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The effectiveness of continuing education on self-reported nursing practice outcomes and barriers

A PILOT INTERVENTION STUDY

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ABSTRACT

Continuing education is essential for maintaining and advancing competencies in nursing practice, particularly among advanced practice nurses (APNs) such as clinical nurse specialists (CNSs) and nurse practitioners (NPs). Originating from North America, APN roles have significantly contributed to healthcare systems by enhancing access, improving safety, and reducing costs. The global nursing shortage, aging populations, and the rising burden of chronic diseases underscore the urgency of integrating advanced practice into healthcare delivery models. However, sustaining advanced nursing competencies requires continuous professional development, which is often hindered by organizational barriers and limited institutional support.

This study evaluates the university-level continuing education pilot program Accessibility, Quality, and Safety for Health Services: Clinical Nurse Specialist Education (EFFICACY). It was implemented by the University of Eastern Finland from 2021 to 2023 and aimed to enhance CNS-related competencies among nurses working in the Wellbeing Services County of North Savo. The effectiveness of the EFFICACY pilot intervention was evaluated using a longitudinal design and standardized instruments

(Kuopio University Hospital Job Satisfaction, Clinical Nurse Specialist Core Competencies, and Specialist Outcomes and Barriers Analysis scales), revealing mixed outcomes. While self-reported nursing practice outcomes did not show improvement and lacked statistically significant predictors, a notable reduction in self-reported practice barriers was observed, with gender and measurement point emerging as significant predictors.

The CNS competencies generally enhanced nursing practice outcomes—except for clinical nursing leadership, which did not influence patient and family response to care. Job satisfaction factors, particularly motivation and participation in decision-making, were positively associated with all practice outcomes, except for the cost of care. Additionally, several job satisfaction dimensions—such as work requirements, workplace well-being, and sense of community—were associated with reduced organizational, interpersonal, and workflow-related barriers. Notably, increased patient competence was negatively associated with organizational and interpersonal barriers, suggesting a complex relationship between advanced competencies and perceived challenges to nursing practice.

Findings from this pilot intervention underscore the crucial role of continuing education in maintaining clinical competency, improving nursing outcomes, and promoting job satisfaction among nurses. The results underscore the importance of supportive workplace policies that foster professional growth and recognize the cumulative nature of nursing expertise. This research contributes to the broader discourse on nursing excellence in healthy working environments and offers practical insights for academic institutions and healthcare organizations aiming to strengthen the APN workforce.

Keywords: Advanced Practice Nursing, Clinical Nurse Specialist, Continuing Education, Continuing Higher Education, Nursing Competency, Job Satisfaction, Nursing Outcomes, Barriers to Nursing Practice

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TIIVISTELMÄ

Täydennyskoulutus on keskeistä hoitotyön osaamisen ylläpitämisessä ja kehittämisessä erityisesti laajavastuisissa hoitotyön rooleissa toimivien sairaanhoitajien, kuten kliinisten hoitotyön asiantuntijoiden ja asiantuntijasairaanhoitajien, keskuudessa. Pohjois-Amerikasta lähtöisin olevat laajavastuisen hoitotyön roolit ovat merkittävästi edistäneet terveydenhuoltojärjestelmiä parantamalla palvelujen saatavuutta, lisäämällä potilasturvallisuutta ja vähentämällä kustannuksia. Maailmanlaajuinen sairaanhoitajapula, väestön ikääntyminen ja kroonisten sairauksien yleistyminen korostavat laajavastuisen hoitotyön integroimisen kiireellisyyttä terveydenhuollon palvelumalleihin. Tämän osaamisen ylläpitäminen edellyttää kuitenkin jatkuvaa ammatillista kehittymistä, jota usein vaikeuttavat organisatoriset esteet ja rajallinen institutionaalinen tuki.

Tässä tutkimuksessa arvioidaan pilottihanketta ”Saavutettavuutta, laatua ja turvallisuutta terveyspalveluihin: Kliinisen hoitotyön asiantuntijakoulutus (TEHOA)”, joka oli Itä-Suomen yliopiston vuosina 2021–2023 toteuttama yliopistotasoinen täydennyskoulutusohjelma. Koulutuksen tavoitteena oli vahvistaa kliinisen hoitotyön asiantuntijarooliin liittyvää osaamista Pohjois-Savon hyvinvointialueella työskentelevien sairaanhoitajien keskuudessa. TEHOA-intervention vaikuttavuutta arvioitiin

pitkittäisasetelmalla ja standardoiduilla mittareilla (Kuopio University Hospital Job Satisfaction Scale, Clinical Nurse Specialist Core Competencies, Specialist Outcomes and Barriers Analysis) ja tulokset olivat osittain ristiriitaisia: itsearvioidut hoitotyön tulokset eivät parantuneet, eikä tilastollisesti merkitseviä ennustavia tekijöitä löytynyt. Sen sijaan hoitotyön esteiden itsearvioitu määrä väheni merkittävästi, ja sukupuoli sekä mittausajankohta osoittautuivat tilastollisesti merkitseviksi taustamuuttujiksi.

Kliinisen hoitotyön asiantuntijaosaaminen paransi yleisesti hoitotyön tuloksia – lukuun ottamatta kliinistä hoitotyön johtajuutta, joka ei vaikuttanut potilaiden ja perheiden hoitovasteeseen. Työtyytyväisyyden osa-alueet, erityisesti motivaatio ja osallistuminen päätöksentekoon, olivat positiivisesti yhteydessä kaikkiin hoitotyön tuloksiin lukuun ottamatta hoidon kustannuksia. Lisäksi useat työtyytyväisyyden ulottuvuudet – kuten työn vaatimukset, työhyvinvointi ja yhteisöllisyyden tunne – olivat yhteydessä organisatoristen, vuorovaikutuksellisten ja työnkulkuun liittyvien esteiden vähenemiseen. Huomionarvoista on, että kliinisen osaamisen lisääntyminen oli negatiivisesti yhteydessä organisatorisiin ja vuorovaikutuksellisiin esteisiin, mikä viittaa monimutkaiseen suhteeseen laajavastuisen osaamisen ja koettujen hoitotyön haasteiden välillä.

Tämän pilottitutkimuksen tulokset korostavat täydennyskoulutuksen ratkaisevaa roolia kliinisen osaamisen ylläpitämisessä, hoitotyön tulosten parantamisessa ja sairaanhoitajien työtyytyväisyyden edistämisessä. Tulokset alleviivaavat tukevien työpaikkakäytäntöjen merkitystä, jotka edistävät ammatillista kasvua ja tunnustavat hoitotyön asiantuntemuksen kumulatiivisen luonteen. Tutkimus rikastuttaa laajempaa keskustelua hoitotyön huippuosaamisesta terveellisissä työympäristöissä ja tarjoaa käytännönläheisiä näkemyksiä sekä akateemisille toimijoille että terveydenhuollon organisaatioille, jotka pyrkivät vahvistamaan laajavastuisen hoitotyön ammattilaisten joukkoa.

