

Review

Nursing students' knowledge of and attitudes towards pain management: An integrative review

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ABSTRACT

Objectives: The objectives of this review were to appraise the available literature regarding nursing students' knowledge of and attitudes towards pain management; and secondly, to examine the instruments currently used to measure students' knowledge of and attitudes towards pain management.

Design: This review was conducted using Whittmore and Knaf's five-stage framework for integrative reviews.

Data sources: A comprehensive search to retrieve relevant studies published in English between 1978 and 2022 was conducted using the databases: CINAHL, MEDLINE, Embase and Scopus databases. An updated search of the same databases was performed to identify studies published in 2023–2024.

Review methods: The initial search located 558 articles. One more relevant article was identified from an updated search test. Total of 244 duplicated records were removed. The remaining 315 studies were eligible for screening. After screening and checking for eligibility, 29 included articles were critically appraised using the Joanna Briggs Institute critical appraisal tools.

Results: Synthesis of the findings of the 29 included studies indicated that, internationally, nursing students have limited knowledge and often hold negative attitudes towards pain. Various instruments have been used to measure students' knowledge and attitudes towards pain. Most studies used true/false or multiple-choice questions and Likert-type scales. The validity and reliability of most of the tools were reported to be acceptable. The most commonly used instrument was the Knowledge and Attitudes Survey Regarding Pain.

Conclusion: The findings from this review suggest the need for refinement of pain education programs to improve nursing students' knowledge of and attitudes towards pain management. Future research should focus on understanding the personal and environmental factors that impact students' level of knowledge and attitudes so as to inform curriculum development and ultimately the quality of the care graduates provide.

1. Introduction

Throughout their careers, nurses provide care for significant numbers of people experiencing pain. Thus, nurses must be knowledgeable and skilled in assessing pain, and implementing and evaluating interventions (Samarkandi, 2018). Positive attitudes, along with knowledge about pain physiology, assessment and management, influence people's outcomes and overall satisfaction (Brant et al., 2017).

Several international studies have identified that nursing students often lack the knowledge required to provide evidence-based and effective pain management and that their attitudes do not always align with person-centred approaches (Alsaqri, 2018; Hroch et al., 2019;

Ursavaş and Karayurt, 2020). The aim of this review was to critically appraise the literature on this topic and examine the utility and validity of the instruments used in the included pain studies.

2. Background

One of the most prevalent reasons for individuals to seek healthcare is acute or persistent pain (Dahlhamer et al., 2018). Pain is considered to be a major public health issue with an estimated 30 % of the global population experiencing pain that significantly impacts their quality of life (Lagueux et al., 2021). For individuals, their families, and society more broadly, poor pain management can have physical, psychological,

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social, and economic ramifications (Cohen et al., 2021).

Pain can be both acute and chronic (persistent) that lasts for more than three months (Cohen et al., 2021). Poorly managed acute pain can cause immunological and neurological alterations which can lead to persistent pain (Jayawardana et al., 2021). Persistent pain is often a cause of disability, impacting physical and mental health and quality of life (Cousins et al., 2022b). Poorly managed or untreated persistent pain commonly results in reduced mobility, increased risk of deep vein thrombosis (DVT), reduced levels of immunity, decreased focus, loss of appetite, and sleep difficulties (Monroe et al., 2022).

The financial burden of persistent pain is also significant. For example, a recent Australian study indicated that 15 % of people live with persistent pain and for them, the average annual cost ranged from AU\$22,588 to \$AU42,979 (Cohen et al., 2021). According to Guertin et al. (2018), one in three Americans suffers from persistent pain, which is estimated to cost US\$560–\$635 billion annually in medical expenses and lost productivity. This figure excludes the cost of caring for people who were institutionalised (such as those in prisons or aged care facilities), children under the age of 18, and members of the military.

Nurses are responsible for recognising, assessing and managing acute and persistent pain, as well as evaluating the impact of pain interventions. Allowing people to suffer pain without appropriate intervention is unethical (Tia et al., 2020). In order to effectively manage pain, nursing students must develop a requisite level of knowledge and appropriate attitudes towards pain management. However, a number of studies suggest that many nursing students have inadequate knowledge and poor attitudes towards pain management (Alsaqri, 2018; Hroch et al., 2019; Ursavaş and Karayurt, 2020).

Two previous reviews examining nursing students' knowledge and attitudes towards pain (Ung et al., 2016; Chow and Chan, 2015) have been conducted, but both had some limitations. For example, Ung et al.'s (2016) review included only quantitative studies published between 1993 and 2014, and the studies included in Chow and Chan's (2015) review were published between 2004 and 2014. There is therefore a need for a review that also includes contemporary studies, and in particular, studies that identify whether recent technological developments in healthcare and in education have impacted students' knowledge and attitudes towards pain management.

2.1. Aim

The aim of this review was to synthesise and critically appraise the literature on nursing students' knowledge of and attitudes towards pain management, and to examine the appropriateness of the instruments used in the included studies.

In undertaking this review, we sought to cover a broader timeframe than the previous reviews by expanding the search to include studies conducted between 1978 and 2024. In this review we sought to answer three research questions:

1. What are nursing students' levels of knowledge of pain management?
2. What are nursing students' attitudes towards pain management?
3. What is the most valid and reliable tool that can be utilised to measure nursing students' knowledge of and attitudes towards pain management?

3. Method

A comprehensive search to retrieve relevant studies published in English between 1978 and 2022 was conducted using the databases: CINAHL, MEDLINE, Embase and Scopus databases. An updated database search was also performed to identify relevant studies were conducted between 2023 and 2024. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was used to report the studies included in the review (Moher et al., 2009). Two co-authors (JP, TLJ) independently reviewed the quality of each of the included studies

to ensure the rigour of the process. A data extraction tool (Excel™) was used to facilitate tabulation and analysis of the data.

