

Review

Integrating psycho-oncology into medical physical education curricula: A systematic review of simulated patient-based exercise counseling

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Abstract: This systematic review investigates the effectiveness of simulation-based education in equipping medical and allied health students with competencies in exercise counseling and psycho-oncological support for individuals with cancer. As holistic cancer care increasingly emphasizes the integration of psychological support and physical activity guidance, medical education must evolve to address these dual demands. A comprehensive literature search across PubMed and the Web of Science Core Collection identified studies published between 2000 and 2025. Following PRISMA guidelines, 20 eligible studies were analyzed. Simulation modalities included standardized patients, high-fidelity mannequins, virtual platforms, and hybrid formats. Findings consistently demonstrate that simulation enhances learners' communication skills, counseling self-efficacy, empathy, and readiness to navigate emotionally complex scenarios involving oncology patients. Thematic synthesis revealed gains across cognitive, behavioral, and affective learning domains. This is the first systematic review to examine how simulated patient-based exercise counseling can function as an interdisciplinary bridge between physical education and psycho-oncology. The results underscore the pedagogical value of integrating behavior change theory, simulation-based learning, and emotional realism into medical curricula to better prepare future healthcare professionals for the psychosocial and physical complexities of cancer care.

Keywords: Behavior change techniques; clinical communication; empathy training; exercise promotion; health professions education; interdisciplinary learning; simulation-based training; supportive cancer care

1. Introduction

Cancer remains one of the most pressing global health challenges, not only because of its increasing incidence and mortality but also due to the profound psychological burden it places on patients across the disease trajectory. According to Sung et al. [1], the global cancer incidence is projected to exceed 28 million new cases annually by 2040, further compounding the psychosocial and physical care needs of affected individuals. In addition to clinical treatment, a substantial body of evidence emphasizes that emotional distress, such as depression, anxiety, and existential fear, can hinder recovery, reduce quality of life, and adversely impact adherence to prescribed treatment regimens. [2–4]. Consequently, the integration of psycho-oncology into cancer care has become a necessary evolution in the comprehensive management of oncology patients.

Psycho-oncology, as a field, emphasizes the psychological, behavioral, and social aspects of cancer and its impact on patients and caregivers. Traditionally, the incorporation of psycho-oncological care has been siloed within specialized psychological services, rather than embedded across the healthcare education

continuum. While oncology nurses and psycho-oncologists are frequently trained in communication and counseling skills, most medical school curricula, especially within physical education or lifestyle medicine modules, lack a structured framework for training students in psychosocial care competencies tailored to cancer patients [5,6]. This gap in education presents a significant challenge, especially as physicians involved in physical rehabilitation and activity counseling are now increasingly expected to provide motivational and emotional support as integral components of holistic, patient-centered care.

Parallel to the growth of psycho-oncology has been the increasing recognition of physical activity (PA) as a key supportive therapy for patients with cancer. Exercise has been shown to alleviate cancer-related fatigue, improve cardiovascular health, reduce treatment side effects, and enhance psychological well-being during and after cancer treatment [7,8]. Exercise guidelines from organizations such as the American College of Sports Medicine and Exercise is Medicine (EIM) advocate for personalized physical activity prescriptions in oncology, delivered by knowledgeable healthcare professionals [9]. However, despite overwhelming evidence supporting the role of physical activity in cancer care, physician-led exercise counseling remains rare. Barriers include lack of training, limited curricular emphasis, and low confidence in communication skills, particularly when working with patients facing emotional distress or undergoing intensive cancer therapy [10,11].

To address this gap, simulation-based education has emerged as a promising pedagogical tool within medical and nursing education. Simulation offers a controlled, risk-free environment where learners can develop and refine not only technical competencies but also interpersonal and psychological skills. When applied to oncology settings, simulation involving standardized or virtual patients has demonstrated efficacy in improving communication skills, empathy, and confidence among medical students and healthcare trainees [12]. Notably, studies have shown that simulation-based interventions focusing on truth-telling, end-of-life discussions, and symptom management can significantly enhance learners' ability to manage emotionally charged encounters with oncology patients [13,14].

Despite these advances, the use of simulation specifically aimed at preparing medical students to provide psychosocially informed exercise counseling for oncology patients remains underdeveloped. Few institutions have attempted to integrate tumor psychology education with lifestyle medicine training, particularly within physical education modules that incorporate exercise counseling. A systematic review by Usman et al. [15] focusing on oncology nursing simulation concluded that while simulation improves technical and communication skills, standardized approaches integrating psychological constructs are still lacking. Another study by Brennan et al. [16] highlighted how behavior change techniques (BCTs) and simulation-based workshops, such as the "Exercise Expo," improved medical students' self-efficacy and attitudes towards exercise counseling, but did not specifically address psycho-oncological needs.

