods design, they found that academically vulnerable nursing students were considerably less likely to respond to outreach initiated by unfamiliar administrative staff, preferring instead to seek support from lecturers with whom they had already established trusting classroom relationships. This finding helps explain why institutionally available support services are sometimes underutilised despite clear evidence of their effectiveness. Similarly, Kim et al. (2021) showed a dose-response effect of intervention efficacy. Students who accessed peer tutoring were initially performing worse than their peers, but those who attended two or more support sessions per semester showed significant improvements in final examination performance, while infrequent attendees experienced negligible academic benefit. These findings suggest that effective support requires not only accessibility, but also sustained engagement facilitated by trusted academic relationships. Several educational theories provide plausible explanations of these observed outcomes. Social Learning Theory suggests that students acquire effective learning behaviours through observation, modelling and interaction with more experienced peers. In peer tutoring programmes, tutors provide accessible role models who demonstrate successful study strategies, clinical reasoning and examination techniques in psychologically safe learning environments. Similarly, cognitive apprenticeship theory proposes that the most effective acquisition of complex cognitive skills occurs when expert thinking is explicitly modelled and scaffolded through guided practice. Faculty mentors and trained peer tutors progressively transfer responsibility for learning to students as competence develops, promoting knowledge acquisition and independent problem-solving. The results can also be understood through the conceptual framework of academic self-efficacy. Personalised feedback, repeated mastery experiences and supportive mentoring relationships serve to increase students' confidence in their ability to overcome academic challenges. An increase in self-efficacy has been consistently linked to increased persistence, resilience and engagement in challenging learning activities. In addition, frequent mentoring promotes accountability and intrinsic motivation through structured goal setting, ongoing feedback and scheduled meetings that reinforce productive study behaviours. These mechanisms

may explain why students who regularly engage in mentoring or tutoring programmes show greater academic gains than those who engage only intermittently. The literature supports the use of academic support interventions, not only for their content, but also for their mode of delivery. Interpersonal trust seems to be an important mediating factor between the recognition of academic risk and successful intervention engagement, with students being more willing to participate when support is provided by familiar faculty members or trained peer mentors, rather than by unfamiliar personnel from the institution. This expands the understanding of academic support beyond instructional content, to the relational context of learning. However, the evidence base has notable limitations. Much of the literature on relational barriers is based on mixed-methods and qualitative designs that provide rich insights into students' experiences but have limited ability to establish causal relationships. Further, many of these studies were conducted at single institutions and within specific nursing programmes, which limits the generalisability of their findings. Although the convergence of quantitative and qualitative evidence strengthens confidence in the importance of mentoring and trusted relationships, further multicentre experimental studies are required to determine the extent to which relational factors independently influence academic outcomes across diverse educational settings.

Discussion

1.Publication bias

Publication bias should also be considered when interpreting the findings. Educational intervention studies reporting positive outcomes are more likely to be published than studies demonstrating neutral or negative effects. Unpublished institutional evaluations and conference reports may also contribute to this overestimation. The exclusion of these may lead to a modest overestimation of the overall effectiveness of academic support interventions.

2.Applicability to low-resource countries

The applicability of these findings to low- and middle-income countries requires careful consideration. Many successful interventions relied on intensive faculty mentoring, individualised remediation, and sophisticated learning analytics that may not be feasible in institutions experiencing faculty shortages or financial constraints. Nevertheless, lower-cost interventions such as structured peer tutoring, early academic screening, and faculty-led mentoring groups may represent practical alternatives that can be adapted within resource-limited educational environments.

3.Methodological weaknesses across studies

Across the included studies, there were several methodological limitations. Limitations are small sample sizes, recruitment from one institution,

convenience sampling, historical comparison groups, short follow-up periods and inconsistent definitions of academic risk. These limitations reduce generalisability and make direct comparison between interventions difficult. Future multi-centre randomised studies employing standardised outcome measures would considerably strengthen the evidence base.

Strengths and Limitations

Strengths

This systematic review's key strength is its methodological diversity and rigorous adherence to acknowledged reporting standards. By employing both the Joanna Briggs Institute (JBI) appraisal tool and the Mixed Methods Appraisal Tool (MMAT), this review successfully synthesised data from highly heterogeneous study designs, ranging from robust randomised controlled trials to large-scale multi-site programme evaluations and localised quality improvement pilots. This broad approach captured data from an overall aggregate cohort pool of N=5,614 students and student tracking records, combining large-scale tracking data with localised, small-cohort interventions to produce a comprehensive evaluation of nursing student attrition. Furthermore, the geographical breadth of the evidence base, including data from the United States, United Kingdom, Spain and Iran, adds to the generalisability of the extracted themes and ensures that the recommendations are widely applicable to modern nursing education frameworks.

Limitations

Despite these strengths, the primary literature presents several limitations that need to be addressed. First, the lack of blinding of participants and instructors in experimental and quasi-experimental studies on the effectiveness of hands-on academic support (e.g., Peyrovi, 2009; Guerra-Martín, 2017) opens the door for performance bias, which is difficult to separate in educational research. Second, many mixed-methods and descriptive tracking cohorts featured a large sampling imbalance; for example, Georgieva et al. (2025) utilized a large quantitative tracking cohort (N=1,198) that identified 144 at-risk individuals but employed a small qualitative sample (n=5). Although this small sample size limits the thematic saturation of the qualitative findings, the richness of the narrative transcripts provides essential context regarding student resistance to automated outreach. Finally, a systemic operational limitation identified in the literature was the low active utilisation and high explicit refusal rates of institutional interventions among the most vulnerable student demographics (Donnell, 2018; Georgieva, 2025), complicating the assessment of true intervention efficacy.

Conclusion

The evidence compiled in this systematic review demonstrates that mitigating programme attrition

in prelicensure nursing education necessitates a move away from reactive, one-size-fits-all remediation and toward proactive, predictive screening methods combined with individualised, high-touch support structures. The synthesised data demonstrates that early diagnostic surveys and reading comprehension measurements are highly beneficial in identifying modifiable risk factors before academic failure occurs. However, a “relational barrier” inherently limits the overall effectiveness of these frameworks. Automated or administrative outreach often leads to student resistance and minimal participation, whereas interventions delivered one-on-one by trusted, known faculty or peer coaches result in large, quantitative increases in exam scores and final course retention. Future nursing education policy must prioritise the implementation of required, theory-guided remediation procedures within the curriculum, ensuring that academic help is more than just an optional resource but an integrated structural pathway. Longitudinal research is essential to examine the long-term impact of these early interventions on NCLEX licensure pass rates and professional nursing retention, thereby connecting student retention with workforce stability.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Ethical Considerations

Ethical approval was not required because this study is a systematic review of previously published literature.

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