Whittemore and Knaf's (2005) five-stage methodology for conducting integrative reviews was used to guide the review; this methodology consists of: problem identification, literature search, data evaluation, data analysis, and presentation. Whittemore and Knaf's methodology is a systematic and transparent process that facilitates the integration of diverse sources, ensuring a robust and nuanced understanding of the research topic (Oermann and Knaf, 2021).

3.1. Criteria for inclusion and exclusion

Full-text peer-reviewed studies, published in English language between 1978 and 2024 where authors reported on knowledge, attitudes, nursing students, and pain management were included in the review. This year range was considered appropriate because it includes studies that have been conducted since The International Association for the Study of Pain (IASP) first provided a definition of pain (Raja et al., 2020). Another reason for the selected timeframe was with respect to the significant changes in nurse education and the greater level of attention given to teaching contemporaneous pain management strategies over recent decades (Isik and Jallad, 2019; Van Oosterwijck et al., 2013). Similarly, emerging educational innovations such as the evolution of high-fidelity simulation manikins has significantly influenced how nursing students learn about and practice pain management skills (Li et al., 2022). We hoped to determine whether these educational developments have impacted the level of knowledge and/or attitudes of nursing students towards pain. Any study that recruited populations other than nursing students was excluded. Master's and PhD dissertations were excluded because of the complexity of critically appraising those studies.

3.2. Literature search

The literature search was guided by the second stage of Whittemore and Knaf's (2005) approach which states that an extensive search for an integrative review must locate the maximum number of potentially relevant primary sources (Whittemore & Knaf, 2005). Databases that were searched included The Cumulative Index of Nursing and Allied Health Literature (CINAHL Complete), MEDLINE Complete, Embase and Scopus. An expert librarian was consulted during the database search process. The search started on 15 April 2022 and continued until 30 July 2022. To retrieve studies that were published in 2023 and 2024, an updated database search was performed. Keywords, medical subject headings (MeSH) and the Booleans (OR, AND) were used to retrieve all related studies (see Table 1).

3.3. Study selection

Evaluation of the primary studies was informed by the third stage of Whittemore and Knaf's (2005) methodology. Five hundred and fifty-eight citations were exported into Covidence™ (2020), and 244 duplicate records were removed before screening. Covidence is a web-based collaboration software platform that streamlines the review process. One more study was retrieved from an updated database search to

Table 1
Search terms.

Key words, MeSH terms and Booleans	Nursing* OR Nurse*
AND	Student* OR Pupil* OR Undergraduate*
AND	Education* OR Teaching*
AND	Knowledge*
OR	Attitude*
OR	Belief*
AND	Pain* OR Pain manag*
Databases searched	CINAHL, MEDLINE, Embase and Scopus

identify any current studies. Title and abstract screening of 315 studies was conducted by two reviewers (FA, JP) to reduce the risk of bias, and 255 studies were excluded. The remaining 60 studies were eligible for full text screening and independently reviewed by the same two reviewers. Any conflicts were discussed with a third reviewer (TLJ). At this stage, 31 further studies were excluded due to either wrong design (systematic reviews, a master's or doctoral thesis), wrong population (nurses not nursing students), wrong outcome (not measuring knowledge and attitude), or no full text being found.

3.4. Methodological quality appraisal

The first author and second authors (FA and JP) critically appraised all of the included studies using The Joanna Briggs Institute critical appraisal tools (checklists for cross-sectional studies, quasi-experimental studies, and qualitative studies).

4. Results

Following the screening, 29 records were considered eligible for inclusion in the study. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Flow Chart was used to report the selection process PRISMA (Page et al., 2021) (see Fig. 1).

Stage four and five of Whittemore and Knaf's (2005) methodology informed the data analysis and presentation. Results were reported according to author, year, country where the study was conducted, aim, design, population, instrument used to measure knowledge and/or attitudes, findings, recommendation and limitations (see Table 2).

4.1. Critical appraisal results

When critically appraised, it was noted that appropriate statistical analyses were evident for quantitative studies and outcomes in all of the studies were measured or explored in valid and reliable ways. Therefore, we decided to include all 29 studies in this review. (Table 3) provides a summary of the critical appraisal results.