This curricular gap is particularly concerning given the high rates of exercise-related avoidance and motivational deficits among cancer patients with concurrent psychological distress. Research suggests that interventions combining physical activity promotion with behavioral and emotional support are more effective than

exercise prescription alone [17]. Thus, preparing future physicians to counsel cancer patients effectively on physical activity necessitates a pedagogical approach that integrates both psychological theory and experiential practice.

Simulated patient (SP) methods present a unique opportunity to achieve this integration. SPs—trained actors or virtual agents—allow learners to engage in realistic, emotionally complex scenarios, such as discussing fatigue management with a breast cancer survivor or addressing resistance to physical activity in a palliative care setting. These scenarios demand not only clinical knowledge but also emotional intelligence, motivational interviewing, and adaptive communication—skills central to both psycho-oncology and exercise psychology [18].

Furthermore, educational frameworks such as the Theory of Planned Behavior (TPB) and Bandura's Social Cognitive Theory (SCT) offer theoretical underpinnings for designing simulation-based modules that enhance students' self-efficacy, behavioral intentions, and communication performance. For instance, when simulation is aligned with these models, students are more likely to develop the attitudes and perceived behavioral control necessary for effective patient counseling [19,20]. Yet, few educational programs explicitly apply such theories in simulation training that combines psychosocial oncology and physical education content.

Given the increasing emphasis on integrative, patient-centered cancer care and the persistent gaps in psycho-oncological training, this systematic review provides a timely synthesis of simulation-based educational interventions that bridge tumor psychology and exercise counseling within physical education curricula. It has three primary aims. First, it identifies and critically appraises interventions designed to enhance psycho-oncological and exercise counseling competencies. Second, it assesses their effectiveness in improving knowledge, communication skills, empathy, and counseling self-efficacy among medical and allied health students. Third, it examines the theoretical frameworks guiding these interventions and evaluates how they are implemented within existing medical school programs. By centering on simulated patient-based exercise counseling, this review offers new insights for designing interdisciplinary education models that address both the psychological and physical dimensions of cancer care.

2. Literature review

2.1. Evolution of psycho-oncological education in medical curricula

Psycho-oncology is a crucial domain within holistic cancer care, encompassing psychological, behavioral, and emotional support throughout the patient journey. Yet, psycho-oncology education remains unevenly implemented across health curricula. Historically, training has emphasized biomedical knowledge while neglecting psychosocial competencies and behavioral counseling—especially in areas like physical activity promotion for cancer patients.

Brennan et al. [16] introduced a simulation-enhanced behavioral change workshop for medical students, improving their confidence and readiness to counsel patients on exercise. This study exemplifies how psycho-oncological content can be integrated into core training using experiential simulation strategies. Similarly, foundational work by Baile et al. [13] with the SPIKES protocol provided a structured

framework for difficult conversations, setting a precedent for empathy-based communication in cancer education [13].

2.2. Simulation as a bridge between theory and empathy in oncology training

Simulation fills a critical gap by translating theoretical psycho-oncological knowledge into empathic clinical practice. Usman et al. [15] conducted a comprehensive systematic review, demonstrating consistent benefits of simulation-based education in oncology—including gains in knowledge, confidence, and communication. Importantly, it highlighted a deficit in empathy-centered frameworks.

Coyle et al. [21] evaluated communication skill training focused on end-of-life discussions using standardized patients. Their results revealed significant increases in nurse confidence and emotional readiness to engage with dying patients. Stan et al. [22] also showed that palliative care simulations enhanced realism, preparedness, and comfort in emotionally charged clinical settings.

2.3. Simulation-based exercise counseling for cancer survivors

Although physical activity plays a significant role in cancer recovery, many clinicians report low confidence in delivering exercise counseling. Gunberg Ross and Burrell's simulation-based workshop used standardized patient encounters in a seven-week nursing seminar to support oncology symptom management. The study demonstrated significant improvements in learners' self-perceived competence and confidence, particularly in communication and decision-making related to exercise and symptom control [23].

Brennan et al. [16] also addressed the gap in medical education by developing a behavior change-focused workshop that incorporated simulated patient counseling. This intervention significantly enhanced students' readiness to promote physical activity among cancer patients [16]. These findings affirm the pedagogical value of experiential learning in equipping future physicians with the skills to support survivorship care.

