



Review

Nursing students' attitudes toward research: An integrative review

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A B S T R A C T

Objective: This paper describes the state of the science related to undergraduate nursing students' attitudes toward research.

Design: The updated integrative review method was used to systematically examine the published nursing literature about students' attitudes toward nursing research.

Data sources: Data sources for this review included: the Cumulative Index of Nursing and Allied Health Literature, PubMed, and Education Resources Information Center databases.

Review methods: Database searches identified 207 articles. Abstracts were screened for relevance, and, if appropriate, the full article was obtained and reviewed. Ancestral searches of reference lists yielded an additional 29 articles, thus a total of 236 articles were screened for this review.

Results: This comprehensive screening process yielded a total of 11 quantitative, 2 qualitative, and 2 mixed method studies about undergraduate nursing students' attitudes toward research.

Conclusions: Nursing students have generally positive attitudes toward research and see the value of research to professional nursing practice. Engaging in a research course or other active research-related activity improves attitudes toward nursing research. More rigorous study is warranted to determine best teaching/learning strategies to enhance students' perceptions of research. Future research is also needed to gain a better understanding of the demographic, academic, and program factors that affect nursing students' attitudes toward nursing research.

1. Introduction and background

The evidence-based practice (EBP) movement in healthcare evolved from the seminal work of medical researchers (International Council of Nurses, 2012) at McMaster University in Ontario, Canada. Their research changed the culture of medicine from one steeped in tradition to one rooted in the use of empirical evidence to support clinical practice. Shortly thereafter, the Institute of Medicine (IOM) (2001) identified a significant gap between healthcare knowledge and patient care that resulted in an alarming number of preventable medical errors (Kohn et al., 2000) in the United States (U.S.). Based upon recommendations from international experts, EBP was widely adopted as a strategy to enhance patient safety and ensure high-quality clinical outcomes (Keib et al., 2017; Stevens, 2013). Thus, EBP has become the cornerstone of contemporary clinical practice for the global healthcare community.

EBP involves the “integration of best research evidence with clinical expertise and patient values” (Sackett, 2002) to ensure safe, high-quality, patient-centered care (Keib et al., 2017). In order to engage in EBP, nurses must not only appreciate research, but also find, critique, synthesize, and apply appropriate empirical findings to clinical practice

(Keib et al., 2017; Sigma Theta Tau, 2005). By exploring topics and best practices that are relevant to nursing practice, nursing research creates knowledge, fosters clinical reasoning, and supports cost-effective care (Halabi, 2016). As such, research is essential for nursing practice to promote evidence-based care, patient safety, and high-quality outcomes (Sigma Theta Tau, 2005; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016). Moreover, strong foundations in research enhance the professional identity and credibility of nursing as a valued member of the healthcare team (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Unver et al., 2017).

Nurses must understand and have positive attitudes toward research to implement EBP in clinical practice (Keib et al., 2017; Halabi, 2016; Pond and Bradshaw, 1996). Both education about research methodology and positive attitudes toward research significantly increase nursing students' application of EBP (Hutchinson and Johnston, 2006; Johansson et al., 2010). Likewise, students with negative attitudes toward research do not generate new knowledge or use empirical findings to support patient care (Halabi, 2016; Unver et al., 2017). Thus, in order to engage in EBP upon entry to professional practice, it is essential that nursing students develop positive attitudes toward research

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Table 1
Summary of studies on students' perceptions of and attitudes of research.