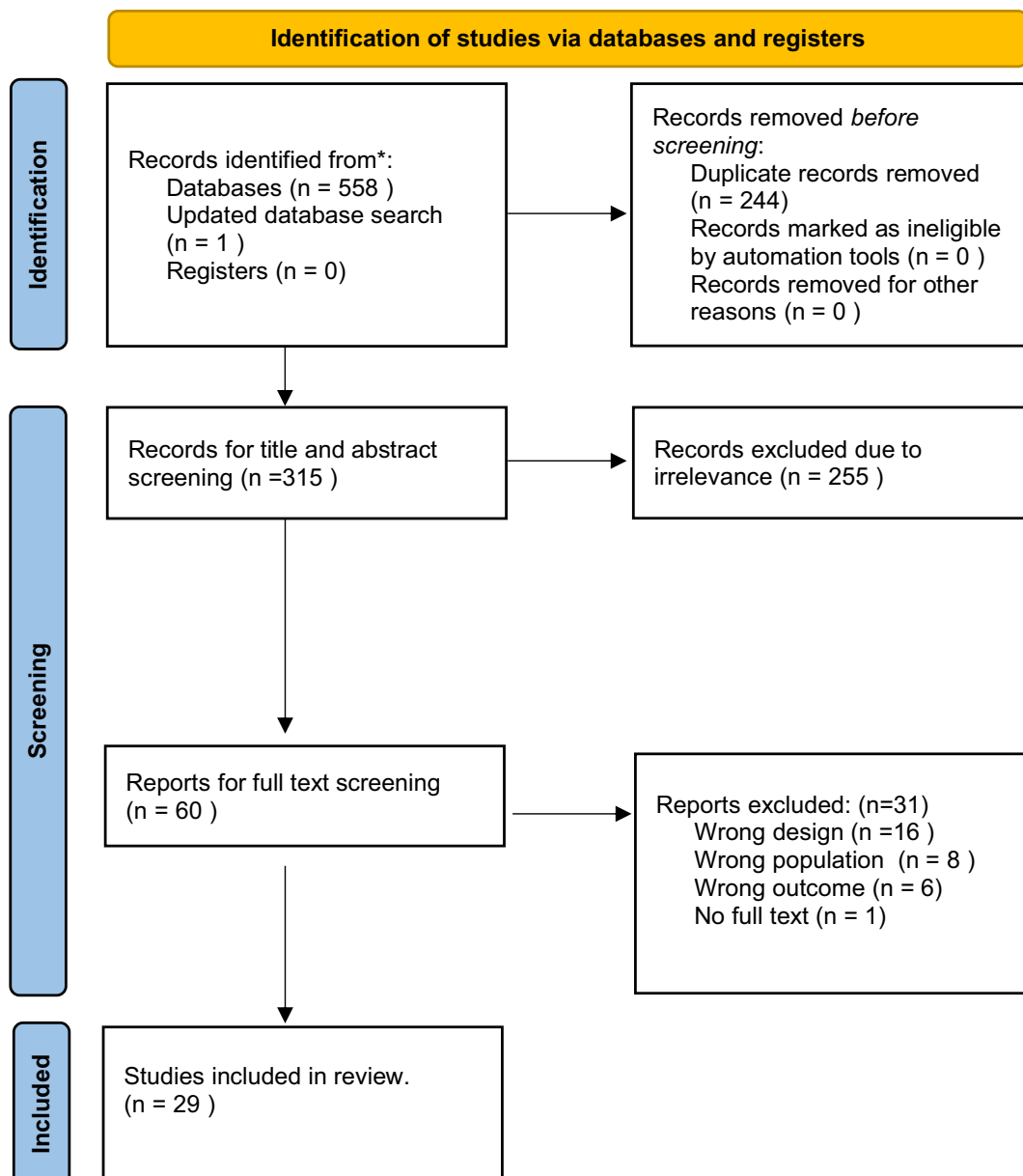


Fig. 1. PRISMA flow chart.

Table 2
Tabulated results.

Author/year/country	Aim	Design	Population = (n)	Instrument	Findings/recommendations	Limitation
(Al-Khawaldeh et al., 2013) Jordan	To examine students' knowledge and attitudes about pain management.	Cross-sectional	Baccalaureate nursing students (240)	Knowledge and Attitude Survey Regarding Pain (KASRP)	Students had insufficient knowledge and attitudes towards pain and its management. Mean correct score: 34.1 %.	The use of convenience sampling from a single institution restricts generalisability of the findings; and the use of self-report questionnaires may have been influenced by social desirability bias.
(Al Khalailah and Al Qadire, 2013) Jordan	To examine students' knowledge and attitudes about pain management.	Cross-sectional	Nursing students (144)	KASRP	Students had low level of knowledge and attitudes towards pain and its management. Correct answers ranged from 11.1 % to 64 %	Convenience sampling restricts generalisability. According to the author, the use of an English language survey may have influenced the results.
(Alsaqri, 2018) Saudi Arabia	To examine students' knowledge and attitudes about pain management.	Cross-sectional	Nursing students (150)	KASRP	Students had a lack of knowledge and attitudes towards pain management. The mean correct score for the entire scale was 41.8 %.	No causality is considered due to using a cross-sectional descriptive design. Using a singular tertiary nursing institution sample and utilising a self-reported survey might influence the validity of the results.
(Duke et al., 2013) USA	To examine the knowledge of and attitudes towards pain in baccalaureate nursing students and faculty.	Descriptive design	Nursing students (162) and Faculty (16)	KASRP	Students had lower scores than faculty. Seniors nearing graduation scored 68 %, with nursing faculty rating just slightly better at 71 %.	Since nonprobability sampling was utilised, generalisability may be hindered because volunteers who participated in the study may have had various incentives for participating.
(Gök and Yıldızeli Topçu, 2023) Turkey	To examine pain management knowledge and attitudes of nursing students who undertake a surgical nursing course.	Cross-sectional	Nursing students (260)	KASRP	The mean score on KASRP was 6.78 ± 2.23 . Of all the students, 48.8 % reported that they only preferred pharmacologic treatments for pain management.	Small sample size. The results of the research cannot be generalised to students who have been exposed to all the content related to pain management.
(Hroch et al., 2019) Canada	To examine preregistration nursing students' knowledge and attitudes about the assessment and management of pain.	Cross-sectional	Final year bachelor nursing students (336)	KASRP	Students were shown to have significant gaps in knowledge and attitudes. The mean KASRP score was 66.7 %.	The use of convenience sampling from a singular institution restricts generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias.
(Shdaifat et al., 2020) Saudi Arabia	To examine the level of nursing students' knowledge and attitudes of pain management.	Cross-sectional	Nursing students (193)	KASRP	Students' mean knowledge of pain management was 42.6 %. The study found that nursing students had insufficient knowledge about pain management.	The use of convenience sampling from a singular institution restricts generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias. The author stated that the use of an English survey may influence the students' understanding of some items.
(Owens et al., 2014) UK	To evaluate the impact of a pain education programme on pre-registration children's nursing students' knowledge of and attitudes towards pain management.	Pre and post design	Pre-registration nursing students (127)	Nursing Knowledge and Attitude Survey Regarding Pain (NKASRP)	Both intervention and control groups improved their knowledge after a year of completing the program.	The use of self-reported design can be subjective. The sample size was small and cannot validate if there is a significant difference between groups.
(Plaisance and Logan, 2006) USA	To examine nursing students' knowledge and attitudes about pain management.	Descriptive correlational	Nursing students (313)	NKSARP	Students' knowledge about Pharmacological interventions was lower than non-pharmacology knowledge. The average correct answer for all students was 64 %. Baccalaureate students	The use of convenience sampling from a singular institution restricts generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias.