Mind-body practices have also been integrated into exercise-oriented psycho-oncological care. Takemura et al. [24] compared Tai Chi with aerobic exercise in lung cancer patients and reported higher adherence rates and improved psychological outcomes in the Tai Chi group. Bower et al. [25] observed fatigue reduction and better sleep quality in breast cancer survivors participating in yoga interventions. Furthermore, Geng et al. [18] conducted a network meta-analysis that highlighted the efficacy of Tai Chi and Liuzijue in reducing depression among cancer survivors.

Together, these studies demonstrate that simulation-based instruction—whether focused on communication skills or the application of mind-body practices—can play a critical role in bridging clinical knowledge with patient-centered survivorship care.

2.4. Emotional complexity and psychophysiological competency in simulated settings

Emotional demands are inherent in oncology, and simulation has emerged as a tool to support emotional and physiological readiness. Chen et al. [26] evaluated a

SHARE-model-based communication simulation with advanced practice nurses, showing increased confidence in truth-telling, even under emotionally charged scenarios. Brennan [16] and Kang et al. [27] found that empathy, critical thinking, and communication skills improved markedly after engaging in high-fidelity or role-play-based simulations.

Such findings affirm simulation's dual role in developing both cognitive and affective competencies—especially important in emotionally complex clinical encounters.

2.5. Gaps in psycho-oncology curricula and exercise-based simulation

Despite its value, simulation is underutilized in integrated psycho-oncology and exercise counseling. While Sharour [28] showed that high-fidelity simulation for oncology emergencies improved clinical self-efficacy and knowledge, it did not explicitly incorporate psychological or behavioral elements. Hancock et al. [14] emphasized, through a systematic review, the reluctance of healthcare professionals to disclose prognostic details—further highlighting a persistent empathy gap.

Peoples et al. [29] linked CBT-I improvements to reductions in depression among cancer survivors, yet this cognitive-behavioral strategy has not been widely incorporated into simulation training. Ebbert and Connors [30] called attention to curriculum-wide use of standardized patients, noting realistic yet infrequently emotional or exercise-related focus.

Silva et al. [31], through a scoping review, revealed that while simulation programs effectively improve psycho-oncological knowledge, many lacked explicit theoretical underpinnings or integration with exercise promotion.

2.6. Advancing integrated psycho-oncology and exercise counseling through simulation

Emerging evidence supports combining psycho-oncological content with exercise education in simulation-based formats. Giuliani et al. [32] demonstrated the feasibility and educational value of high-fidelity simulation in radiation oncology, enhancing team-based decision-making and interprofessional communication. Burrell et al. [33] expanded this framework into telehealth, finding that virtual simulations increased decision-making capacity and self-assessed clinical performance among nursing students.

Al Wachami et al. [34] systematically examined simulation-based training across oncology education and found consistent improvements in both technical and interpersonal competencies. Silva et al. [31] emphasized that simulation-based education improved psycho-oncological knowledge, skills, confidence, and learner satisfaction across both nursing and medical settings. Their review highlighted the adaptability of both in-person and virtual simulation modalities and called attention to the resource demands of large-scale implementation.

Standardized patients remain central in creating realism, while debriefing sessions help solidify learning and emotional processing. In end-of-life care training, Coyle et al. [21] found that combining simulated role-play with structured workshops significantly improved nurse confidence in emotionally intense conversations.

Similarly, in emergencies, Sharour [28] demonstrated that high-fidelity simulations can enhance student self-efficacy and preparedness.

Together, these examples emphasize that both virtual and in-person formats can be designed to support emotionally intelligent, behaviorally grounded clinical performance. They reinforce the importance of integrating psychological and physical care into a single, simulation-based learning pathway.

2.7. Summary of literature review

The integration of psycho-oncology and exercise counseling into simulation-based education offers a promising path forward. Studies consistently show that simulation improves cognitive, emotional, and behavioral competencies across health professions. However, gaps remain—particularly regarding emotional depth, theoretical alignment, and curricular continuity.

Future developments should adopt comprehensive behavioral models, expand virtual and telehealth modalities, and address underrepresented populations. Simulation must also evolve to mirror real-world complexity, equipping future healthcare providers to deliver emotionally intelligent, behaviorally informed, and interprofessionally collaborative cancer care. By uniting psycho-oncology with exercise science in medical education, future physicians can be better prepared to address both the physical and psychological burdens of cancer. Although existing evidence supports the value of integrated training, no prior review has systematically examined simulation-based psycho-oncology education within the context of physical education or exercise counseling. The following methodology presents the approach taken in this review to address that gap.

3. Methodology

This systematic review was conducted to examine the integration of simulation-based exercise counseling into medical curricula, specifically within the psycho-oncology context. The review design followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which offer a comprehensive framework for ensuring methodological transparency and reproducibility in evidence synthesis [35]. The study selection process was guided by PRISMA 2020 guidelines. A flow diagram summarizing this process is presented in **Figure 1** of Chapter 4.