Avainsanat: Laajavastuinen hoitotyö, Kliinisen hoitotyön asiantuntija, Täydennyskoulutus, Korkeakoulutasoinen täydennyskoulutus, Hoitotyön kompetenssit, Työtyytyväisyys, Hoitotyön tulokset, Hoitotyön esteet

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following original publications:

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CONTENTS

ABBREVIATIONS

APN Advanced Practice Nurse

CNS Clinical Nurse Specialist

CNS-CoCos Clinical Nurse Specialist Core Competencies

CPD Continuing Professional Development

ECTS European Credit Transfer System

EFFICACY Accessibility, Quality, and Safety for Health Services: Clinical Nurse Specialist Education

FINBRI The Finnish National Board on Research Integrity

FINEEC The Finnish Education Evaluation Centre

FNA The Finnish Nurses Association

HEI Higher Education Institution

ICN International Council of Nurses

KUHJSS Kuopio University Hospital Job Satisfaction Scale

MOOC Massive Open Online Course

NP Nurse Practitioner

PRISMA-ScR The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews

RN Registered Nurse

SN Specialized Nurse

SOBA Specialist Outcomes and Barriers Analysis

STROBE Strengthening the Reporting of Observational Studies in Epidemiology

TREND The Transparent Reporting of Evaluations with Nonrandomized Designs

UAS University of Applied Sciences

UEF University of Eastern Finland

UNESCO The United Nations Educational, Scientific, and Cultural Organization

WSCNS The Wellbeing Services County of North Savo

WHO The World Health Organization

1 INTRODUCTION

The increasing demands of patient care, combined with scientific and technological progress, pose challenges for nurses in maintaining up-to-date knowledge and motivation to engage in ongoing education, which is essential for ensuring safe patient care. (Vázquez-Calatayud et al., 2021). Advanced competency is a crucial skill necessary for executing nursing duties. Therefore, it is essential to recognize the cumulative nature of nursing competency as a vital component for continuing professional development after acquiring a nursing license. (Fukada, 2018) Nurses' clinical competence is influenced by various demographic, professional, and environmental factors, such as individual traits (like age, education level, and marital status), job-related conditions (including role, salary, work setting, and employment type), and opportunities for professional growth (such as ongoing training, hands-on experience, and theoretical knowledge). Studies also highlight the influence of job satisfaction and turnover intention on competency (Almarwani and Alzahrani, 2023; Gunawan et al., 2020).

Maintaining nursing competency can be achieved through continuing education (Rahmah et al., 2021). Knowledge gained through lifelong learning alters work patterns by encouraging daily creativity, transitioning from empirical to evidence-based care, striving for perfection in treatment, and allowing healthcare professionals to focus their knowledge and skills in specific fields. (Ortega-Lapiedra et al., 2023) While the importance of continuing education for nurses is widely acknowledged, there remains a lack of insight into how nurses personally experience and interpret this continuous learning process (Mlambo et al., 2021). Institutional support skills are often undervalued in professional development due to their limited practical application, being constrained by organizational barriers, leadership inattention, and a lack of peer support (Ortega-Lapiedra et al., 2023).

In response to evolving healthcare demands and the growing complexity of patient needs, advanced practice nursing roles have

developed over the past six decades (Boehning and Punsalan, 2023; Canadian Nurses Association, 2019; De Raeve et al., 2024). The concept of advanced practice nursing, which originated in the US and Canada, has spread across continents and influenced healthcare delivery all over the world (Kilpatrick et al., 2024). This paradigm shift is being represented by highly educated and skilled practitioners, such as clinical nurse specialists (CNS) and nurse practitioners (NP), who play critical roles in advanced patient care (International Council of Nurses [ICN], 2020).

The Accessibility, Quality, and Safety for Health Services: Clinical Nurse Specialist Education (EFFICACY) pilot educational intervention was developed to provide university-level continuing nursing education that enhances CNS-related skills. The EFFICACY pilot intervention, developed and implemented by the University of Eastern Finland's (UEF) Department of Nursing Science, was conducted from September 2021 to May 2023 in the Northern Savo area of Finland. The continuing education intervention was offered to nurses who wanted to enhance their advanced competencies in nursing and who worked in the Wellbeing Services County of North Savo (WSCNS). This research aims to evaluate the effectiveness of the EFFICACY pilot intervention in terms of self-reported nursing practice outcomes and barriers. Additionally, this study investigates the potential associations between job satisfaction, CNS-related competencies, and self-reported nursing practice outcomes and barriers. The study is strongly linked to the research themes of UEF's Department of Nursing Science, and falls particularly under the theme "Nursing excellence in healthy working environments" (UEF, 2025).

The findings of this longitudinal pilot educational intervention shed light on the understudied role of the CNS in the context of continuing education. Investigating the potential relationship between CNS competency, job satisfaction, and nursing practice outcomes could highlight the importance of maintaining clinical competency and how healthcare organizations can further support nurses' job satisfaction and the quality of patient care. The results of this pilot intervention can be utilized by continuing education providers and academic organizations.

2 REVIEW OF THE LITERATURE

2.1 LIFELONG LEARNING IN NURSING: DEFINITIONS, CHARACTERISTICS, AND EDUCATIONAL CONTEXTS

2.1.1 Adult learning and andragogy

Adult learning plays a crucial role in the concept of lifelong learning due to its integral nature (Matulčík, 2023). The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines it as "all forms of education and learning that aim to ensure that all adults participate in their societies and the world of work." (UNESCO, 2016, pp. 6–7). Adult learning encompasses a wide spectrum of formal, non-formal, and informal learning experiences that support individuals recognized as adults by their community in enhancing their ability to work and live in ways that benefit themselves and their communities, organizations, and societies. Adult learning involves continuous processes and activities to develop, identify, exchange, and adapt skills. (UNESCO, 2016)

Adult learning is closely linked to andragogy. In some references, these concepts are used as synonyms (Smith et al., 2015). According to McCauley et al. (2017), andragogy encompasses a set of assumptions about adult learners and provides guidelines for planning, managing, and evaluating adult education. This concept is based on two key presuppositions: first, self-directedness is fundamental to adulthood; second, andragogical practice involves collaborating with learners to pursue knowledge (McCauley et al., 2017). The andragogical model leans on several assumptions about adult learners presented in Table 1.

As an educational professional, it is imperative to align learning objectives with the most appropriate delivery methods and environments. This ensures that participants benefit from facilitator-led instruction while retaining some control over variables, such as timing and pace. (Hofmann, 2018) Thus, blended learning has gained popularity in higher education, particularly at universities (Castro, 2019).

Table 1: The assumptions of the andragogical model (Knowles, 2020).

Assumption	Definition
The need to know	The need for adults to know why they must learn something.
The learners' self-concept	Adults must take responsibility for their learning decisions and excel when they can direct their learning.
The role of the learners' experiences	Adult learners bring a wealth of experience that should be the foundation for many learning activities. Connecting their prior experiences with new material is essential to facilitating effective learning.
Readiness to learn	Adults achieve optimal learning outcomes when training is designed to address immediate, real-world problems they face.
Orientation to learning	Adults learn most effectively when the content is problem-oriented. Rather than engaging with generic material, they seek to acquire specific knowledge, skills, and abilities that address particular issues and concerns.
Motivation	Adults achieve optimal learning outcomes when their motivation is intrinsic rather than extrinsic.

2.1.2 Lifelong learning

Lifelong learning has been defined as "A cradle to the grave involvement of the individual with his or her learning and working environment. It implies a growth of all skills and a cumulative interweaving of knowledge and experience." (Whyte, 1985, p. 25). Lifelong learning as a concept has been loosely used without a consensus definition (Smith et al., 2015). Davis et al. (2014) conducted a Delphi study to clarify the concept. Their research concluded that lifelong learning is a continuous journey that spans both personal and professional realms, encompassing both structured and unstructured learning experiences. This process involves exploring and valuing new ideas and perspectives while critically examining one's surroundings, knowledge, skills, and interactions. (Davis et al., 2014).

The most crucial traits of a lifelong learner include the ability to reflect, ask questions, derive pleasure from learning, recognize the ever-changing

nature of information, and actively seek out learning opportunities. Maintaining an active mind is crucial for lifelong learning and transforming information into the ability to deliver high-quality nursing care. (Davis et al., 2014) Mandatory educational requirements, such as continuing education units and postgraduate certifications, can facilitate lifelong learning in the nursing profession (Smith et al., 2015).