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Table 2 (continued)

Author/year/country	Aim	Design	Population = (n)	Instrument	Findings/recommendations	Limitation
(Topal Hançer and Yılmaz, 2020) Turkey	To examine the knowledge and attitudes of nursing students regarding the concept of pain.	Cross-sectional	Nursing students (440)	NKASRP	scored 65 %, whereas associate degree students scored 60.8 %. Students did not have adequate knowledge and a positive attitude for pain management. Total mean score in the NKASRP was found to be 19.38 %	No causality can be made due to using a self-reported survey. Selection bias can be considered.
(Chan and Hamamura, 2016) Hong Kong	To examine the correlation between emotional intelligence and pain knowledge and the attitudes of nursing students.	Cross-sectional	Nursing students (140). 45 year 1 students/59 year 3 students	KASRP + Schutte Emotional Intelligence Scale (SEIS)	The pain knowledge and attitudes of both Year 1 students (M = 20.40, SD = 3.78) and Year 3 students (M = 21.36, SD = 3.15) were suboptimal. It suggested that nursing students' pain knowledge and attitudes could be improved.	Self-report survey might be influenced by social willing to contribute. The students were not asked about their previous pain management experiences. The sample were from a single institution which could limit the generalisation of the results.
(Dag et al., 2022) North Cyprus	To determine the factors influencing pain knowledge and attitudes among nursing students and evaluate the relationship between students' empathy and pain knowledge and attitudes.	Quantitative descriptive-correlation design.	Third and senior grade nursing students (150)	KASRP + Basic Empathy Scale (BES).	The mean NKASRP score was 33.8 %. A weakly positive connection was identified between cognitive ($r = 0.100$, $p = 0.252$) and affective ($r = 0.013$, $p = 0.881$) empathy levels and pain knowledge and attitudes was statistically insignificant ($p > 0.05$).	The result cannot be generalised to other population. Risk of selection bias due to the use of convenience sampling.
(Erol Ursavaş and Karayurt, 2021) Turkey	To examine the effects of pain management education on nursing students' knowledge, attitudes, and beliefs concerning pain management in Turkey.	Quasi-experimental	Nursing student (97)	NKASRP + Pain Belief Questionnaire (PBQ)	The students' knowledge had improved during the first education month and at 3-monthes after the education compared to their level of pain knowledge before the education session, mean score was 45.85 before the education, 76.80 just after the education, and 65.91 at 3 months after the education.	The result cannot be generalised to any other population due to the use of a singular institution. No control group was used.
(Greenberger et al., 2006) Israel	To determine the level of predictors of knowledge and attitudes regarding pain among Israeli baccalaureate nursing students and nurses pursuing specialty certification	Cross-sectional	First and fourth year nursing students and nurses completing their certification (1149) program	NKASRP + Family pain questionnaire	The mean score of the correct answered question was 5.9 %. Educational level was the largest predictor of knowledge and attitudes, contributing for the majority of the 42.8 % explained variance. This suggests that formal education is an effective means of improving knowledge and attitudes.	Risk of selection bias and unable causality. Singular institution was recruited. Therefore, the results cannot be generalised. Also, there is a lack of information regarding the clinical experience.
(Aydin and Bektas, 2020) USA	To determine the level of paediatric pain management knowledge of intern nursing students	Cross-sectional	Paediatric nursing internship students (72)	Paediatric pain management knowledge (PPMK)	The PPMK total score was 67.58. The lowest pain control ratings 29.35 and the highest pain assessment scores 5.49.	Because of the study's restricted sample size, it cannot be generalised to the entire population.
(Kusi Amponsah et al., 2019) Ghana	To assess and compare nursing students and nurses' knowledge and attitudes pertaining to children's pain	Cross-sectional	Nursing students (554) and nurses (65)	Paediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKAS)	Nursing students and nurses had unsatisfactory knowledge and attitudes towards pain management in children. However, students had significantly higher scores than nurses in the total PNKAS score and in 10 out of the 13 identified item-areas.	Surveyed participants were chosen upon their availability not randomly. The participants were younger in age and experience than the nurses in general.
(Kusi Amponsah et al., 2020) Ghana	To assess final year nursing student's knowledge and attitudes pertaining to paediatric pain	Cross-sectional	Nursing students (100)	(PNKAS)	Final year nursing students have inadequate knowledge and attitudes towards children's pain management. The correct answer score of 44.0 % (10.6 %).	The study used nonprobability sampling approach in a singular private university college, it may not be a true representation of final year nursing students in Ghana.

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Table 2 (continued)