Study citation	Country of origin	Purpose	Sample & design	Instruments, data collection, & data analysis	Major findings	Limitations
Ax and Kincade (2001)	England	To investigate nursing students' perceptions about the usefulness of research, barriers to implementing research, and satisfaction with research training in the undergraduate nursing program.	Qualitative, cross-sectional N = 12. Full-time nursing students at varying stages of their studies with most students having completed a research course. (Mostly female (n = 8) with a mean age of 31 [22–42] years old).	Semi-structured interviews Data analysis: thematic	Students felt that research improved clinical practice, but that implementing change in clinical practice based upon research was limited because of the opposition bias in participant interviews with others, usually superiors (e.g., physicians and nurse managers). Students thought that the skills they learned could not be translated into clinical practice; however, these students reported an improved ability to read and evaluate research.	Retrospective interviews which may have affected participants memory and result in recall bias. Potential for socially desirability bias in participant interviews with previous faculty. No mention of the researchers achieving data saturation during thematic analysis or checking with participant ensure accuracy of researchers' interpretation of participant responses.
Bjorkstorm et al. (2003)	Sweden	To examine factors that may influence nursing students' attitudes and awareness of research and development.	Quantitative, cross-sectional Descriptive/correlational N = 155. Senior baccalaureate nursing students (135 female, mostly between 20 and 29 years old).	Three-part, revised questionnaire originally developed by Björkstöm & Hamrin (2001) consisting of demographic data, attitude scale, and research awareness. This survey was originally developed to assess perceptions of research in Swedish nurses. Internal consistency was adequate for all subscales (α = 0.70–0.84), except the developing resources subscale (α = 0.60). Data analysis: Mann-Whitney U test, and one-way analysis of variance (ANOVA).	Most nursing students in the study had overall positive attitudes toward nursing research and development. Interest in a particular area of research in nursing lead to significantly more positive attitudes toward research in nursing.	In this sample of nursing students, the internal reliability of the entire revised survey for nursing students was excellent (α = 0.92); however, 3 of the 7 factors (subscales) demonstrated Cronbach alphas were < 0.70. Sample largely consisting of female nursing students and the use of convenience sampling techniques from one institution reduces the generalizability of findings. The researchers excluded of data from two classes because of response rates < 50%, which may have affected findings.
Brooke et al. (2015)	England and Slovenia	To explore student nurses' perceptions on the importance of research and evidence-based practice.	Qualitative, cross-sectional Phenomenology N = 70. Full-time nursing students participated in 10 focus groups – 7 in England and 3 in Slovenia.	Focus groups Data analysis: phenomenological analysis	Students believed that research and evidence-based practice (EBP) are vital for patient care, safety, and advancement of the development of the nursing profession. Students stated research and EBP, while daunting and difficult to understand, provided nursing students with confidence, knowledge, and empowerment. Students perceived an overall lack of clinical nurses' involvement in research.	Potential for socially desirability bias in participant responses during focus groups with faculty. No mention of techniques to reduce potential interviewer bias during focus groups; achieving saturation with participant responses; member checking with participant to ensure accurate interpretation of responses.
Champion (1988)	U.S.A.	To determine the effect of five teaching strategies on nursing students' attitudes toward research.	Quantitative, longitudinal one group, pre/post – test N = 264. All participants were baccalaureate	Attitude's Assessment Scale (Champion, 1988). Internal reliability (α = 0.88 to 0.90) administered before and after	Students had significantly better attitudes toward research after	One-group design/lack of a comparison group. Use of convenience sampling (continued on next page)

Table 1 (continued)

Study citation	Country of origin	Purpose	Sample & design	Instruments, data collection, & data analysis	Major findings	Limitations
Gercek et al. (2016)	Turkey	Five teaching strategies included: enthusiastic teaching style; role modeling; citing examples of clinical nursing research; application of research to student interest; and critiquing of nursing research. To compare the awareness of and attitudes toward research and development in nursing among nursing students enrolled in six different universities in six different regions throughout Turkey.	nursing students enrolled in a research course. Quantitative, cross-sectional, descriptive/correlational N = 390. Senior baccalaureate nursing students – largely consisting of female students (70%) and students under the age of 22 years old (70%). Participants were recruited using random sampling techniques from six schools in six different geographic regions in Turkey.	the completion of a research course. Data analysis: paired t-tests Nursing Students' Attitudes to and Awareness of Research and Development Within Nursing Scale – Turkish Version (Temel et al., 2010). Internal consistency $\alpha = 0.92$ for the total scale and Cronbach alphas ranged from 0.73 to 0.80 for the subscales. Data analysis: ANOVA	completing a research course using the five teaching strategies. There were significant differences among participants' attitudes toward research and development among the six schools. The number of research credits and inclusion of certain topics, including research techniques, publishing principles, and academic writing skills were significantly associated with improved attitudes toward research.	techniques from one institution reduces the generalizability of findings. No demographic information on subjects detailed in report, which limits the generalizability of findings. Potential for social desirability bias. Homogenous sample largely consisting of females < 22 year old which limits generalizability.
Halabi and Hamdan-Monsour (2016)	Saudi Arabia	To investigate attitudes of Saudi nursing students toward research and the demographic and educational characteristics that affect nursing students' attitudes toward research.	Quantitative, cross-sectional Descriptive/correlational N = 244. Female, senior and junior baccalaureate students in traditional or accelerated nursing programs with a mean age of 23 (19–30) years old.	Attitudes toward nursing research (Halabi and Hamdan-Monsour, 2010). Internal Consistency $\alpha = 0.74$ for the total scale and $\alpha = 0.64$ – 0.76 for subscales. In this study, the overall reliability was $\alpha = 0.83$, and the subscales reliability ranged from $\alpha = 0.70$ to $\alpha = 0.83$. Data analysis: t-tests, bivariate analysis, multiple regression, and Pearson correlation coefficients.	Most nursing students in the study had overall positive attitudes toward nursing research, especially toward usefulness of research. Younger, traditional students who had taken a research course was positively related to research attitudes. Positive attitudes do not correlate to utilization of research.	Use of convenience sampling to recruit participants, which limits the generalizability of findings.
Halabi and Hamdan-Monsour (2010)	Jordan	To examine Jordanian nursing students' attitudes toward nursing research.	Quantitative, cross-sectional Descriptive/correlational N = 612. Junior and senior baccalaureate students who had completed a nursing research course, of whom the majority were males (51%) with a mean age of 20.5 (20–21) years old.	Attitudes toward nursing research (Halabi and Hamdan-Monsour, 2010). Internal Consistency $\alpha = 0.74$ for the total scale and $\alpha = 0.64$ – 0.76 for subscales. In this study, the overall reliability was $\alpha = 0.74$, and the subscales reliability ranged from $\alpha = 0.63$ to $\alpha = 0.76$. Data analysis: Mann-Whitney U, and chi-square	Nursing students had a positive overall attitude toward nursing research, believed it has a role in developing the nursing profession, and expressed willingness to conduct research in clinical settings. Lowest scores were related to students' attitudes to their own research abilities. Nursing students had significantly more positive attitudes toward research at the end of the nursing program when compared to the beginning of the research course. Knowledge scores were higher after completion of a research course when compared to both at the beginning of the course and at the end of the nursing program.	Sample largely consisting of male nursing students and the use of convenience sampling techniques from one institution reduces the generalizability of findings. Inadequate internal consistency for the research abilities subscale. Potential for social desirability bias.
Harrison et al. (1991)	U.S.A.	To determine the effect of a research course on baccalaureate nursing students' knowledge about and attitudes toward research.	Quantitative, longitudinal One group, pre/post-test N = 54 Nursing students enrolled in a research course.	Attitudes Towards Nursing Research Questionnaire (Swenson and Kleinbaum, 1984). Internal consistency $\alpha = 0.76$ – 0.88 the total instrument. In this sample, $\alpha = 0.83$ – 0.85 for total scale. The attitudes instrument was administered at the beginning of a research course (pre) and at the end of the nursing program (post 2) only. Data analysis: analysis of variance, Tukey Honestly Significant Difference, and paired t-tests.	Nursing students had significantly more positive attitudes toward research at the end of the nursing program when compared to the beginning of the research course. Knowledge scores were higher after completion of a research course when compared to both at the beginning of the course and at the end of the nursing program.	Use of a one-group design/lack of a comparison group. Limited information was provided about the students' demographic information as well as information about the research course. Poor post-test completion rate of 47% percent, which may have resulted in attrition bias. Potential for social desirability bias.