The concept of lifelong learning is broad. It encompasses all learning activities that people engage in, whether in formal (school and university), non-formal (other institutionalized learning environments), or informal (at home, with family members, or peers) settings throughout their lives (Steffens, 2015). Therefore, it is impossible to identify a single learning theory that can account for all types of lifelong learning (Steffens, 2015; Thwe and Kálmán, 2023).

2.1.3 The role of higher education institutions in continuing education

A key component of lifelong and adult learning for nurses is continuing professional development (CPD), which is essential for maintaining nurses' current knowledge and skill sets (Pool et al., 2016). The Oxford Dictionary of Nursing defines continuing education as “the concept that learning continues throughout one’s life, both through educational courses and work experience and practice. Individuals are encouraged to identify their personal learning needs and to assess their progress in dynamic ways” (Law, 2021, p. 103). In the Encyclopedia of Nursing Education, continuing education is defined as “an instructional program for adults, consisting of nursing courses in a particular area of knowledge and expertise to increase the learner’s knowledge and skills to provide competent patient care” (Smith et al., 2015, p. 79).

The complexity of healthcare demands that professional nurses pursue ongoing education throughout their careers. The purpose of continuing education is to support students in addressing the demands of practice on both a personal and professional level, while also meeting legal requirements and the needs of patients. To uphold the constantly evolving and rising standards of patient care, educators, clinicians, and professional

associations must prioritize the development of innovative ways to deliver high-quality continuing education courses. (Smith et al., 2015) In Europe and other parts of the world, nurses may be required to participate in continuing professional development on a voluntary or mandatory basis (Mlambo et al., 2021).

Globally, postgraduate training and specialization follow undergraduate curricula to provide healthcare professionals with a comprehensive education. Although CPD is the longest segment of the continuum—often spanning 40 or more years of a healthcare professional's career—it is also, in many nations, the least regulated and structured segment of the continuum. CPD is essential for ensuring that healthcare practitioners remain competent and provide high-quality, evidence-based care, as new evidence in medicine and healthcare is continually being produced. (Sherman and Chappell, 2018) Thus, continuing education is deemed a pivotal part of nursing competency; unfortunately, it is sometimes viewed solely as an expense due to its poor quality and the fact that it doesn't supplement or expand academic training. Determining whether the continuing education intervention transforms competency and leads to better patient care quality is also challenging. (Ortega-Lapiedra et al., 2023) Several issues have been identified concerning the transference of competencies to patient care, including autonomy and instrumental tools (Arvidsson et al., 2021; Ortega-Lapiedra et al., 2023), holism, care work, organizational barriers, specialization, confidence, knowledge, safe care, and technical issues (Ortega-Lapiedra et al., 2023). Regardless of how challenging it is, it's necessary to create motivation and space for quality improvement through a system (macro) level support (Arvidsson et al., 2021).

Higher education is offered in higher education institutions (HEI), such as universities and similar institutions (Wallace, 2015). This research defines continuing higher education as continuing education offered by HEIs. There is limited recent research concerning continuing higher education in nursing. The phenomenon of continuing higher education has, however, been studied in a more generalized manner. In a study by Kwon (2018), autonomy was found to be the most significant determinant

of both general and task-related self-efficacy. This is likely since in an autonomous and flexible workplace, individuals are better equipped to manage independent tasks and more readily develop self-concepts, such as a belief in their capabilities (Kwon, 2018), which is a significant factor in learning in higher education (Kleemola et al., 2024). Another study by Neureuther & Brömer (2020) highlighted the significance of communication with other participants, the availability of flexible entry points, and the preference for completing an offer in smaller sections over an extended period as a mode for learning (Neureuther and Böhmer, 2020). Continuing higher education programs should be flexible enough to effectively reach diverse target groups. For instance, low-threshold and short-term options, such as Massive Open Online Courses (MOOCs) or web-based offerings, can serve as entry points into study programs. MOOCs are particularly beneficial due to their flexibility in time and location, making them easier to incorporate into daily life. (Neureuther and Böhmer, 2020)

Burrow et al. (2016) conducted a systematic review exploring the motivations and experiences of part-time social and healthcare professionals engaged in higher education. Their findings highlighted key challenges such as adjusting to academic expectations, managing the competing pressures of study, work, and family life, and the varying levels of support available in personal and professional settings. The study concluded that professionals in health and social care face multiple barriers when pursuing part-time continuing education. Further research is needed to identify how higher education institutions can better meet their learning needs and develop teaching strategies that support effective and flexible learning. (Burrow et al., 2016)

2.1.4 Modern trends in continuing nursing education provided by Finnish higher education institutions

The legislation concerning social and healthcare professionals includes regulations ensuring continuing professional development. Act on

Healthcare Professionals (559/1994, §18) outlines the continuing education obligations of healthcare professionals and their employers. Healthcare professionals must maintain and develop skills required for professional activity and familiarize themselves with the rules and regulations concerning their professional activities. This also includes the demand of healthcare employers to create conditions for the personnel's participation in continuing professional education. (Act on Healthcare Professionals 559/1994, 1994; Finnish Government, 2023) In addition to the Act on Healthcare Professionals, the Healthcare Act (1326/2010), the Act of Organizing Social and Healthcare (612/2021), and the Decree of the Ministry of Social Affairs and Health (57/2024) have regulations about continuing professional development.

The Finnish Government's project for developing higher education in the social and health sector, as stated in its final report, emphasizes the need for universities and healthcare organizations to establish the working life equivalence of continuing education jointly. The legislation on Universities of Applied Sciences (UAS) and universities was amended in 2018, allowing higher education institutions to better respond to the problems of skilled labor availability and the growing demand for further and supplementary education. The report also emphasizes the need for continuing education to effectively impact healthcare professionals' career paths. (Finnish Government, 2023) The growing role of continuing education has also been emphasized in the Finnish Education Evaluation Centre's (FINEEC) evaluation on higher education in social and health care (FINEEC, 2021).

The nature of clinical care influences nurses' abilities to seek CPD (Hakvoort et al., 2022). Thus, continuing education should be accessible, attainable, and relevant (Mlambo et al., 2021). Blended learning is a method that combines face-to-face learning with online learning (Castro, 2019; Kang and Seomun, 2018). Beyond formal educational experiences, blended learning encompasses informal learning that occurs outside the structured curriculum. Learning designers must recognize that learning is an ongoing process that happens everywhere and at all times. (Hofmann, 2018)

Online education utilizes internet technologies, digital media, and innovative tools to engage learners and deliver instructional content within a dynamic and varied learning environment. It broadly includes methods and resources designed to enhance, complement, or even substitute traditional classroom teaching (Smith et al., 2015). An online course is specifically defined as one where at least 80% of the content is delivered online (Allen and Seaman, 2014). Online learning can be conducted synchronously, with content delivered in real time, requiring students to be present at a specific time. More commonly, it is undertaken asynchronously, allowing students to access content on demand within a course timeframe or at their own pace. (Smith et al., 2015)

2.1.5 Curriculum development in continuing education

Theoretical frameworks, such as Kern's 6-step approach (Kern, 2022) are available for educational curriculum development, implementation, and evaluation. Kern's 6-step approach to Curriculum Development derives from the generic curriculum development approaches by Taba, Tyler, Yura, Torres, McGaghie, and Golden (Kern, 2022). The underlying assumptions of the Kern's approach can be summarized as follows: 1) educational programs inherently possess aims or goals, regardless of their clarity, 2) health professional educators have a duty—both ethical and professional—to respond to the needs of their students, patients, and the wider community, 3) these educators should be accountable for the results of their educational interventions, and 4) to effectively meet these goals, it is crucial to adopt a structured and methodical approach to designing educational curricula. The framework is presented with six steps, which are illustrated in Table 2. The interactive and continuous nature of the framework is underpinned. Several phases usually coincide, and the curriculum development process continues to evolve.