Author/year/country	Aim	Design	Population = (n)	Instrument	Findings/recommendations	Limitation
(Augeard et al., 2019) UK	To explore the variations in attitudes and beliefs about chronic pain management between first- and final-year undergraduate student nurses, as well as the degree of change between disciplines	Cross-sectional	First and final year nursing and physiotherapy students (1474)	Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) + Back Beliefs Questionnaire (BBQ)	Final-year healthcare students tend to have more positive attitudes and beliefs about chronic pain management than first-year students. The mean HC-PAIRS score of all participants was 67.60 (first-year; standard deviation [SD] = 9.571) and 61.85 (final-year; SD = 10.345). At the pre-test, only 57 % of the questions were correctly answered. Following the pain education session, 91.4 % of questions were correctly answered. PPEP should be incorporated into paediatric nursing curriculum to improve knowledge and abilities in the early stages of a nursing career.	The use of convenience sampling restricts the generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias.
(Chiang et al., 2006) Taiwan	To examine the effectiveness of a paediatric pain education program (PPEP) for student nurses' Knowledge, Attitudes, and Self-Efficacy.	Quasi-experimental	Nursing students (243)	Modified tool adapted from McCaffery and Ferrell and Manworren	Mean score of concordant answers for all students was 38.6 %, scores ranged from 0 % to 70 %, 95 % CI of the mean was 36–41 %. The final year nursing classes had consistently poor levels of knowledge and gaps in knowledge on basic pain mechanisms, terminology, and treatment.	The study was limited to one nursing school, the findings may not be representative of Taiwanese nurses. Second, while this programme improved student nurses' knowledge and attitudes towards pain management in children, several ideas were overlooked, and teaching tactics must be revised. Finally, no behavioural change was assessed in this investigation. Self-reported questionnaire. The results cannot be generalised.
(Chiu et al., 2003) Australia and Philippines	To assess the type and level of knowledge of basic aspects of pain mechanisms and treatment principles in complete classes of final year nurses, at three nursing schools.	Exploratory study	150 Final year nursing students (81 Australian and 69 Philippine)	30-Item questionnaire consists of 23 factual questions, and seven items related to demographic data and perceptions of pain management education.	The attitude and behavioural intention scores were 51.13 and 0.06 respectively, indicating that the overall intention to treat pain is negative. Negative attitudes and behavioural intentions regarding pain management were identified among Chinese nursing students. The strongest predictor was direct control. Students had increased knowledge in specific areas of pain management from the start of their nursing degree until graduation, although numerous gaps persisted.	The use of convenience sampling from one university in China restricts generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias.
(Fang et al., 2017) China	To determine the attitude and intention about pain management of Chinese nursing students and investigate the factors and their interactions regarding intention towards pain management.	Cross-sectional	Nursing students (512)	Pain management survey questionnaire (PMS)	Students had increased knowledge in specific areas of pain management from the start of their nursing degree until graduation, although numerous gaps persisted.	Result cannot be generalised to other participants.
(Goodrich, 2006) USA	To assess the baseline knowledge and attitudes of nursing students and faculty regarding pain management science, and to evaluate the contents of pain management material and the degree to which it is integrated into the curriculum.	Descriptive Survey	Nursing students and Faculty (n = not reported)	Pain Knowledge and Attitude Survey (PKAS)	Some participants exhibited increased discernment and empathy towards patients with pain, while others remained minimally interested. Active interest in pain is essential so that individuals can react critically to assumptions of the clinical culture they are exposed to.	Small sample size. The results of the study cannot be generalised.
(Mackintosh-Franklin, 2014) UK	To study the impact of experience on nursing students' reactions to patients with pain	Qualitative Longitudinal Study	Nursing students (16)	Qualitative interview (2 points interview)	Over four years, there was a statistically significant improvement in student opioid knowledge and	Small sample size. The results of the study cannot be generalised. No formal
(Meadows et al., 2021) USA	To describe nursing students' knowledge and attitudes regarding opioids and the opioid epidemic	Cross-sectional	Nursing students (134)	Tool designed by the author contains of 31 items.		

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Table 2 (continued)

Author/year/country	Aim	Design	Population = (n)	Instrument	Findings/recommendations	Limitation
	during a 4-year baccalaureate program.				confidence ($p < 0.001$). General opioid attitudes were primarily negative ($n = 70$; 52.5 %) or neutral ($n = 54$; 40.3 %).	validity was done for the survey.
(Rababa et al., 2021) Jordan and Nigeria	To examine the variations in Jordanian and Nigerian nursing students' knowledge and attitudes towards pain in older individuals based on cultural background and demographic characteristics.	Descriptive-comparative design	Jordanian and Nigerian nursing students (221)	Pain in Older Adults Knowledge Survey (POAKS)	The Jordanian students had higher total POAKS scores than the Nigerian students ($t = 4.58$, $p < 0.001$). Jordanian female students had higher total scores as compared to Nigerian female students.	The use of convenience sampling restricts the generalisability of the findings; and the use of self-reported questionnaires can be influenced by social desirability bias.
(Rahimi-Madiseh et al., 2010) Iran	To assess the present pain management knowledge and attitudes of nursing students in Iran.	Cross-sectional	Nursing Students (146)	Knowledge and Attitudes Regarding Pain Tool (KARPT).	The group mean score was 37 % accurate. Graduate entrance nursing students scored 38 % higher than school leavers, but not significantly higher ($P = 0.42$). Results from the survey questionnaire showed that there was a severe deficit in knowledge relating to pain and its management.	Small sample size, the results cannot be generalised.
(Salantera and Lauri, 2000) Finland	To evaluate graduate nursing students' perspectives and knowledge base in the area of providing care to children in pain	Exploratory design	Last semester nursing students ($n = 85$)	Purpose-designed Likert-type instrument	According to the findings, students had positive attitudes and views regarding caring for children in pain. Students lack knowledge, particularly in the areas of pain medications and pain assessment.	Small sample size
(Shaw and Lee, 2010) New Zealand	To exploring the misconceptions (inaccurate knowledge and inadequate attitudes) student nurses have of adults experiencing chronic non-malignant pain.	Cross-sectional	Nursing students (430)	Survey began with a vignette of a patient experiencing chronic pain.	Students had misconceptions regarding people with chronic pain. Students enrolled in semester six had somewhat less misconceptions than those enrolled in semesters one and four.	Self-reported survey. Result cannot be generalised due to recruiting a sample from a singular nursing school.
(Wazqar, 2019) Saudi Arabia	To evaluate female nursing students' knowledge and attitudes regarding cancer pain management.	Cross-sectional	Nursing students at two universities in Jeddah, Saudi Arabia (135)	Pain management principal assessment test (PMPAT)	Nursing students had inadequate knowledge (11.4 ± 2.92) and negative attitudes regarding cancer pain management (68.8 ± 5.75).	It is not possible to establish causal or temporal links between the variables. Another limitation of this study is the use of an English survey among Arabic-speaking respondents.

4.2. Overview of the studies

One study from each of the following countries/regions was included in the review: Australia, Canada, China, Hong Kong, Finland, Iran, Israel, New Zealand, Nigeria, North Cyprus, Philippines, and Taiwan. There were two studies from Ghana; and three from Jordan, The United Kingdom, Turkey and Saudi Arabia. Five of the studies had been conducted in The United States. (NB: two of the included studies were comparing two nursing students' cohorts in two different countries (Australia and Philippines) and (Jordan and Nigeria)). Table 2 provides a summary of the included studies.