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Table 1 (continued)

Study citation	Country of origin	Purpose	Sample & design	Instruments, data collection, & data analysis	Major findings	Limitations
Keib et al. (2017)	U.S.A.	To evaluate changes in nursing students' perceptions of confidence in, interest in participating in research and evidence-based practice.	Quantitative, longitudinal One group, pre/post-test N = 99, Junior baccalaureate nursing students enrolled in a research course, of whom most were 20 years old (67%), female (98%), and Caucasian (93%). 47% had previous research experience.	Confidence in Research and Evidence-Based Practice Survey (Keib et al., 2017). Internal Consistency $\alpha = 0.92$ for the total scale and $\alpha = 0.76-0.95$ for subscales. The instrument was administered at the beginning and end of the semester in which students completed a research and evidence-based practice course. Data analysis: Wilcoxon signed-rank and Mann-Whitney U test.	Students' perceptions and attitudes about EBP and research significantly improved at the end of the research course. Research course had a small impact on students' interest in future research participation.	Threat to internal validity due to the one-group design. Sample largely consisting of White, female nursing students and the use of convenience sampling techniques from one institution reduces the generalizability of finding. Potential for social desirability bias.
Owens and Kelly (1998)	Australia	To determine nursing students' perceptions and attitudes about nursing research.	Mixed methods, cross-sectional, descriptive N = 26. Third-year baccalaureate students.	Unknown. Information about the questionnaire was not provided.	46% of student responses indicated a negative opinion of research. 88% of students identified research as valuable to clinical practice. 50% of students did not see themselves initiating research in the future.	Limited information was provided about the study sample, data collection instrument, and the study methods. Small sample size, lack of demographic information about the sample, and use of convenience sampling limit the generalizability of findings.
Pond and Bradshaw (1996)	U.S.A.	To assess students changes in attitudes toward research and understanding of the research process following a participatory exercise involving data collection and analysis.	Mixed-methods, longitudinal One group, pre/post-test Nursing students participating in a maternal-child clinical rotation. No sample size provided.	Nursing Research Attitude Questionnaire and the Student Feedback Questionnaire (Pond and Bradshaw, 1996) were administered before and after the clinical rotation. No psychometric testing reported for either instrument. Data analysis: t-tests (quantitative) and method of analysis of open-ended responses not reported.	Significant positive change in students' attitude toward research after clinical rotation. Students understood the value of applying research findings to improve nursing practice and patient outcomes. Students gained first-hand knowledge about nursing research and this participatory learning led to developing a more positive toward and an increased interest in the research process.	Threat to internal validity due to the one-group design. No information was provided on the sample size; sample recruitment; sample characteristics; or psychometric properties of the tool used to collect data in this study. Potential for social desirability bias.
Slimmer (1992)	U.S.A.	To determine the effect of a research theory course and research proposal assignment on nursing students' attitudes toward nursing research.	Quantitative, longitudinal One group, pre/post-test N = 17. Senior baccalaureate students enrolled in a research course.	Pre/post-test created by the study's investigators (Slimmer, 1992) was administered prior to research course (pre) and after the theory portion (post 1) and application portion (post 2) of the research course. Internal reliability for all subscales was $\alpha \geq 0.85$. Data analysis: paired t-tests	Students initially had high positive attitudes related to the importance of nursing research. Attitudes increased after the theory portion of a research course and again after the application portion (writing a partial proposal); however, these increases were not significant. Students' feelings about behaviors associated with nursing research increased significantly from pre-test and post-test 1 (theory portion of the research course) and from pre-test to post-test 2 (application portion of the research course). Students' beliefs about the desirability of nursing research increased overtime; however a significant increase was only observed between pre-test and post-test 1.	Use of a one-group design/lack of comparison group. Small sample size, lack of demographic information about the sample, and use of convenience sampling from one institution limit the generalizability of findings. Potential for social desirability bias.