The review aimed to identify, evaluate, and synthesize studies that implemented SP-based exercise counseling to enhance psycho-oncological competencies in medical education. Considering the interprofessional and interdisciplinary nature of this topic, which spans oncology, psychology, physical activity, and pedagogy, a multi-domain review strategy was adopted. The review protocol was developed a priori to ensure clarity in inclusion criteria, search strategy, and outcome synthesis. Although this protocol was not formally registered, its design adhered to international best practices in health education reviews, including alignment with Synthesis Without Meta-analysis (SWiM) reporting standards [36].

The eligibility of studies was determined using the PICOS (Population, Intervention, Comparison, Outcomes, Study design) criteria. The population of

interest included undergraduate and graduate-level medical students, oncology trainees, and simulated patients participating in education modules related to exercise counseling and psycho-oncology. Interventions had to involve the use of simulation—either in-person or virtual—including standardized patients, high-fidelity mannequins, or telehealth-based SPs. These simulations had to incorporate or be directly related to physical activity counseling for oncology patients. Comparators could include traditional didactic education, control groups receiving no intervention, or alternate educational formats.

Outcomes of interest focused on improvements in learner knowledge, communication skills, psychological resilience awareness, self-efficacy, and attitudes towards exercise counseling in cancer care. Acceptable study designs included randomized controlled trials, quasi-experimental studies, cohort designs, pre-post studies, and mixed-methods evaluations. Studies were excluded if they were not peer-reviewed, were published in languages other than English, or did not include empirical data. Additionally, review articles, case reports, and conference abstracts were excluded due to their limited methodological detail.

The search strategy was comprehensive and multi-database. It was implemented using PubMed and Web of Science Core Collection—two databases well-recognized for indexing interdisciplinary content in medicine, psychology, and education. The search timeframe was January 2000 to July 2025 to capture a wide historical arc of simulation-based education, particularly after the early adoption of virtual simulations post-2000. The keywords and Boolean operators used included: (“simulated patient” OR “standardized patient” OR “simulation-based learning”) AND (“exercise counseling” OR “physical activity promotion”) AND (“oncology” OR “cancer care”) AND (“medical education” OR “clinical training”). These terms were refined based on preliminary scoping to maximize relevance and comprehensiveness.

All search results were exported to Covidence for systematic screening and duplicate removal. After eliminating 103 duplicates, 239 articles remained. Title and abstract screening were conducted independently by two trained reviewers using the eligibility criteria outlined above. Disagreements were resolved through consensus discussions, and if unresolved, a third reviewer was consulted. In total, 63 articles were excluded at this stage, primarily for not meeting the population or intervention criteria.

Subsequently, 76 full-text articles were retrieved and reviewed for eligibility. Of these, 56 were excluded for various reasons: 12 failed to report relevant outcome measures, 10 used simulations in a context unrelated to exercise or psycho-oncology, and 8 provided insufficient methodological detail. This resulted in a final inclusion of 20 studies that met all criteria for data extraction and synthesis. **Figure 1** provides a clear summary of this process, documenting each stage from identification through inclusion.

Data extraction was guided by a structured Excel spreadsheet and completed independently by two reviewers. Extracted variables included publication year, author, country, sample size, simulation modality, intervention duration, targeted outcomes, and evaluation tools used. Tools included validated instruments such as the Confidence in Communication Scale, the NLN Student Satisfaction Survey, and versions of the Hospital Anxiety and Depression Scale. Moreover, specific attention was given to behavior change techniques (BCTs) embedded in the simulations,

following the BCT taxonomy developed by Michie et al. [37]. This allowed for a deeper understanding of how interventions theoretically targeted learner behavior change.