More than half of the studies (20 out of 29) reported on quasi-experimental or cross-sectional studies. The remainder of the studies reported used descriptive analysis and exploratory designs.

Eighteen of the reported studies used cross-sectional designs, five used descriptive designs, one used pre-post designs, two used exploratory designs and two were quasi-experimental studies. One study was a qualitative design that used semi-structured interviews conducted at two points in time.

4.3. Students' knowledge regarding pain management

The 29 included studies measured nursing students' knowledge of pain management. Nine were cross-sectional studies that used The Knowledge and Attitude Survey Regarding Pain (KASRP) instrument (Al Khalailah and Al Qadire, 2013; Al-Khawaldeh et al., 2013; Alsaqri, 2018; Dag et al., 2022; Duke et al., 2013; Hroch et al., 2019; Shdaifat et al., 2020; Topal Hançer and Yilmaz, 2020). The results of these studies depicted a consistently low or insufficient level of knowledge of pain management among nursing students. For example, many students believed that vital signs are the only sign that can indicate the intensity of the person's pain. Two studies conducted in Jordan revealed that less than half of the students (47.9 % and 34.6 % respectively) understood that pain can be present even when vital signs are normal (Al Khalailah and Al Qadire, 2013; Al-Khawaldeh et al., 2013). A cross-sectional study using the Knowledge and Attitude Survey Regarding Pain instrument conducted by Alsaqri (2018) identified that 80 % of Saudi nursing students believed that vital signs were always trustworthy indicators of the intensity of a person's pain. This study also found that 61 % of students

Table 3
Critical appraisal results.

Author/Q	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
(Al-Khawaldeh et al., 2013)	Y ^a	Y	N/A ^a	Y	N/A	N/A	Y	Y			
(Al Khalaileh and Al Qadire, 2013)	Y	Y	N/A	Y	N/A	N/A	Y	Y			
(Alsaqri, 2018)	Y	Y	Y	Y	N/A	N/A	Y	Y			
(Duke et al., 2013)	N ^a	Y	Y	N	N	U	Y	Y	U	U	Y
(Gök and Yıldızeli Topçu, 2023)	Y	Y	Y	Y	N	N	Y	Y			
(Hroch et al., 2019)	Y	Y	Y	Y	N	N	Y	Y			
(Shdaifat et al., 2020)	Y	Y	Y	Y	N	N	Y	Y			
(Owens et al., 2014)	U	Y	U	U	U	Y	U	U			
(Plaisance and Logan, 2006)	Y	Y	Y	Y	N	N	Y	Y			
(Topal Haçer and Yılmaz, 2020)	Y	Y	Y	Y	N	N	Y	Y			
(Chan and Hamamura, 2016)	Y	Y	N/A	Y	N/A	N/A	Y	Y			
(Dag et al., 2022)	Y	Y	N/A	Y	N/A	N/A	Y	Y			
(Erol Ursavaş and Karayurt, 2021)	Y	Y	U	N	Y	U	Y	Y	Y		
(Greenberger et al., 2006)	Y	Y	N/A	Y	N	N/A	Y	Y			
(Aydin and Bektas, 2020)	U	Y	N/A	U	N/A	N/A	U	Y			
(Kusi Amponsah et al., 2019)	Y	Y	Y	Y	N	N	Y	Y			
(Kusi Amponsah et al., 2020)	Y	N	Y	Y	N	N	U	U			
(Augeard et al., 2019)	Y	Y	N/A	Y	N	N	Y	Y			
(Chiang et al., 2006)	Y	Y	N/A	N	N	N	Y	Y			
(Chiu et al., 2003)	Y	Y	Y	Y	N	N	Y	Y			
(Fang et al., 2017)	Y	Y	Y	Y	N	N	Y	Y			
(Goodrich, 2006)	N	N	Y	U	U	U	Y	Y	U	N/A	Y
(Mackintosh-Franklin, 2014)	U	Y	Y	Y	U	Y	Y	Y	Y	Y	Y
(Meadows et al., 2021)	Y	Y	Y	Y	N	N	Y	Y			
(Rababa et al., 2021)	Y	Y	Y	Y	N	U	Y	Y			
(Rahimi-Madiseh et al., 2010)	Y	N	Y	Y	N	N	U	U			
(Salantera and Lauri, 2000)	Y	Y	Y	Y	N	N	Y	Y			
(Shaw and Lee, 2010)	Y	N	Y	Y	N	N	Y	Y			
(Wazqar, 2019)	Y	N	Y	Y	N	N	Y	Y			

^a Y = Yes, N/A = Not Applicable, N = No, U = Unclear.

incorrectly believed that a person who can be distracted from pain does not have severe pain. Similarly, two other studies conducted with Saudi nursing students, showed low levels of knowledge about pain management (Shdaifat et al., 2020; Wazqar, 2019). The authors from the above studies concluded that students required more appropriate education about pain management.

Two cross-sectional studies conducted in Ghana (Kusi Amponsah et al., 2020; Kusi Amponsah et al., 2019) reported nursing students had insufficient knowledge about paediatric pain management, particularly with regard to pharmacological and non-pharmacological pain management. The top ten questions that students answered incorrectly included those related to pain perceptions (Q23, Q37 and Q39), opioid drug administration (Q38, Q40 and Q42), effectiveness of medicines (Q20 and Q34), pain physiology (Q1), and nonpharmacological pain management techniques (Q10). Similarly, a US study conducted by Aydin and Bektas (2020), reported that nursing students' knowledge of children's pain was moderate with the lowest Paediatric Pain Management Knowledge score in relation to pharmacological and non-pharmacological methods of pain control, including properties of analgesic drugs, their administration, and effects.

Studies conducted in Finland and New Zealand (Salantera and Lauri, 2000; Shaw and Lee, 2010) also indicated that nursing students had limited knowledge about pain management and held many misconceptions about analgesic medications and pain assessment. In Salantera and Lauri's (2000) study, 50 % (N = 36/73) of students indicated that a child who appears to be relaxed is unlikely to be in pain, even if they say they are.