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Table 1 (continued)

Study citation	Country of origin	Purpose	Sample & design	Instruments, data collection, & data analysis	Major findings	Limitations
Swenson and Kleinbaum (1984)	U.S.A.	To determine changes in attitudes toward research during a baccalaureate nursing program.	Quantitative, longitudinal One group, pre/post-test N = 179. Junior traditional baccalaureate nursing students (n = 150) and RN to BSN students (n = 29) enrolled in a research course.	Attitudes Towards Nursing Research Questionnaire (Swenson and Kleinbaum, 1984). Internal consistency for this sample included: total instrument $\alpha = 0.76-0.88$ and all subscales $\alpha = 0.73-0.84$. Data collected before and after the completion of a research course (post-1) and one-year after the completion of the research course (post-2). Data analysis: standard t-test with a level of significance set at $p < 0.005$.	Overall, students' attitudes toward research did not significantly improve after the research course (post-1) or at one year after completion of the research course (post-2). Significant improvement in confidence related to understanding research terminology and evaluating adequacy of research studies after completion of research course; however interest in research decrease after completion of the research course. Statistically significant results suggest that writing a thesis in nursing education has a positive influence on nursing students' attitudes toward and awareness of research and development in nursing. The majority of students who did or did not write a thesis agreed research in nursing is important.	Use of a one-group design/lack of a comparison group. Potential for social desirability bias and attrition bias (38% response rate at post-test 2). Potential for analytical bias related to the lack of identifying information on individual cases which precluded the use of the most appropriate statistical analysis. Lack of demographic information about the sample and research course, and use of convenience sampling from one institution limit the generalizability of findings.
Toraman et al. (2017)	Turkey	To investigate effect of writing a bachelor's thesis on nursing students' attitudes toward research and development in nursing.	Quantitative, cross-sectional Two group Comparative/descriptive N = 180. Senior baccalaureate students (n = 91) who completed a thesis and those students who did not complete a thesis (n = 89) were recruited to participate in this study from three nursing schools. Majority of participants were female with a mean age of 23 (20 to 33) years old. All students had completed a research course.	Turkish version of the three-part questionnaire created by Björkstöm & Hamrin (2001) consisting of demographic data, attitude scale, and research awareness scale (Bayik et al., 2008). Internal consistency for the total scale $\alpha = 0.89$ (subscales not reported). Data analysis: Mann-Whitney U test	Junior-level nursing students, older nursing students, and nursing students with prior research. Experience had more positive attitudes toward research. Older age, previous research experience, following regular nursing broadcasts, and participating in scientific activities were significantly influenced attitudes toward research.	Use of a one-group design/lack of a comparison group. Potential for social desirability bias and attrition bias (38% response rate at post-test 2). Potential for analytical bias related to the lack of identifying information on individual cases which precluded the use of the most appropriate statistical analysis. Lack of demographic information about the sample and research course, and use of convenience sampling from one institution limit the generalizability of findings. Lack of randomization of group assignments and no attention to intervention fidelity are threats to internal validity. Limited description of sample characteristics and convenience sampling from three schools in one region of Turkey limits generalizability.
Unver et al. (2017)	Turkey	To determine the attitudes of nursing students toward scientific research during all four years of a baccalaureate nursing program.	Quantitative, cross-sectional Descriptive/correlational N = 375. Participants were largely female (90.1%) with a mean age of 20 (18–30) years old recruited from one nursing school in Turkey. Of whom, 34% were sophomore (second-year) students.	Attitude Scale towards Scientific Studies by Korkmaz et al. (2011). Internal consistency for each subscale ranged from $\alpha = 0.77$ to $\alpha = 0.85$. In this study, internal consistency for the total scale was $\alpha = 0.77$ with subscales ranging from $\alpha = 0.83$ to $\alpha = 0.88$. Data analysis: Spearman's correlation, Mann-Whitney U test, and Kruskal-Wallis test.	Junior-level nursing students, older nursing students, and nursing students with prior research. Experience had more positive attitudes toward research. Older age, previous research experience, following regular nursing broadcasts, and participating in scientific activities were significantly influenced attitudes toward research.	Participants were largely female and recruited from one nursing program, which reduces the generalizability of findings.

during their undergraduate education (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Unver et al., 2017; Harrison et al., 1991).