Kern's model has been used increasingly during recent years, e.g., in the development of a novel anaesthesiology curriculum for perioperative code status and goals of care discussions (Robertson et al., 2019), integrating health systems science curricula into medical education (Singh et al., 2021),

and reviewing an initial physician assistant training program's orthopedics course curriculum (Chalupa et al., 2022).

Table 2: Kern's 6-step approach to Curriculum Development (Kern, 2022)

Step	Definition
Step 1: Problem Identification and General Needs Assessment	Defining the health care problem, mapping the current and ideal approaches.
Step 2: Targeted Needs Assessment	Assessing the needs and learning environments of the target learning group.
Step 3: Goals and Objectives	The curriculum goals and objectives can be written after phases one and two. Objectives are developed from general goals to more specific, measurable ones.
Step 4: Educational Strategies	After the learning objectives are set, curriculum content and educational methods are selected.
Step 5: Implementation	Includes both the implementation and evaluation of the educational intervention.
Step 6: Evaluation and Feedback	Assessing the individuals and the curriculum. Both formative and summative assessments can be utilized.

2.2 BENEFITS OF CONTINUING EDUCATION IN NURSING

2.2.1 Job satisfaction

One of the benefits of continuing nursing education is improved job satisfaction (Niskala et al., 2020; Waltz et al., 2020). In the healthcare sector, job satisfaction has a significant impact on quality, productivity, effectiveness, and healthcare costs. It serves as an indicator of employees' well-being and quality of life within the organization. Higher job satisfaction is associated with improved performance and is inversely related to absenteeism and turnover. (Karaferis et al., 2022) Some definitions of job

satisfaction focus on the individual's emotional reactions or attitudes toward their work as a whole (Locke, 1976; Price, 2002). Other definitions take into account both the overall nature and specific aspects of a job, emphasizing how individuals evaluate their work environment based on personal expectations and perceptions (Spector, 1997). Some later definitions, however, focus on the factors contributing to job satisfaction or dissatisfaction and examine different job aspects that can lead to these feelings (Lu et al., 2012). A concept analysis utilizing Walker and Avant's method (Walker and Avant, 2019) defines the main attributes of job satisfaction as "(1) fulfillment of desired needs within the work settings, (2) happiness or gratifying emotional responses towards working conditions, and (3) job value or equity." (Liu et al., 2016, p. 1). This concept analysis also highlights that nurses' job satisfaction may be shaped by different observable factors depending on cultural, situational, and contextual variations.

The nursing profession holds significant importance in delivering high-quality healthcare services. The presence of nursing practitioners who possess essential competencies and exhibit high levels of job satisfaction is critical for achieving optimal patient outcomes. (Alshammari and Alenezi, 2023) The connection between nursing competence and job satisfaction has been indicated in research, and job satisfaction seems to increase with working experience (Shaheen et al., 2021). Furthermore, the possibility for professional development seems to increase nurses' job satisfaction (Waltz et al., 2020). It suggests that through continuing education, it is possible to strengthen nurses' professional development and job satisfaction (Niskala et al., 2020; Shiri et al., 2023).

2.2.2 Nursing competency development

Competency is defined as the ability to carry out a particular task or activity effectively, using the necessary knowledge and skills. Due to its multifaceted nature, defining and measuring nursing competency is a complex process (Mrayyan et al., 2023). Nursing competency encompasses the fundamental abilities necessary to perform one's role as a nurse

effectively. As a result, clearly defining nursing competency is critical for laying the groundwork for nursing education curricula. Despite the importance of nursing competency, its conceptual foundations are still underdeveloped, presenting ongoing challenges in defining and structuring the concept effectively. (Fukada, 2018) A recent systematic review stated that several factors significantly impact nurses' clinical competency. These factors included working experience, working environment, educational level, job satisfaction and stress, clinical training, and intention to leave. (Almarwani and Alzahrani, 2023) A concept analysis has utilized Walker and Avant's concept analysis approach (Walker and Avant, 2019) in defining competency in nursing practice as "The ability to execute a certain task or action with the necessary knowledge. It is the dynamic process of acquiring knowledge, behaviours, judgement, skills, values, and attitudes to provide patients with effective, safe, and quality care." (Mrayyan et al., 2023, p. 5).

Another concept analysis adhering to a three-phase hybrid model (Schwartz-Barcott, 2000) defined the concept of clinical competence in nursing as a continuous process involving the integration of knowledge, values, attitudes, technical and communication skills, ethical principles, clinical judgment, critical thinking, creativity, and innovation in practice. This competence can be strengthened through education and managerial support, and is closely linked to accountability, professionalism, and career success (Nabizadeh-Gharghozar et al., 2021)

Continuing education can improve nursing competence. Research indicates that nurses hope their managers will support them in maintaining competency through ongoing professional development. (Rahmah et al., 2021) Continuing competency development throughout one's life is significant for nurses. The healthcare system may sometimes fund this acquisition, but the critical question is how the system leverages it and, ultimately, how it translates into patient care. (Ortega-Lapiedra et al., 2023)

Several theoretical frameworks exist for nurses' competency development (Benner, 2009; Gardner, 2012; Graf et al., 2020). One is the well-known and widely used Benner's novice-to-expert theory. The theory derives from Dreyfus' skill acquisition model and was applied to nursing

performance by Benner in 1982 (Benner, 1982). Like the Dreyfus model, Benner's novice to expert theory outlines the development of a nurse from a novice to an expert through five distinct stages, illustrated in Figure 1 (Benner, 2009). Novice nurses are new to clinical settings and lack experience with specific patient populations. As they advance, nurses become proficient by mastering time management, understanding holistic care, and eventually relying on intuition in clinical practice (Benner, 1982, 2009).

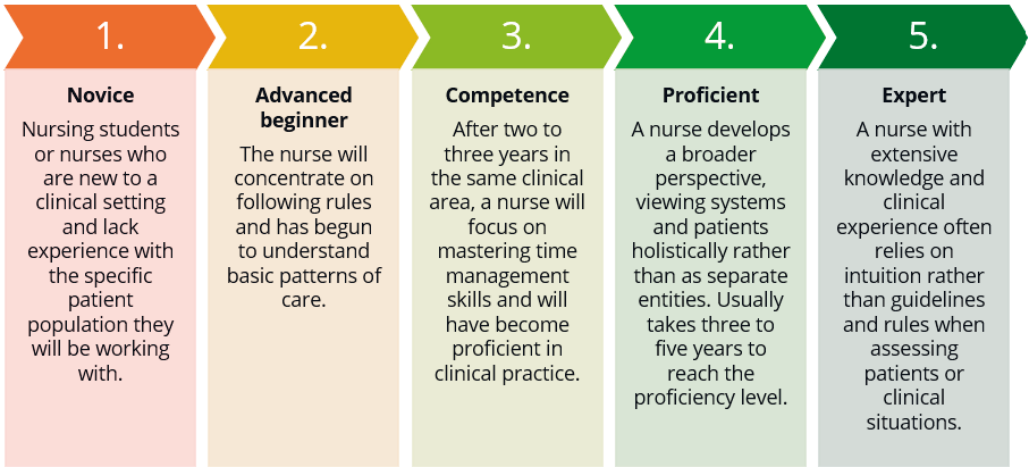

Figure 1: Benner's novice to expert model (Benner, 2009).