In contrast, another cross-sectional conducted in Turkey by Gök and Yıldızeli Topçu (2023) found that nursing students who had taken a surgical nursing course have a moderate level of knowledge and attitudes towards pain.

Some differences have been found between knowledge levels of nursing students from some upper-middle income and lower-middle income countries. For example, a cross-sectional study conducted by Rababa et al. (2021) showed that, even though overall knowledge levels for both groups were limited, Jordanian students scored higher than

Nigerian students in total Pain in Older adults' Knowledge scores ($t = 4.58$, $p < 0.001$). Jordanian female students, in particular, had higher overall scores than Nigerian female students. It is noteworthy that the results of Chiu et al.'s (2003) exploratory study with participants from high income and lower middle-income countries contradicted the findings of Rababa et al. (2021), and revealed no significant differences in levels of knowledge between nursing students from the Philippines and Australia.

Nine of the included studies highlighted the correlation between educational level and pain management scores, with more senior students (those in their final year of a nursing program) having higher knowledge scores (Chan and Hamamura, 2016; Duke et al., 2013; Erol Ursavaş and Karayurt, 2021; Goodrich, 2006; Greenberger et al., 2006; Meadows et al., 2021; Owens, 2000; Plaisance and Logan, 2006; Rahimi-Madiseh et al., 2010). In Taiwan, a quasi-experimental study that used a modified version of the Knowledge and Attitude Survey Regarding Pain instrument McCaffrey and Ferrell (1997) identified that students' knowledge levels improved after participating in a Paediatric Pain Education Program (Chiang et al., 2006). Similarly, a pre-post-test study by Owens (2000) showed that student's knowledge slightly improved after completing a bespoke pain education program.

In summary, the analysis of the results of the included studies suggests that many nursing students have a lack of knowledge of pain management, influenced to some degree by the level of education on this topic. However, sample sizes were reported as a limitation of some of the studies (Aydin and Bektas, 2020; Dag et al., 2022; Erol Ursavaş and Karayurt, 2021; Gök and Yıldızeli Topçu, 2023; Kusi Amponsah et al., 2020; Meadows et al., 2021; Salantera and Lauri, 2000), which impacts the reliability of the results. It is noteworthy that some of the included studies were conducted in a single site which may also limit the generalisability of the results. Lastly, it was reported in the studies conducted in an Arabic-speaking context, that the utilisation of an English language instrument may have influenced the results.

4.4. Students' attitudes regarding pain management

Nurses' attitudes can significantly influence how they assess and manage people's pain (Cousins et al., 2022a). A number of the included studies that use the Knowledge and Attitude Survey Regarding Pain instrument (Ferrell and McCaffery, 2014) identified that nursing students often held negative attitudes towards pain management. For example, Al Khalailah and Al Qadire (2013) identified that 52 % of students believed that people should tolerate as much pain as possible before being given opioid medications. Similarly, most students (60.8 %) believed that people who continuously request more doses of opioids are likely to be addicted rather than experiencing severe pain (Al-Khalwaldeh et al., 2013).

A study conducted by Owens (2000) found that pain education programs have the potential to influence nursing students' attitudes towards individuals experiencing pain. Similarly, a cross-sectional study undertaken by Greenberger et al. (2006) revealed that there was a correlation between students' attitudes towards pain management and the frequency of opportunities they had to care for people experiencing pain.

A qualitative study undertaken in the United Kingdom, in which interviews were conducted at two time points over a two year period (Mackintosh-Franklin, 2014), found that students had an overall lack of interest in the topic of pain at the first interview, and this persisted for many of the students at the time of the second interview. The findings also revealed that students' views were influenced by negative experiences of caring for people in pain.

The above results suggest that educational experiences and clinical opportunities may influence nursing students' attitudes towards pain management, however, further research is required to determine the type of education that is likely to be most beneficial. It is also important to note that studies measuring students' attitudes towards pain management were mainly small scale and conducted in single sites, which might limit generalisability of the results to other cohorts. Again, the use of an English language instrument in an Arabic speaking context may have affected the results.

4.5. Instruments used to measure nursing students' knowledge of and attitudes towards pain

The most frequently used instrument identified to measure nursing students' knowledge of and attitudes towards pain was Ferrell and McCaffery's (2014) 'Knowledge and Attitudes Survey Regarding Pain' (KASRP), sometimes referred to as Knowledge and Attitude Regarding Pain Tool (KARPT). This tool has been revised over time to reflect current developments in pain management practices. The 39-item instrument includes two case studies, 22 True/False questions and 17 Multiple-Choice Questions. Of the 29 studies included in this review, 14 used the Knowledge and Attitudes Survey Regarding Pain. This survey has been reported as a reliable ($r > 0.80$) and valid instrument with sound internal consistency (Cronbach's alpha > 0.70) (Ferrell and McCaffery, 2014). However, like most survey instruments, the Knowledge and Attitude Survey Regarding Pain has limitations. For example, it measures self-reported knowledge and attitudes, which may not accurately reflect actual knowledge or attitudes. According to Brenner and DeLamater (2016), participants that complete a self-report survey may provide socially desirable responses rather than truthful responses to avoid embarrassment or negative judgements. Further, in self-report surveys, recall bias is a concern due to the fact that it can lead to incomplete or inaccurate data if participants have difficulty recalling previous experiences or events (Cherpitel et al., 2018). Additionally, the Knowledge and Attitude Survey Regarding Pain may not capture subtle cultural nuances in students' knowledge and attitudes towards pain management. In countries where English is not the first language, low English language proficiency may negatively impact students' responses (Alhamami and Almelhi, 2021). According to Al Khalailah and Al Qadire

(2013), using English language surveys may influence some students' ability to understand survey items, which may impact the rigour of the study.