The American Association of Colleges of Nursing (AACN) (2008) identifies evidence-based patient care as an essential component of baccalaureate nursing education. Moreover, the International Council of Nurses (ICN) has acknowledged the importance of research within professional nursing starting with research training in pre-licensure programs (International Council of Nurses, 2012, 2007). Although there is a documented need to understand nursing students' attitudes toward research, there remains limited evidence (Gercek et al., 2016) on this topic. This paper examines the state of the science related to undergraduate nursing students' attitudes toward research.

2. Methods

The Whittemore and Knaf's (2005) updated integrative review method was used to conduct this review of the literature. A comprehensive search of the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and Education Resources Information Center (ERIC) electronic databases was conducted to obtain relevant studies related to undergraduate nursing students' attitudes toward nursing research. Key terms used for these searches included: students, attitudes, perceptions, research, undergraduate, subjects, nursing, and participation using the BOOLEAN search terms AND, OR, and NOT to generate the most comprehensive list of empirical articles available. Database searches were limited to articles published in English; doctoral dissertations were excluded. No limits were applied for year of publication or methods to ensure that all available manuscripts were retrieved. Electronic database searches identified 207 articles for initial review.

Each article's abstract was screened for relevance, and, if appropriate, the full article was obtained and reviewed. Next, ancestral searches of reference lists of all relevant articles were performed. Reference lists were screened for titles that included the key terms; this identified an additional 29 articles. This comprehensive search process yielded a total of 236 articles for review. Ultimately, a total of 15 research studies on pre-licensure nursing students' attitudes toward research were identified for inclusion in this integrative review: 11 quantitative, 2 qualitative, and 2 mixed methods. An overview of the purpose, sample and design, instruments, data collection and data analysis methods, major findings, and limitations for each article is detailed in Table 1.

3. Results

3.1. Methods

Of the eleven quantitative studies included in this review, five used a cross-sectional, descriptive/correlational design (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Unver et al., 2017; Bjorkstorm et al., 2003) and one used a two-group descriptive comparative design (Toraman et al., 2017). The remaining five studies used a longitudinal, pre-test/post-test design (Keib et al., 2017; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992). Although some of these studies were identified as using a longitudinal design, none of the researchers used a two-group design. Moreover, most researchers used a simple one-group, pre-test/post-test design, in which student attitudes were assessed in relation to completion of a research course (Keib et al., 2017; Champion, 1988; Slimmer, 1992); only two researchers examined student attitudes beyond the completion of a research course (Harrison et al., 1991; Swenson and Kleinbaum, 1984). For example, Swenson and Kleinbaum (1984) measured student attitudes toward research immediately before and after a junior-level research course, and again one year after the course completion. In all quantitative studies, data were collected using self-reported questionnaires or surveys.

The two qualitative studies included in this review both collected data from participants at one point in time either using semi-structured interviews (Ax and Kincade, 2001) or focus groups (Brooke et al., 2015). Brooke et al. (2015) conducted 10 focus groups for 70 student nurses across the pre-licensure curriculum in both England and Slovenia while Ax and Kincade (2001) conducted semi-structured interviews with 12 nursing students across the pre-licensure curriculum in England. Both the focus groups and semi-structured interviews were audiotaped, transcribed, and reviewed for themes.

Of the two mixed-methods studies in this review, one used a cross-sectional, descriptive design and one used a one-group, longitudinal, pre-test/post-test design. Owens and Kelly (1998) did not describe data collection and analysis procedures. Pond and Bradshaw (1996) used a unique approach by assessing student attitudes toward research in a clinical course rather than a traditional didactic research course. Data were collected using a researcher-developed tool with Likert-style and open-ended questions at both the beginning and end of the clinical rotation that included a participatory exercise involving data collection and analysis (Pond and Bradshaw, 1996).

Sample sizes ranged from as few as 12 participants to as many as 612 participants. Participants in all studies were undergraduate nursing students, the majority of whom were baccalaureate students (Keib et al., 2017; Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Unver et al., 2017; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992; Bjorkstorm et al., 2003; Toraman et al., 2017; Owens and Kelly, 1998) in their junior (Keib et al., 2017; Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Swenson and Kleinbaum, 1984; Owens and Kelly, 1998) or senior (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Slimmer, 1992; Bjorkstorm et al., 2003; Toraman et al., 2017) years. Geographical distribution of the participant samples derived from seven countries: six from the United States (Keib et al., 2017; Pond and Bradshaw, 1996; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992), three from Turkey (Gercek et al., 2016; Unver et al., 2017; Toraman et al., 2017), two from England (Ax and Kincade, 2001; Brooke et al., 2015), and one each from Saudi Arabia (Halabi, 2016), Jordan (Halabi and Hamdan-Monsour, 2010), Sweden (Bjorkstorm et al., 2003), and Australia (Owens and Kelly, 1998). All but one study (Halabi and Hamdan-Monsour, 2010) had samples that were primarily female. Five of the studies identified that participants were enrolled in a research course at the time of the study (Keib et al., 2017; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992), while in one study participants had already completed a research course (Halabi and Hamdan-Monsour, 2010). Nine of the samples were recruited from a single institution of higher education (Keib et al., 2017; Halabi and Hamdan-Monsour, 2010; Unver et al., 2017; Pond and Bradshaw, 1996; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992; Bjorkstorm et al., 2003).