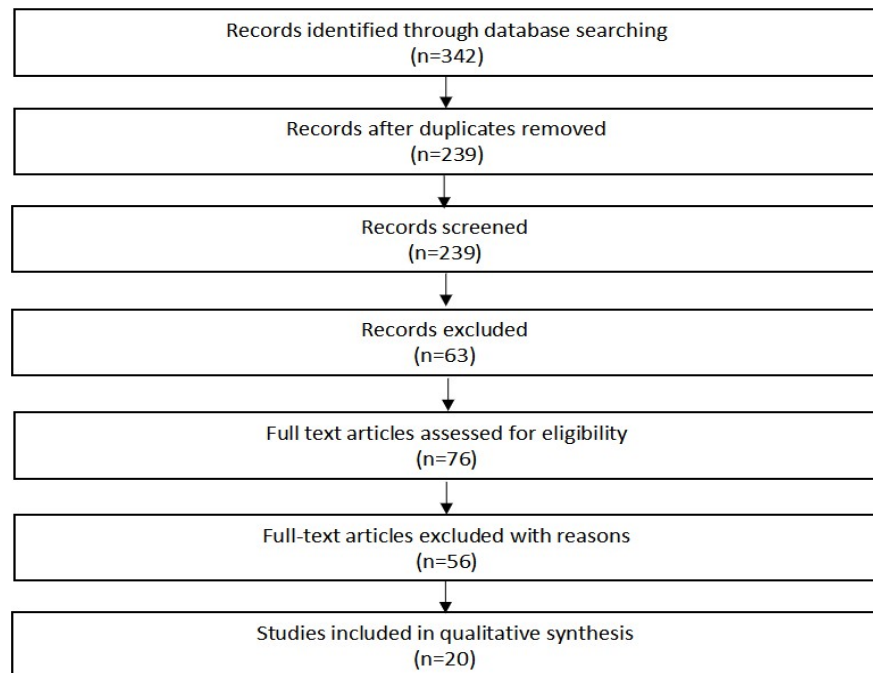


Figure 1. PRISMA 2020 flow diagram of study selection.

Quality appraisal of the included studies was performed using the Mixed Methods Appraisal Tool (MMAT), which is suitable for appraising studies across diverse methodological traditions. Studies were assessed on criteria relevant to their design, such as randomization procedures for RCTs or data integration approaches for mixed-methods studies. No studies were excluded based on quality scores, but the findings of this assessment informed the interpretation of evidence strength during synthesis. Most included studies demonstrated moderate to high methodological rigor. However, limitations included lack of follow-up data, insufficient blinding procedures, and underreporting of inter-rater reliability for outcome assessments.

Due to the heterogeneity of study designs and outcomes, statistical meta-analysis was not feasible. Instead, a thematic narrative synthesis was conducted, informed by SWiM guidelines. This synthesis grouped studies into thematic domains: (1) development of communication and empathy through simulation, (2) confidence and self-efficacy in prescribing physical activity to oncology patients, (3) impact on psychological insight, including awareness of cancer-related distress and fatigue, and (4) effectiveness of simulation-based pedagogies in promoting interdisciplinary learning.

A consistent finding across studies was that SP-based training enhanced students' empathy and communication skills when discussing sensitive topics such as cancer-related fatigue or emotional distress. One study noted that learners who participated in simulation scenarios involving patients undergoing chemotherapy exhibited significantly greater comfort in addressing psychosocial issues than those in control groups [12]. Additionally, simulation-based workshops using SPs and exercise

counseling improved students' confidence in applying physical activity guidelines, particularly for complex cases involving depression, fatigue, or treatment side effects. Several studies also identified improved patient-centered communication strategies following immersive simulations, such as the use of motivational interviewing and behavioral goal-setting.

Importantly, the incorporation of behavioral change techniques such as “credible source,” “feedback on behavior,” and “behavioral rehearsal” was strongly associated with improved learner engagement and perceived competence. The alignment of these interventions with theoretical constructs from the Theory of Planned Behavior further supports their validity and pedagogical robustness [19]. Overall, this review suggests that integrating simulation-based physical activity counseling into psycho-oncology education can improve learner preparedness, clinical empathy, and health promotion competencies.

4. Results

4.1. Overview

This chapter presents the results of the systematic review evaluating simulation-based exercise counseling interventions within medical education curricula, with a specific emphasis on psycho-oncology. Structured according to the PRISMA 2020 guidelines, the findings encompass study characteristics, simulation modalities, educational outcomes, and thematic trends. Twenty simulation-based studies were ultimately included after a rigorous screening and eligibility process, which has been updated in Chapter 3 to reflect the correct inclusion count.

4.2. PRISMA flow diagram

The study selection process is illustrated in **Figure 1**. All search results were exported to Covidence for systematic screening and duplicate removal. After eliminating 103 duplicates, 239 articles remained. Title and abstract screening were conducted independently by two trained reviewers using the eligibility criteria outlined above. Disagreements were resolved through consensus discussions, and if unresolved, a third reviewer was consulted. In total, 63 articles were excluded at this stage, primarily for not meeting the population or intervention criteria.

Subsequently, 76 full-text articles were retrieved and reviewed for eligibility. Of these, 56 were excluded for various reasons: 12 failed to report relevant outcome measures, 10 used simulations in a context unrelated to exercise or psycho-oncology, and 8 provided insufficient methodological detail. This resulted in a final inclusion of 20 studies that met all criteria for data extraction and synthesis. **Figure 1** provides a clear summary of this process, documenting each stage from identification through inclusion. The reasons for exclusions included non-educational focus, absence of simulation, and irrelevance to oncology or exercise counseling.