An instrument used to assess knowledge and attitudes regarding pain in older adults is the Pain in Older Adults Knowledge Survey (POAKS) (Fetherstonhaugh et al., 2016). It contains 24 'True/False/Do not know' questions, where the correct answer is equivalent to a score of 1 and 'Do not know' is equivalent to a score of 0. Higher scores indicate a higher level of pain related knowledge and attitudes. This instrument has satisfactory internal consistency validity (Cronbach's alpha = 0.84) (Rababa et al., 2021). While the Pain in Older Adults Knowledge Survey has been shown to be a valid instrument, it is another a self-reported tool which increase the risk of response and recall bias. Also, the Pain in Older Adults Knowledge Survey is designed to assess knowledge to older adults and may not be applicable to other populations.

The Pain Management Principal Assessment Test (PMPAT) has been used to determine nursing students' level of pain management specific to cancer (McMillan et al., 2000). This instrument consists of 31 MCQs that relate to pharmacology, physiology, principles of management, physical dependency, and addiction. The correlation coefficient for the Pain Management Principal Assessment Test is high ($r = 0.89$, $p = 0.00$) as is the internal consistency reliability (alpha = 0.86) (McMillan et al., 2000). This survey only assesses knowledge levels and does not capture attitudes or beliefs about pain management. Additionally, the Pain Management Principal Assessment Test relies on self-reported knowledge and may not accurately reflect actual knowledge levels.

Paediatric pain management knowledge was measured using two instruments – the Paediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKAS) (Manworren, 2001) and the Paediatric Pain Management Knowledge (PPMK) (Aydin and Bektas, 2020). The PNKAS contains 42 questions, 25 True/False questions and 13 MCQs. Its reliability is acceptable ($r = 0.67$) as is the internal consistency validity (Cronbach's alpha = 0.72). Again, this is a self-report instrument and only focuses on one population group.

The updated version of the Paediatric Pain Management Knowledge by Aydin and Bektas (2020) contains 71 MCQs, true/false, open-ended, and matching questions designed to measure the knowledge of pain management. The internal consistency reliability of this instrument is 0.79. A key limitation is the length of the Paediatric Pain Management Knowledge which may cause survey fatigue and increase the risk of low response rate.

The Pain Management Survey Questionnaire (PMS) by Edwards et al. (2001) is one of the few instruments that measures nursing students' direct attitude, belief-based attitudes, subjective norms, direct control, indirect control, and behavioural intention. The development of the Pain Management Survey Questionnaire was informed by the Theory of Planned Behaviour (Fang et al., 2017). This theory posits that attitudes towards the behaviour, subjective norms, and perceived behavioural control are key influences on behavioural intentions. The validity of the Pain Management Survey Questionnaire has been reported as acceptable (Cronbach's alpha = 0.72). Again, the Pain Management Survey Questionnaire is a self-reported instrument, however, surveys informed by the Theory of Planned Behaviour are considered to have a high degree of predictive validity (Guo et al., 2022). Predictive validity refers to the extent to which a theory or model can accurately predict behaviour based on the constructs or factors it proposes (Desmarais et al., 2021).

5. Discussion

The aim of this integrative review was to review and synthesise the available literature related to nursing students' knowledge of and attitudes towards pain management, and to examine the instruments used to measure these constructs. This is an important topic as nurses' knowledge and attitudes have been identified as key factors in the provision of safe, effective and empathic pain management (Dag et al., 2022). Conversely, a lack of knowledge about pain management as well

as negative attitudes, have been shown to influence the quality of care provided (Jemebere, 2020).

The cultural diversity of the participants in the included studies, along with the range of contexts represented, is a factor that cannot be ignored in any discussion of the results. According to Keivan et al. (2019) cultural and religious backgrounds may impact how people perceive, manifest and manage pain. Some cultures encourage people to cope with pain by relaxation and meditation, while others cultures encourage people to use more spiritual and religious practices such as prayer (Miller and Abu-Alhajja, 2019). In many Western cultures, the use of opioids for the treatment of pain is acceptable and encouraged, while this is not always so in many non-Western settings (Ju et al., 2022). Therefore, the diversity of the participants' contexts and cultural beliefs may have impacted their attitudes regarding pain management.

This review identified a range of instruments (including the KASRP, PMPAT, PPMK, PNKAS, POAKS, PMS) for measuring knowledge and/or attitudes towards pain management and most demonstrated accepted levels of reliability and validity. However, as noted by Ung et al. (2016) in a previous review, none of the available tools can be referred to as the gold standard as each have a number of limitations. For example, the use of convenience sampling which may increase the risk of selection bias, small sample sizes that limit generalisability, and the use of self-report instruments. Importantly, and as noted by some authors (Al Khalailah and Al Qadire, 2013; Shdaifat et al., 2020; Wazqar, 2019), use of English language surveys in countries where English is a second language may also impact the reliability of the results. Lastly, only one of the included studies used a qualitative design for measuring students' knowledge of and attitudes towards pain. Given the dearth of qualitative studies on this topic, there is a need for further mixed methods studies that explore, in particular, the factors that influence nursing student's knowledge and attitudes towards pain management (Mackintosh-Franklin, 2014).

6. Conclusion

Effective pain management is a fundamental human right and integral to ethical, professional and cost-effective nursing practice. Pain management requires a sound knowledge base, appropriate attitudes, and a commitment to person-centred care. It is concerning that, despite significant developments in pain management strategies over recent decades, in this integrative review we were able to identify that many nursing students' knowledge levels are inadequate and that, too often, they hold negative attitudes and misconceptions towards pain and use of associated medications. Without doubt, there is a need for ongoing and targeted education on pain and its management. Nursing programs need to place more emphasis on evidence-based pain management and dispelling potential misconceptions. Pain management education needs to specifically focus on providing person-centred and culturally appropriate care for all people. Nursing students provided with an adequate level of education will be better prepared to provide effective and persistent pain management. However, a deeper understanding of the factors that influence students' knowledge attainment and attitudes towards pain is required in order to inform curriculum development and future educational policies.

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Declaration of competing interest

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