Theoretical frameworks were not identified in 13 of the 15 studies included in this review. Of the two studies that identified theoretical frameworks, one framework was used to support the actual study while the other framework was used to support tool development. Klausmeier and Ripple's (1971) Learning and Human Abilities theory purports that attitudes are learned through experiences and thus was used as a framework to support study design (Slimmer, 1992) Bandura's (2012). Social Cognitive Theory asserts that individuals are more able to perform a skill if they are confident in their ability, thus this theory was used to guide tool development to measure confidence in research and EBP (Keib et al., 2017).

Several valid and reliable tools to measure nursing students' attitudes toward research have been developed, psychometrically tested, and widely used; including: the Nursing Students' Attitudes and Awareness of Research and Development in Nursing (Bjorkstorm et al., 2003), the Attitudes toward Nursing Research Scale (Halabi and Hamdan-Monsour, 2010), and the Attitude toward Nursing Research

Questionnaire (Swenson and Kleinbaum, 1984), all of which demonstrated at least adequate reliability and validity. The most commonly used tool was the Nursing Students' Attitudes and Awareness of Research and Development in Nursing which was used in three studies (Gercek et al., 2016; Bjorkstorm et al., 2003; Toraman et al., 2017). The Nursing Students' Attitudes and Awareness of Research and Development in Nursing tool was modified for use in students from a tool developed by Bjorkstrom and colleagues to explore nurses' attitudes toward research and development in nursing (Bjorkstorm et al., 2003). The modified tool contained 35 five-point Likert-style questions related to attitudes about nursing research, demographic data items, and questions related to awareness of research (Bjorkstorm et al., 2003). The modified tool demonstrated excellent overall reliability ($\alpha = 0.92$) (Bjorkstorm et al., 2003). Two studies used the Attitudes toward Nursing Research Scale (Halabi, 2016; Halabi and Hamdan-Monsour, 2010) and two utilized the Attitude toward Nursing Research Questionnaire (Harrison et al., 1991; Swenson and Kleinbaum, 1984). Additionally, one instrument not specific to nursing, the Attitudes Toward Scientific Studies Scale (Korkmaz et al., 2011), was used in one study (Unver et al., 2017). Despite these existing reliable and valid tools, several researchers used self-developed tools (Keib et al., 2017; Pond and Bradshaw, 1996; Champion, 1988; Slimmer, 1992).

3.2. Findings

3.2.1. Positive attitudes toward nursing research

Overall, nursing students were found to have positive attitudes toward research. Six studies reported that nursing students generally had positive perceptions of, or attitudes toward, research (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Unver et al., 2017; Slimmer, 1992; Bjorkstorm et al., 2003; Brooke et al., 2015). Additionally, five studies identified that nursing students demonstrated positive attitudes in relation to a research-related intervention (Keib et al., 2017; Pond and Bradshaw, 1996; Harrison et al., 1991; Champion, 1988; Slimmer, 1992). For example, Slimmer (1992) found that students had initially positive attitudes about nursing research and after intervention demonstrated significant improvements in attitudes about the desirability of research ($p = 0.045$) and research-related behaviors ($p = 0.031$). While attitudes about the importance of nursing research improved over time, this change was not statistically significant (Slimmer, 1992).

3.2.2. Negative attitudes toward nursing research

One study identified that almost half of the students had generally negative attitudes toward nursing research, identifying it as boring, time-consuming, and difficult (Owens and Kelly, 1998). Similarly, another study discovered that nursing students had negative attitudes toward research due to the way research was taught early in the curriculum with large class sizes, complex terminology, inadequate training, and insufficient practical application (Ax and Kincade, 2001).

3.2.3. Factors affecting attitudes toward nursing research

Eleven studies identified various factors that affected students' attitudes toward nursing research (Keib et al., 2017; Halabi, 2016; Gercek et al., 2016; Unver et al., 2017; Pond and Bradshaw, 1996; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992; Bjorkstorm et al., 2003; Toraman et al., 2017) including: taking a research course, interest in a particular area of nursing research, application of research knowledge, student age, year in program, and prior research experience. The most commonly explored factor was taking a research course. Seven studies found that taking at least one research course improved student attitudes toward nursing research (Keib et al., 2017; Halabi, 2016; Gercek et al., 2016; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992); of these, findings from five of these studies (Keib et al., 2017; Halabi, 2016; Gercek et al., 2016; Harrison et al., 1991; Champion, 1988) were statistically significant. For example, Keib et al. (2017)

reported that baccalaureate nursing students from the U.S. ($n = 99$) demonstrated significant improvements in perceptions of ($p < 0.001$) and confidence in ($p < 0.005$) research after the completion of a junior-level research and EBP course.