4.3. Summary of included simulation studies

Table 1 summarizes the 20 included studies based on study focus, intervention type, and key outcomes. Simulation types included simulated/standardized patients

(SPs), high-fidelity mannequins, virtual simulations, and hands-on models. Participants ranged from undergraduate medical students to practicing oncology nurses.

Table 1. Summary of included simulation-based exercise counseling studies.

Author(s)	Study focus	Intervention type	Key outcomes
Brennan et al. [16]	Behavior change and exercise counseling workshop for medical students	Workshop + Simulation	Improved confidence and intention to counsel
Takemura et al. [24]	Tai Chi vs aerobic exercise in lung cancer patients	RCT: Tai Chi vs Aerobic	Better adherence, fewer side effects
Bower et al. [25]	Yoga and fatigue reduction in breast cancer patients	Yoga Intervention	Fatigue reduction
Geng et al. [18]	Mind-body exercise for depression in cancer survivors	Network Meta-analysis	Tai Chi and Liuzijue most effective for depression
Al Wachami et al. [34]	Simulation-based training for oncology safety and care quality	Scoping Review of 29 SBT studies	Improved technical, decision-making, and communication skills across domains
Baile et al. [13]	SPIKES protocol for breaking bad news to cancer patients	Communication Protocol Training (SPIKES)	Improved confidence and structured approach to delivering bad news; widely accepted by oncologists
Berragan [12]	Theoretical basis and pedagogical role of simulation in nurse education	Narrative Review + Theoretical Analysis	Simulation enhances professional identity formation and skill development; cautions against over-reliance on high-tech fidelity
Gunberg Ross and Burrell [23]	SP simulation to facilitate evidence-based oncology symptom management in undergraduate nursing students	Standardized Patient Simulations in 7-week seminar	Self-perceived competence and confidence increased significantly; students valued realism and application; faculty noted simulations feasible and promising
Chen et al. [26]	Communication skill training (CST) on cancer truth-telling for advanced practice nurses using SHARE model	Pilot RCT + Simulated Patient	Improved APNs' confidence and perceptions of truth-telling; no significant impact on patient/caregiver satisfaction or emotional distress
Coyle et al. [21]	End-of-life care communication training module for oncology nurses	CST Workshop + Simulated Patient Role Play	Improved nurse confidence in discussing death and dying; high satisfaction and skill application post-training
Hancock et al. [14]	Truth-telling practices about prognosis and end-of-life issues in life-limiting illnesses	Systematic Review (46 Studies)	HPs often reticent to disclose prognosis; training deficits, emotional discomfort, cultural barriers identified; supports communication skills training
Kang et al. [27]	Palliative care simulation for newly hired oncology nurses in China	Quasi-Experimental SP Simulation (3 Scenarios)	Improved knowledge (pain management, communication), skill performance (turnover), critical thinking, and learning satisfaction
Peoples et al. [29]	CBT-I effects on depression in cancer survivors: mediation by insomnia severity	Secondary Analysis of RCT (CBT-I vs. Non-CBT-I)	CBT-I led to 48% reduction in depression; effects sustained at 3 months; mediation via improved insomnia (not direct CBT-I effect)
Sharour [28]	High-fidelity simulation in oncology emergencies education for undergraduate nursing students	Quasi-Experimental HFS Program (Septic Shock + Infusion Reaction)	Significant improvements in knowledge, self-confidence, satisfaction, and self-efficacy in managing oncology emergencies
Stan et al. [22]	Evaluating a palliative care simulation for oncology nurses	Mixed-Methods Evaluation of SP Simulation	Enhanced realism and preparedness; improved knowledge and attitudes toward dying patients; qualitative feedback supports feasibility and realism
Usman et al. [15]	Systematic review of simulation-based learning in oncology nursing	Systematic Review (15 studies, 1164 participants)	Simulation improved knowledge (mean difference +18.69), communication (+5.04), confidence (+22.75), attitudes, and satisfaction; supports widespread integration into oncology nursing curricula

Table 1. (Continued).