According to Benner's work, expert nurses represent the pinnacle of clinical nursing practice, playing a crucial role in delivering optimal patient care and achieving excellent clinical outcomes. In conjunction with the Dreyfus model of skill acquisition, Benner's theory offers valuable insights into the progression required for nurses to reach expert status. (Healy, 2024) Expert nurses represent the highest level of nursing practice and are crucial for ensuring excellent patient care. They are characterized by their intuitive practice, which allows them to act on relevant information and prioritize interventions without needing explicit reasoning. Expert nurses serve as resources, mentors, and preceptors for novices and advanced beginners, as well as role models for competent nurses. They contribute to

positive patient outcomes and enhance the culture of their units and practices. (Benner, 2009; Healy, 2024)

2.2.3 Nursing practice outcomes

Nurse-sensitive outcomes are patient outcomes that fall within the scope and domain of nursing practice and are directly influenced by nursing actions and interventions (Veldhuizen et al., 2021). A nursing-sensitive outcome is "an individual, family, or community state, behaviour, or perception that is measured along a continuum in response to a nursing intervention(s)" (Moorhead et al., 2023, p. 6). The outcomes are diverse metrics that can be assessed by nurses, other healthcare professionals, caregivers, or patients (Moorhead et al., 2023). Identifying desirable and measurable nursing outcomes and evaluating their actualization is a pivotal part of the basic nursing process (Ernstmeyer and Christman, 2021).

Nurses advocate for a comprehensive evaluation of their practice that extends beyond safety outcomes. When monitoring medical errors, falls, and pressure injuries, it is imperative to consider the characteristics of the working environment and patient experiences when assessing nurse-sensitive outcomes (Sim et al., 2018). Empirical evidence indicates that an increased incidence of missed nursing activities is associated with understaffing. Furthermore, inadequate staffing and a high frequency of missed nursing activities are inversely related to the quality of nursing care, job satisfaction, patient safety, and retention rates (Cho et al., 2020). Moreover, patients' perceptions of nurse staffing adequacy are a critical determinant of their overall healthcare experience (Cho et al., 2017)."

2.3 NURSING CAREER PATHWAY AND ADVANCED PRACTICE NURSING

2.3.1 Nursing career pathway in Finland

Nurses' career development and utilization of skills are significant competitive factors in maintaining the Finnish welfare society (Finnish Nurses Association [FNA], 2023). Finland's healthcare system is built on

publicly funded services that are available to all residents. Healthcare professionals in the country are classified either as licensed practitioners or as individuals holding a protected professional title. (EU Healthcare, 2023) Registered nurses (RNs), including midwives, paramedics, and public health nurses, are educated at UASs (FNA, n.d.). After the bachelor-level education, nurses have the opportunity to specialize in specific fields, which requires 30 to 60 European Credit Transfer and Accumulation System (ECTS) credits. UASs offer specialized nurse programs in various subjects, including wound care. (Liljamo et al., 2017) In the continuum of the clinical nursing career, the next step is the advanced practice nursing roles, such as a CNS or NP. The minimum educational requirement for the APN roles in Finland is a master's degree, comprising 90 to 120 ECTS credits (Jokiniemi et al., 2021a), which can be pursued at universities or UASs.

While the exact number of specialized nurses (SNs) and APNs in Finland is unknown, approximately 120 CNSs worked in Finland in 2022 (FNA, 2023). Seventy-three percent of Finnish CNSs have acquired a master’s degree from a university, and 9 % from a UAS. Additionally, 18% of working CNSs have doctorate-level preparation. The majority of CNSs (68 %) work in specialized healthcare settings. (FNA, 2023) The career progression for nurses in Finland is illustrated in Figure 2.

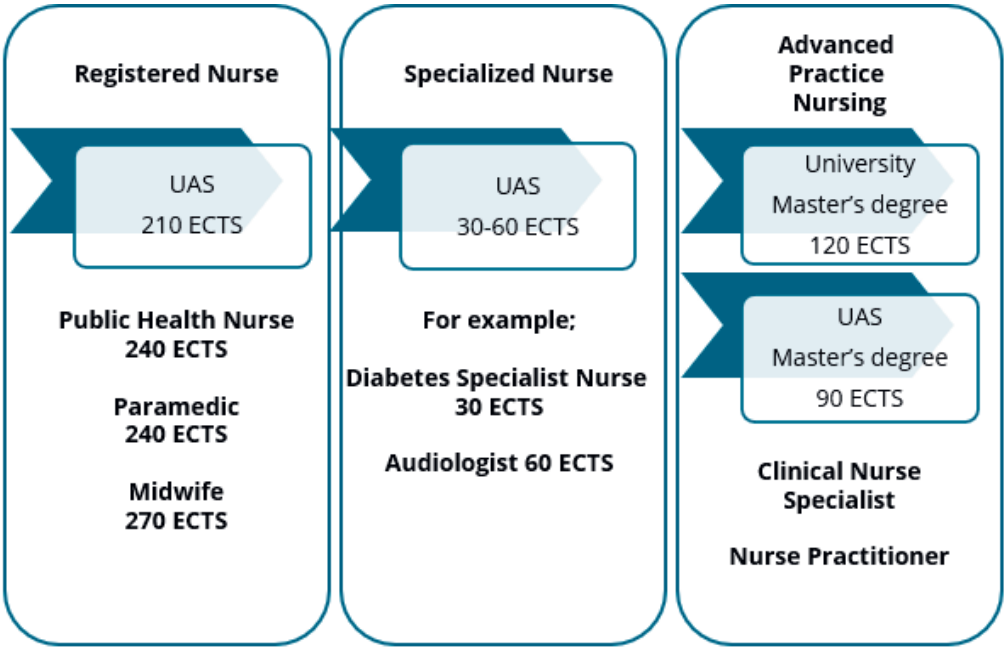

Figure 2: Nursing career pathway in Finland (FNA, n.d.).
UAS: University of Applied Sciences, ECTS: European Credit Transfer System

2.3.2 Advanced practice nursing

Advanced practice nursing encompasses a broad scope of responsibilities that are essential to contemporary healthcare systems globally. According to ICN, it involves the delivery of advanced-level care by nurses who have acquired expert clinical skills, decision-making capabilities, and a comprehensive knowledge base through additional education (master's degree) and training (ICN, 2020). This study adopts the ICN definitions of APNs and CNSs as the conceptual framework for examining professional roles and competencies.

The notion of advanced practice nursing originated in the US and Canada over 60 years ago (Lewis, 2022). The APN roles were established in the United Kingdom and Australia in the late 1980s (ICN, 2020; O'Baugh et al., 2007). Around the year 2000, APN roles began to take shape in the Nordic region (Jokiniemi et al., 2022). Advanced practice nursing is among the most rapidly expanding healthcare professions in the United States

(Ohio Association of Advanced Practice Nursing, 2023), and several European countries are now utilizing APN roles (Kilpatrick et al., 2024). In the ever-evolving landscape of healthcare, the imperative to meet diverse population health needs has catalyzed the emergence of advanced practice nursing roles over the past six decades (Boehning and Punsalan, 2023; De Raeve et al., 2024).

Expanding the number of advanced practice nurses is essential to ensure healthcare delivery is supported by a balanced and sustainable mix of nursing skills (ICN, 2025). The WHO has advocated for expanding nurses' scope of practice to ensure equitable care delivery and meet the increasing demand for healthcare services (National Academies of Sciences and Medicines, 2021; WHO, 2020a). In the report "State of the World's Nursing," the WHO stated that 78 countries, representing 53% of the responding countries, reported utilizing advanced practice roles for nurses. Workplace policies should address the factors that affect nurse retention in practice settings. This involves, e.g., providing support for nurse-led care models and advanced practice roles. (WHO, 2020b)

A recent synthesis of systematic reviews revealed strong and consistent evidence that care provided by Advanced Practice Nurses (including NPs and CNSs) is comparable to—or often exceeds—that delivered by physicians across various indicators, patient groups, and clinical settings (Kilpatrick et al., 2024). Research shows that advanced practice nursing positively impacts clinical outcomes and cost-effectiveness (Htay and Whitehead, 2021; Ordóñez-Piedra et al., 2021).