The second most commonly explored factor was active application of research knowledge (Pond and Bradshaw, 1996; Champion, 1988; Slimmer, 1992; Toraman et al., 2017). Two studies identified that writing a thesis or research proposal significantly improved student attitudes toward research (Slimmer, 1992; Toraman et al., 2017). For example, Toraman et al. (2017) found that Turkish nursing students who completed a bachelor's thesis ($n = 91$) had significantly more positive attitudes toward research than those who did not complete a thesis ($n = 89$) ($p = 0.025$). Another study found that critiquing research studies significantly improved student attitudes toward research (Champion, 1988). Lastly, one study determined that a participatory exercise, including data collection and analysis, significantly improved students' attitudes toward research (Pond and Bradshaw, 1996).

Several studies explored the effect of age and year in program on student perceptions (Halabi, 2016; Unver et al., 2017; Harrison et al., 1991), but with conflicting results. Unver et al. (2017) found that older students had more positive attitudes toward nursing research; whereas, Halabi (2016) found that younger students had more positive attitudes. Likewise, both junior-level (Unver et al., 2017) and senior-level students (Halabi, 2016; Harrison et al., 1991) were identified as having more positive attitudes toward nursing research. Two studies found that an interest in a particular area of nursing research significantly improved student attitudes (Champion, 1988; Bjorkstorm et al., 2003). Champion (1988) found that a course which included the application of research to student interests significantly increased positive attitudes toward research, while Bjorkstorm et al. (2003) found that subjects who identified an interest in a certain research area had significantly more positive attitudes about nursing research than those who did not, making this the most influential factor on research attitudes. Only one study explored prior research experience as a factor and found that such experience had a significantly positive impact on student perceptions of nursing research (Unver et al., 2017).

3.2.4. Importance of nursing research to the profession

Another common theme that emerged from the reviewed studies was that students perceived nursing research as important to nursing practice (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Pond and Bradshaw, 1996; Toraman et al., 2017; Ax and Kincade, 2001; Brooke et al., 2015; Owens and Kelly, 1998). Research and EBP were identified as being important to improve clinical practice (Pond and Bradshaw, 1996; Ax and Kincade, 2001; Owens and Kelly, 1998) and patient care (Brooke et al., 2015) to promote patient safety (Brooke et al., 2015) and quality patient outcomes (Pond and Bradshaw, 1996). Through qualitative analysis, participants in the Brooke et al. (2015) study identified the importance of research and EBP for patient care and safety and the development of the nursing profession. They also discussed how research and EBP help nursing students develop confidence, knowledge, and empowerment in clinical practice (Brooke et al., 2015). Moreover, students recognized that research is important for the development of the nursing profession (Halabi and Hamdan-Monsour, 2010; Brooke et al., 2015). However, despite the positive perceptions of the role of nursing research in practice, students identified that research is difficult to implement in clinical practice due to opposition in the clinical setting by administrators (Ax and Kincade, 2001), lack of clinical nurses' involvement in research (Brooke et al., 2015), and difficulty translating learned research skills to the clinical setting (Ax and Kincade, 2001).

4. Discussion

Overall, few published studies have explored undergraduate nursing students' attitudes toward research. However, recently there has been increased attention to this topic, with one-third of the available

literature published since 2016. This may be a result of the recent global emphasis on EBP in the nursing profession (Keib et al., 2017; Halabi, 2016; Gercek et al., 2016; Unver et al., 2017; Toraman et al., 2017), and a recent increase in published reports describing the psychometric development of instruments to measure this phenomenon (Keib et al., 2017; Halabi and Hamdan-Monsour, 2010; Temel et al., 2010; Bayik et al., 2008; Korkmaz et al., 2011).

Nursing students' attitudes toward research has international relevance as evidenced by the fact that only 40% of studies in this review, including only one recent study, emanated from the U.S. (Keib et al., 2017; Pond and Bradshaw, 1996; Harrison et al., 1991; Swenson and Kleinbaum, 1984; Champion, 1988; Slimmer, 1992). The majority of research related to nursing students' attitudes toward research has originated from the Middle East portion of Asia (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Unver et al., 2017; Toraman et al., 2017), Northern Europe (Bjorkstorm et al., 2003; Ax and Kincade, 2001; Brooke et al., 2015), and Australia (Owens and Kelly, 1998). Thus, the results from this review represent worldwide perceptions of undergraduate baccalaureate nursing students. This diversity of research location, along with calls from international nursing organizations related to research and evidence-based practice in nursing (International Council of Nurses, 2012; Institute of Medicine, 2001; Sigma Theta Tau, 2005), signals the importance of this topic to the global nursing community.