Author(s)	Study focus	Intervention type	Key outcomes
Giuliani et al. [32]	High-fidelity interprofessional simulation in radiation oncology education	Single-Day SP Simulation with 5 Scenarios	Feasible, highly rated (mean scores ~9/10) for knowledge, decision-making, and teamwork; resource-intensive but supports team-based training
Burrell et al. [33]	Pilot testing of evidence-based symptom management via telehealth simulation	Telehealth Simulation-Based Experience (T-SBE)	Improved competence, confidence, and clinical decision-making in symptom management among nursing students; strong qualitative endorsement of T-SBE format
Ebbert and Connors [30]	Standardized patient experiences for nurse practitioner students	SP Experiences across NP Curriculum	Valuable and realistic learning experiences; enabled objective and valid performance assessment across multiple clinical domains
Silva et al. [31]	The use of simulation-based education in cancer care: a scoping review	Scoping Review (19 Studies)	Simulation-based education improved knowledge, skills, confidence, and satisfaction across nursing and medical cancer care; emphasized both virtual and in-person simulation; noted resource constraints

4.4. Thematic outcome synthesis

Based on the 20-study synthesis, four core outcome categories were identified and aligned with the structure of Section 4.4: knowledge acquisition, communication competence, confidence and self-efficacy, and attitudes and affective impact. **Figure 2** illustrates the distribution of the most commonly reported educational outcomes across the 20 included studies. Attitudes and affective impact were the most frequently reported (14 studies), followed by confidence and self-efficacy (13), communication competence (7), and knowledge acquisition (6).

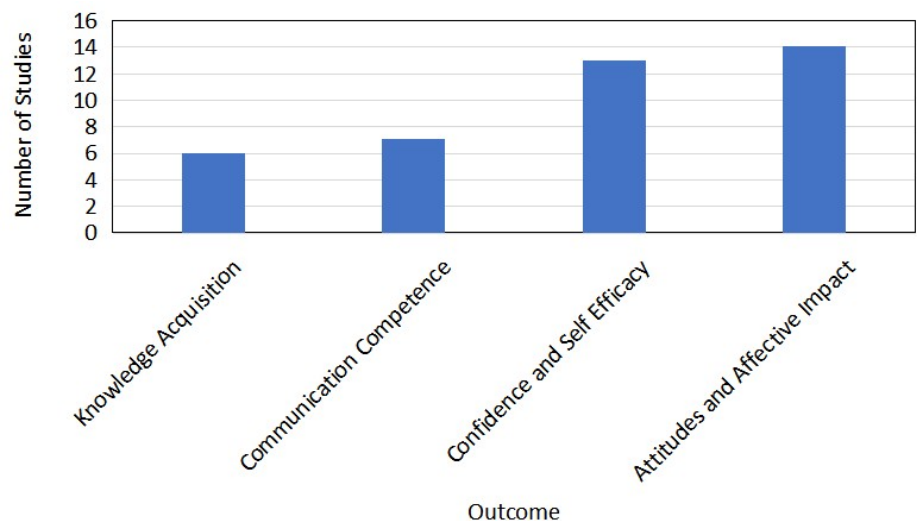


Figure 2. Distribution of educational outcomes reported across included studies.

4.4.1. Knowledge acquisition

Across studies, simulation-based interventions significantly improved learners' knowledge on psycho-oncological topics such as chemotherapy safety, pain management, and physical activity promotion. For example, mean knowledge scores rose from 32.15 to 50.84 following SP-led simulations [27].

4.4.2. Communication competence

Studies integrating structured BCTs—such as instruction, rehearsal, and feedback—demonstrated significant gains in communication skills. Notably, participants in Chen et al.'s [26] study reported improved confidence in cancer truth-telling post-simulation, with a mean increase of 16.86 on communication scales.

4.4.3. Confidence and self-efficacy

Self-confidence improvements were reported in nearly all interventions. Sharour observed a mean increase from 38.5 to 61.25 in self-confidence scores among nursing students trained in oncology emergencies [28]. Similarly, Burrell et al. [33] reported that participants' perceived competence in symptom management and oncologic emergencies improved substantially.

4.4.4. Attitudes and affective impact

Positive attitudinal shifts toward exercise counseling and cancer care were evident in several studies [21,27]. Simulation participation fostered empathy, reduced anxiety, and built readiness to engage patients in lifestyle interventions.

4.5. Summary of findings

Simulation-based exercise counseling interventions in psycho-oncology education consistently improved learner outcomes across domains such as confidence, communication, knowledge, and attitudes. Confidence was the most frequently enhanced competency, followed by gains in knowledge and improvements in communication skills. Simulated patient (SP) interventions were the most widely implemented and demonstrated the strongest impact across these domains. The use of behavior change frameworks, especially the Theory of Planned Behavior, contributed to the effectiveness of these simulations [16]. These results support integrating simulation into psycho-oncology curricula to strengthen essential clinical and interpersonal competencies.