There seems to be a lack of a consistent definition of barriers to nursing practice. Barriers to APN practice, however, have been rigorously studied. In the US, these barriers include institutional barriers (Kleinpell et al., 2022), licensure and administrative challenges (Kleinpell et al., 2022; Schorn et al., 2022), therapy limitations, requirements for physician signatures, lack of collegiality, prescribing restrictions, inconsistent reimbursement, procedures exclusive to physicians, and issues related to telehealth (Schorn et al., 2022). There is no unified agreement on the APN curriculum or role preparation in Europe. Additionally, not all countries acknowledge

or endorse advanced practice within their nursing regulations. (G. Lee et al., 2020; Sulosaari et al., 2023)

2.3.3 Clinical nurse specialist

A CNS is one of the most recognized advanced practice nursing roles. The CNS is a nurse with a master's or doctoral degree, tailored explicitly to CNS practice. They provide healthcare services by applying advanced, specialized expertise, particularly when caring for patients or populations with complex or high-risk needs. CNSs educate and support interdisciplinary teams, promoting change and innovation in healthcare systems. Their practice focuses on advanced specialized nursing care and a systems approach, integrating direct and indirect clinical services. (ICN, 2020) Through instruction, advice, mentorship, and the promotion of evidence-based or evidence-informed nursing practices, CNSs advance nursing practice and excel as expert clinicians in their specialty areas (ICN, 2020; Kilpatrick et al., 2024).

The CNS role has proven successful in various countries and settings (ICN, 2020). Recent studies have found several positive CNS-specific outcomes, including enhanced quality and safety of care, increased collaboration, improved staff competencies, and the integration of best practices (Jokiniemi et al., 2023), and higher patient satisfaction (Htay and Whitehead, 2021; Sánchez-Gómez et al., 2019). Assessing and evaluating CNS-related outcomes is essential in the current cost-containment environment (Kleinpell, 2021). The Davidson Hierarchy of outcome evaluation in CNS practice presents four levels of practice outcomes from least-valued and most-utilized to most-valued and least-utilized outcomes assessment in four levels starting from the bottom: 1) time spent on activities, 2) process measures, 3) surrogate outcome measures, and 4) patient or staff outcomes. Each level should be essential when indicating CNS-related nursing and patient outcomes. The actual effectiveness of a practice change is determined by assessing long-term patient and nursing outcomes, even if it takes months to obtain meaningful results. (Kleinpell, 2021)

The CNS core competency models vary between countries (Fulton et al., 2021; ICN, 2020). For example, in Canada, the core competencies are grouped under the following categories: clinical care, system leadership, advancement of nursing practice, and evaluation and research (CNA, 2014). In the US, CNS competency is described within three spheres of impact: nurses and nursing practice, patient/client, and organization/system (Baldwin et al., 2009). In Finland, the CNS core competencies were categorized into four areas: patient competency, clinical nursing leadership competency, organizational competency, and scholarship competency, based on rigorous research (Jokiniemi et al., 2021a, 2021b).

With ongoing global healthcare reform, CNSs will have opportunities to address unmet needs across different populations and healthcare environments. To fully leverage these opportunities, it is crucial to enhance understanding of the CNS role within advanced practice nursing. This includes ensuring title protection, mandating graduate education (at least a master's degree), and defining a clear scope of practice. (ICN, 2020) For clarity, this study adheres to the International Council of Nurses' publication Guidelines on Advanced Practice Nursing (2020) regarding the role of a CNS.

2.4 SUMMARY OF THE THEORETICAL BACKGROUND

Increasing nursing excellence to an advanced level is a crucial global goal due to the demands of modern healthcare. The population is ageing, and the burden of chronic diseases is increasing (Hacker, 2024). In addition, there is a shortage of nurses and other healthcare professionals globally (WHO, 2016). To address these challenges, advanced nursing roles with graduate preparation (ICN, 2020; Lewis, 2022), such as CNS and NP, have been gaining worldwide popularity (Htay and Whitehead, 2021; Kilpatrick et al., 2024; Lewis, 2022).

Professional development through continuing education can increase nursing competency (Mlambo et al., 2021). Continuing education should be role-specific and adaptable to acquire professional competency (Kurtović et al., 2024). Assessing continuing education outcomes is a complex and

multifaceted phenomenon, and several challenges to continuing education effectiveness have been identified (Arvidsson et al., 2021; Ortega-Lapiedra et al., 2023). However, creating space for quality improvement at the system level is deemed highly necessary (Arvidsson et al., 2021).

Continuing education can be developed, implemented, and assessed through various theoretical frameworks, such as Kern's 6-step approach to curriculum development (Kern, 2022). What is equally important in every implemented framework, is the longitudinal and thorough evaluation of the actual effectiveness of the educational intervention (Ortega-Lapiedra et al., 2023). Equally as important is to evaluate the effectiveness of the interventions from the nurses' perspective, including job satisfaction (Mlambo et al., 2021).

Nursing competency can be illustrated through theoretical frameworks, such as Benner's novice-to-expert model (Benner, 2009; Healy, 2024) and Hamric's model for advanced practice nursing (Hamric et al., 1996; Oberle and Allen, 2001). Benner's model has been recognized in the field of advanced practice nursing by Oberle & Allen (2001) and Hamric (2008) as there are notable similarities between the descriptions of APNs and expert nurses (Comellas-Oliva, 2016). Hamric outlined key competencies essential to advanced practice, placing particular emphasis on the concept of "expertise." These competencies include advanced clinical skills, mentoring and coaching, consultation, research capabilities (such as conducting, evaluating, and applying research), leadership in clinical and professional contexts, collaboration, the ability to drive change, and ethical decision-making. Thus, while Hamric considers expertise a vital component of advanced practice, it is not sufficient on its own (Hamric et al., 1996; Oberle and Allen, 2001).

Nurse-sensitive outcomes are a variety of metrics that can be evaluated by nurses, other healthcare professionals, caregivers, or patients (Moorhead et al., 2023). Identifying desirable and measurable nursing outcomes and assessing their achievement are crucial components of the basic nursing process (Ernstmeyer and Christman, 2021). In this study, nursing practice barriers encompass all aspects that hinder nursing

practice outcomes or prevent nurses from achieving the desired outcomes of their work.

3 AIMS OF THE STUDY

This research aimed to examine the effectiveness of a continuing education intervention on self-reported nursing practice outcomes and barriers by following steps: Identifying research gaps, validating an assessment tool, and evaluating the impact of a 2-year pilot intervention designed to enhance CNS competency. This study also examines whether job satisfaction and CNS-related competencies are associated with self-reported nursing practice outcomes and barriers. The specific aims were as follows:

Aim I: to explore the scope and characteristics of scientific research focused on continuing education for advanced practice nurses (sub-study I).

Aim II: to assess the psychometric qualities of the Finnish adaptation of the Specialist Outcomes and Barriers Analysis (SOBA) instrument, using a sample including expert panelists and Finnish RNs (sub-study II).

Aim III: to examine the effects of the EFFICACY pilot intervention on nurses' perceived practice outcomes and barriers, and to explore the connection between job satisfaction, CNS core competencies, and perceived practice outcomes and barriers (sub-study III).