Three valid and reliable tools to assess nursing students' attitudes toward nursing research have been developed, psychometrically tested, and used in the existing literature (Halabi and Hamdan-Monsour, 2010; Swenson and Kleinbaum, 1984; Bjorkstorm et al., 2003). However, despite these existing tools, many researchers continue to use self-developed instruments to measure this phenomenon (Keib et al., 2017; Pond and Bradshaw, 1996; Champion, 1988; Slimmer, 1992). Results stemming from studies that use instruments that have not been adequately psychometrically tested must be interpreted with caution. In addition, the variety of tools used to measure attitudes toward nursing research makes it difficult to compare results across studies.

Overall, the literature maintains that pre-licensure nursing students have generally positive attitudes toward research (Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Pond and Bradshaw, 1996; Slimmer, 1992; Bjorkstorm et al., 2003); and appreciate the importance of research for clinical practice and EBP (Toraman et al., 2017; Brooke et al., 2015; Owens and Kelly, 1998). Conversely, it must be noted that some researchers reported that undergraduate students had overall negative attitudes toward research (Ax and Kincade, 2001; Owens and Kelly, 1998) or did not see the usefulness of research in clinical practice (Ax and Kincade, 2001).

The effect of several factors on nursing students' attitudes toward research has been explored. Nursing students' attitudes toward research were enhanced after participating in a research or EBP course or other research-related learning activity such as writing a thesis or participating in data collection and analysis (Keib et al., 2017; Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Pond and Bradshaw, 1996; Champion, 1988; Slimmer, 1992; Toraman et al., 2017). Additionally, prior research experience (Unver et al., 2017), engagement in research activities (Unver et al., 2017), and interest in a specific research area (Bjorkstorm et al., 2003) have positive effects on undergraduate nursing students' attitudes toward research. Interestingly, there is conflicting evidence about how age and level in the nursing program affect students' attitudes toward nursing research (Halabi, 2016; Unver et al., 2017; Harrison et al., 1991). Despite the positive effect of various factors on undergraduate nursing students' attitudes toward nursing research, the literature does not provide support for best practice in pre-licensure nursing research education because these varied teaching strategies have been evaluated in isolation without comparison or consensus. Even without support for best practices in pre-licensure nursing research education, most authors recommended research integration throughout the pre-licensure nursing

curriculum (Keib et al., 2017; Halabi, 2016; Halabi and Hamdan-Monsour, 2010; Gercek et al., 2016; Pond and Bradshaw, 1996; Harrison et al., 1991; Brooke et al., 2015) to support understanding and application of research, and an appreciation for the role of research in nursing practice. Due to the limited and conflicting data, more research is needed to determine how student and academic factors affect nursing students' attitudes toward research.

Most of the available research related to undergraduate nursing students' attitudes toward nursing research has significant limitations including the use of one-group designs, convenience samples from single sites, and lack of theoretical support. The one-group designs threaten internal validity, therefore results from these studies must be interpreted with caution. The use of convenience sampling techniques from a single institution limits generalizability. Theoretical support of research studies is important to support the study design and hypotheses because the theory helps to define and explain the phenomenon of interest.

4.1. Future research

Based on this literature review, recommendations for future research related to nursing student attitudes toward research include: using appropriate theoretical frameworks; using psychometrically sound instruments; exploring demographic, academic, and program factors that affect students' attitudes toward nursing research; and testing the effects of various teaching/learning strategies on students' attitudes toward research, using a longitudinal approach with a two-group design. Moreover, nursing education research must explore best practices for research education integration into pre-licensure nursing education.

4.2. Strengths and limitations

To our knowledge, this is the first integrative review to examine baccalaureate nursing students' attitudes toward research. As such, this review provides valuable insight into students' attitudes and factors that influence attitudes related to nursing research. To enhance the rigor of this review, the updated integrative review method as described by Whittemore and Knafl (2005) was used. Another strength of this review was that no limitations for study inclusion were applied for research design, study location, or year of publication to provide the most representative view of this phenomenon and to enhance generalizability of the findings.

However, there are some limitations to this review that must be acknowledged. Despite using a comprehensive search process, database searches were limited to articles published in the English language in CINAHL, PubMed, and ERIC. Furthermore, doctoral dissertations, articles published in a language other than English, and review articles were not included. Thus, it is possible that some studies on undergraduate nursing students' attitudes toward research may have been unintentionally excluded from this review.

5. Conclusions

Recent renewed interest in EBP has resulted in a notable increase in nursing studies published about student attitudes toward research within the last few years. Findings from this literature review suggest that nursing students have generally positive attitudes toward research and appreciate the value of research to support professional nursing practice. Several factors: taking a research course, interest in a particular area of nursing research, application of research knowledge, student age, year in program, and prior research experience, were found to be associated with significantly improved undergraduate nursing students' attitudes toward nursing research. However, there is conflicting evidence on how age and program year affect students' attitudes toward research. Future research should be supported by

appropriate theoretical frameworks, utilize psychometrically sound instruments, and use two-group, longitudinal designs to determine the effectiveness of teaching strategies on students' attitudes toward nursing research. Overall, more rigorous study of this topic is warranted to determine best practices. Also, research is needed to examine demographic, program, and academic factors that affect nursing students' attitudes toward nursing research.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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