5. Discussion and future directions

5.1. Summary of key findings

This systematic review investigated the integration of simulation-based exercise counseling within psycho-oncology modules in medical education, with a focus on simulated patient (SP) approaches. Across the 20 included studies, consistent findings highlighted that SP-based simulation significantly enhanced medical students' confidence, communication skills, clinical decision-making, and attitude toward psycho-oncological care. The interventions spanned a range of simulation types, including SP scenarios, high-fidelity mannequins, virtual simulations, and integrated mind-body modules such as Tai Chi and yoga. Notably, SP-led and telehealth simulations demonstrated particularly strong improvements in communication, self-efficacy, and psycho-oncological competency. The majority of interventions also reported increased learner satisfaction and a greater intention to incorporate exercise-based discussions into clinical encounters. These findings strongly support the incorporation of simulation-based modules as a core pedagogical strategy in psycho-

oncology education. A particularly unique contribution of this review lies in its focus on the intersection of physical education, psycho-oncology, and simulation-based counseling—a combination that has been largely underexplored in existing literature.

5.2. Comparison with existing literature

Our results align with prior reviews emphasizing the efficacy of simulation in oncology nursing education, where improvements were noted in knowledge retention, professional attitude, and communication competence. Usman et al. [15] highlighted these benefits across various nursing training settings. Similarly, the Exercise Expo intervention described by Brennan et al. [16] demonstrated that structured, theory-informed exercise counseling workshops significantly improve medical students' attitudes and intentions to promote physical activity. The present review extends this evidence by synthesizing studies that emphasize the psycho-oncological dimension of patient interaction, confirming that SP-led training facilitates emotionally sensitive, behaviorally effective counseling practices. What distinguishes this review is its emphasis on the application of simulated patient exercise counseling as a psycho-oncological teaching strategy specifically within physical education courses—a novel pedagogical direction in medical education.

5.3. Implications for medical education and psycho-oncology

The findings affirm that simulation—especially SP-based training—should be embedded into medical school curricula as a strategy to develop core competencies in psycho-oncology. In particular, SP scenarios that simulate exercise guidance sessions for cancer patients promote holistic learning by bridging the cognitive, emotional, and behavioral domains of medical education. Given the rising global burden of cancer and increasing emphasis on patient-centered care, preparing future physicians to integrate exercise counseling with psychological support is a critical step toward comprehensive oncological care. The review suggests that the proposed tumor psychology module, centered around simulated patient exercise counseling, is both pedagogically justified and practically feasible. Its interdisciplinary nature, combining exercise science, psychological theory, and oncology simulation, presents a fresh instructional paradigm for curriculum developers.

5.4. Methodological considerations and limitations

Several limitations should be acknowledged. The included studies displayed heterogeneity in simulation design, frequency, duration, and outcome measures, precluding meta-analysis. Many relied on self-reported measures with limited use of validated assessment tools or inter-rater reliability reporting. Some studies lacked long-term follow-up, which is necessary to assess retention and translation into clinical practice. The language and publication date restrictions may have introduced selection bias. Additionally, cultural and institutional contexts varied, potentially affecting generalizability.

5.5. Future research directions

Looking forward, future studies should be designed to evaluate the long-term

impact of SP-based psycho-oncology training. This includes conducting longitudinal research that can assess the sustainability of knowledge retention and behavioral change in clinical settings. It is also important to develop standardized simulation protocols with clearly defined learning objectives, fidelity levels, and validated assessment instruments to ensure consistency and reproducibility across programs. In line with technological advancements, further research should investigate how AI-driven simulations and virtual reality environments might enhance personalized learning, adaptive feedback, and learner engagement. Exploring the adaptation and effectiveness of simulation-based psycho-oncology education in low- and middle-income countries would provide valuable insights into context-specific challenges and opportunities. Lastly, future research could benefit from examining interdisciplinary collaboration among departments of psychology, physical education, and oncology, aiming to design integrated modules that reflect real-world complexity. Such investigations will help determine whether simulation training meaningfully improves patient-centered outcomes such as adherence to treatment, psychological resilience, and overall quality of life.

5.6. Conclusion

This systematic review reinforces the value of simulated patient-based exercise counseling as a core component of psycho-oncology education within medical school curricula. The findings consistently demonstrate that simulation-based interventions enhance students' confidence, empathy, communication skills, and readiness to provide integrative care for individuals with cancer. Simulated patient scenarios were especially effective in cultivating emotional intelligence and behaviorally grounded counseling practices, aligning with the needs of holistic cancer care. To the best of the authors' knowledge, this is the first systematic review to examine how simulation can be used to integrate exercise counseling and psycho-oncological principles within physical education modules in medical training. These insights provide a strong foundation for the development of interdisciplinary tumor psychology curricula and highlight the need for further empirical evaluation of such models across diverse educational settings.

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