4 SUBJECTS AND METHODS

This research was conducted with three sub-studies: a scoping review of the literature (sub-study I), a content and construct validation study of the Finnish version of the Specialist Outcomes and Barriers Analysis (SOBA) scale (sub-study II), and a pilot intervention study with three repeated measures (sub-study III). The study process is summarized in Table 3

Table 3: Summary of the study process

	Sub-study / Original publication I	**Sub-study /** original publication II	**Sub-study /** Original publication III
Objective	To examine the nature and extent of scientific research addressing continuing education for advanced practice nurses	To evaluate the psychometric properties of the Finnish version of the SOBA instrument in a sample comprising expert panelists and Finnish RNs	To examine the effects of the EFFICACY program on nurses' perceived practice outcomes and barriers. To examine the relationship between job satisfaction, CNS competencies, and nursing practice outcomes and barriers
Participants / Data	21 studies	Nurses n = 60 Panelists n = 5	Intervention n = 35 Control n = 44
Methods	Scoping review	Cross-sectional web-based survey	Longitudinal web-based survey
Data Analysis	Narrative synthesis	Principal component analysis Content validity index	Linear mixed-effect model
Timeline	2021-2023	2021-2023	2021-2024

4.1 SCOPING REVIEW OF LITERATURE (SUB-STUDY I)

4.1.1 Objectives

Sub-study I was conducted as a scoping review of the literature. Scientific research published between 2012 and 2023 on continuing education for advanced practice nurses was examined to determine its scope and focus. The study specifically aimed to address the following objectives:

Objective 1: to explore what kind of continuing education interventions exist for APNs.
Objective 2: to assess what is known about APNs' continuing education needs and preferences.
Objective 3: to determine what limitations the authors of the selected articles identify in their research.

4.1.2 Methods

The Joanna Briggs Institute's (JBI) manual for scoping reviews was adhered to (Peters et al., 2024) and the study protocol was published in Figshare (Wright et al., 2022). A systematic search was conducted on September 17, 2023, using CINAHL, Cochrane Library, Joanna Briggs Institute's Evidence-Based Practice Database, PsycINFO, PubMed, Scopus, and Web of Science to retrieve articles published between 2012 and 2023. Altogether, 1534 studies were identified, of which 21 were selected in the review following the inclusion criteria. For further information, see article I in the original publications section of this dissertation.

4.1.3 Data analysis

Data were collected by two independent reviewers using the extraction tool specified in the study protocol. (Wright et al., 2022). The extracted information included the author(s), year, country, title, aims, population, sample size, study design, methods, key findings, and limitations. The synthesis employed a narrative, descriptive method (Aromataris and Munn,

2020). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines were used to ensure the quality of the manuscript (Tricco et al., 2018).

4.2 VALIDATION OF THE SPECIALIST OUTCOMES AND BARRIERS ANALYSIS SCALE INTO FINNISH LANGUAGE (SUB-STUDY II)

4.2.1 Objectives

Sub-study II was conducted in two phases: 1) A content validation study of the translated instrument and 2) a construct validation study exploring the psychometric properties of the instrument. The content validation was conducted as a web-based survey with five expert panelists and roundtable discussions. The construct validation study comprised 60 nurses participating in the web-based survey. The research objectives were:

Objective 1: to examine the content validity and the cultural adaptation of the Finnish version of the SOBA instrument.
Objective 2: to evaluate the psychometric properties of the Finnish version of the SOBA instrument.

4.2.2 Methods & participants

In the content validation study, the original SOBA instrument, developed by Smith and Waltman in 1994, was translated into Finnish in 2021. To strengthen the study, certified translation services and expert panelists were used to ensure the accuracy of the two-step Finnish translation of the SOBA instrument. The SOBA tool consists of two main sections: outcomes and barriers. The outcomes section includes 45 closed-ended items and one open-ended question, with all closed items rated on a Likert scale from 1 (seldom influences this outcome) to 4 (constantly influences this outcome). The barriers section contains 14 closed items with a Likert scale ranging from 1

to 4 (seldom encountered as a barrier – constantly encountered as a barrier). The original version of the instrument also includes a demographic section, comprising 12 questions about the respondent's background. This demographic section of the instrument was not utilized in the Finnish version.

The translation process depicted several strategies to ensure translation fidelity (see article II in the original publications section of this dissertation). Expert panelists and personnel from the EFFICACY project evaluated the translation within the Finnish context to ensure it maintained idiomatic, conceptual, and experiential accuracy.

The construct validation study was conducted as a cross-sectional, web-based survey (n=60) of Finnish RNs. The sample comprised students from the EFFICACY project (26 responses) and a control group (34 responses), selected by the organization's stakeholders. The construct validation study was conducted using Principal Component Analysis (PCA) (Abdi and Williams, 2010). For further information, see the original publications section of the dissertation.

4.2.3 Data analysis

In the content validation study, the data analysis was carried out by calculating the content validity index (CVI) (Lynn, 1986; Polit and Beck, 2006) for each item and for the whole scale. Based on ratings from an expert panel (n = 5), the item-level Content Validity Index (I-CVI) was calculated as the proportion of panelists who rated each item as 'relevant' or 'highly relevant.' The scale-level CVI (S-CVI/Ave) was then computed by averaging the I-CVI scores across all items.

The construct validation study was carried out using PCA with Kaiser normalization (Abdi and Williams, 2010). To obtain more interpretable components, an oblique Promax rotation was applied to the outcomes scale, and an orthogonal varimax rotation was applied to the barriers scale. Missing values were not imputed (n = 43). Strengthening the Reporting of

Observational Studies in Epidemiology (STROBE) statement (von Elm et al., 2007) was used to ensure the quality of the manuscript. The data were analyzed with the Statistical Package for the Social Sciences (SPSS, version 27.0, 2017; IBM Corp, Armonk, New York).

4.3 OUTCOME EVALUATION OF A CLINICAL NURSE SPECIALIST CONTINUING EDUCATION PILOT PROGRAM: AN INTERVENTION STUDY WITH THREE REPEATED MEASURES (SUB-STUDY III)

4.3.1 Objectives

Sub-study III was a pilot intervention study conducted with three repeated measures. The data were collected with a web-based survey before the EFFICACY intervention (September 2021), immediately after (June-August 2023), and one year after the intervention (May 2024). The UEF's Department of Nursing Science developed, implemented, and managed the EFFICACY pilot intervention between September 2021 and May 2023. The study objectives were as follows:

Objective 1: to assess how the nurses evaluated their perceived practice outcomes and barriers before, immediately after, and 1 year after the EFFICACY pilot intervention
Objective 2: to explore the predictors associated with nurses' perceived practice outcomes and barriers.
Objective 3: to explore the relationship between CNS core competencies and job satisfaction with nurses' perceived practice outcomes and barriers.

4.3.2 The EFFICACY pilot intervention

Northern Savo is the most impaired and, by many measures, the most disadvantaged (from the perspective of human, social, and economic disadvantage) region in Finland (North Savo Wellbeing Services County, 2021). North Savo has a low birth rate, and the population is ageing, creating a dependency ratio issue in the area (Nort Savo Regional Council,

2025). Additionally, the region experiences a high burden of mental health issues (Finnish Institute for Health and Welfare, 2022).

Considering these regional attributes, the UEF's Department of Nursing Science developed the EFFICACY pilot intervention. The objective of the pilot program was to offer continuing education to enhance CNS-related competency. The program also explored whether the educational content could be integrated into UEF's Nursing Science master's degree program as an advanced practice nursing module.

The intervention curriculum was developed through a series of steps: first, international and national CNS curricula were compared and assessed. Additionally, consultations were held with nursing managers to address the need for continuing education to bolster clinical competence in healthcare settings. The research team, which had extensive experience in CNS practice and research, also participated in these discussions. Discussions were also held within the research team, who were highly experienced in CNS practice and research. The EFFICACY syllabus was created after cross-mapping the existing CNS curricula and having round-table discussions. The syllabus outlined the EFFICACY curriculum, including prerequisites and admission criteria, learning outcome-based educational content, teaching methods, study methods, and assessment criteria.

The EFFICACY pilot intervention project was developed to enhance RNs' competency in CNS scope of practice, advanced practice mental health nursing, evidence-informed decision-making, current healthcare challenges, advanced practice nursing, and project development skills. This pilot intervention for continuing education featured a two-year curriculum worth 40 ECTS. The curriculum, detailed in Table 4, did not result in a specific degree but provided continuing education credits. This study examines the intervention effectiveness on participants' self-reported nursing practice outcomes and barriers, as well as the potential relationship between CNS competencies, job satisfaction, and nursing practice outcomes and barriers.

The intervention was organized by the UEF's Department of Nursing Science for the nurses working in the North Savo area in Finland between September 2021 and May 2023. The development and assessment of the

EFFICACY pilot intervention are depicted in Table 5 through Kern's six-step model approach (Kern, 2022). The assumptions of the andragogical model and adult learning, presented in chapter 2, guided the development of the educational content.

Table 4: The EFFICACY curriculum

Theme	Courses	ECTS
CNS Scope of Practice	CNS Competency and Scope of Practice	4 ECTS
	Leadership in Clinical Nursing	3 ECTS
	Basic Pharmacology	3 ECTS
Advanced Practice Mental Health Nursing	Psychiatry for CNSs	2 ECTS
	Patient Encounter and Interviewing in Mental Health Nursing	3 ECTS
	Therapeutic Interventions in Mental Health Nursing	5 ECTS
Evidence-Informed Policymaking	Evidence-Based Nursing and Quality Improvement	4 ECTS
	Information Skills in Nursing	1 ECTS
Current Challenges in Healthcare and Advanced Practice Nursing	Nursing and Its Leadership in Times of Crisis	5 ECTS
Clinical work placement	Clinical Work Placement and Project Management	10 ECTS
Altogether		**40 ECTS**

Table 5: The development of the EFFICACY intervention through Kern's six-step approach (Kern, 2022).

Kern's Approach	The EFFICACY intervention
Step 1: Problem Identification and General Needs Assessment	• Defining the need for a CNS-competency enhancing continuing education program through regional characteristics and roundtable discussions with nursing managers working in WSCNS, Finland. • Cross-mapping the current national and international CNS curricula.
Step 2: Targeted Needs Assessment	• Assessing the needs of the target group with WSCNS representatives. • Planning of the learning environment (UEF property and digital platforms, clinical visits in WSCNS.
Step 3: Goals and Objectives	• The EFFICACY syllabus was created by generating the general goals of the program. • Learning objectives were created. • Student admission criteria were established.
Step 4: Educational Strategies	• Course outline, credits, and learning objectives were set. • Educational content, teaching and study methods, and assessment criteria were set.
Step 5: Implementation	• The EFFICACY intervention was implemented as a 40 ECTS continuing education program between 09/2021 and 15/2023. • Course evaluations were collected.
Step 6: Evaluation and Feedback	• Curriculum evaluation was done during and after the program implementation with course evaluations and focus group interviews.

WSCNS: Wellbeing services county of North Savo, CNS: Clinical nurse specialist

4.3.3 Methods & participants

The data were gathered with a web-based survey conducted before, immediately after, and one year after the EFFICACY intervention (Figure 3). The survey was sent to all students of the EFFICACY program (n = 35) and a control group (n = 44) consisting of nurses working in the same organizations. Because the intervention group size was predetermined, no power analysis was conducted. The participants were RNs working in the North Savo area, Finland. The intervention study process is presented in Figure 3. For additional information, see the original publications section of this dissertation.

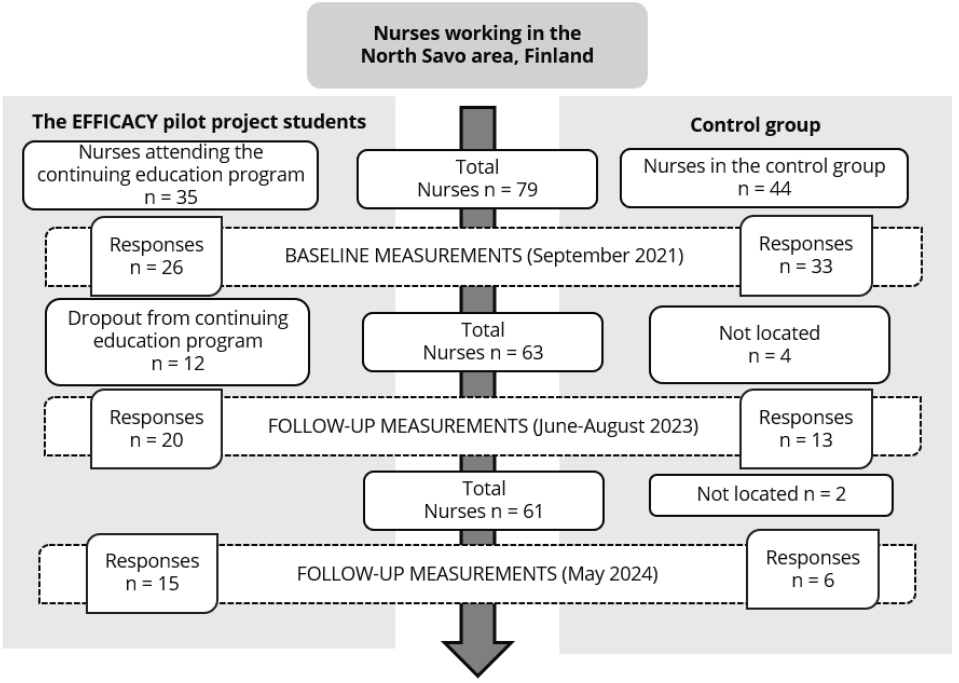

Figure 3: The intervention study process, adapted from Wright et al. (2025)

4.3.4 Instruments

The web-based survey consisted of a background information sheet, the Clinical Nurse Specialist Core Competencies (CNS-CoCos) instrument (Jokiniemi et al., 2018), the Finnish version of the SOBA instrument (Wright

et al., 2023), and the Kuopio University Hospital Job Satisfaction Scale (KUHJSS) (Kvist et al., 2012).

CNS core competencies were measured with the CNS-CoCos instrument, initially developed in Finland by Jokiniemi et al. (2021c). The scale consists of 47 items across four domains: patient, clinical nursing leadership, organizational, and scholarship competence. The instrument's reliability was verified using Cronbach's alpha coefficients: 0.86 for nursing competence, 0.89 for patient competence, 0.90 for organizational competence, and 0.92 for scholarship competence (Jokiniemi et al., 2021c).

Job satisfaction was measured with the KUHJSS. It consists of 38 items that assess job satisfaction across seven areas: leadership, requiring factors of work, motivating factors of the work, working environment, work welfare, participation in decision-making, and sense of community. The scale's reliability (Cronbach's α ranging from 0.64 to 0.92 between subscales) was considered modest. (Kvist et al., 2012) After its development, the scale has been widely used and translated into various languages, e.g., the Greek language (Sapountzi-Krepia et al., 2017).

Nurses' self-reported practice outcomes and barriers were assessed using the Finnish version of the SOBA scale. This version includes 56 items covering five outcome areas: patient and family response to care, organizational processes, research activities, cost of care, and consultative/interdisciplinary processes. It also identifies barriers in two categories: organizational and interpersonal, as well as workflow-related barriers. The scale demonstrated adequate reliability, with sub-scale Cronbach's alpha coefficients varied between 0.73 and 0.92 in the scale validation study (original publication II).

Based on the data of this study, all scales demonstrated excellent reliability. The Cronbach's alphas were 0.97 for the CNS-CoCos, 0.91 for the KUHJSS, and 0.96 for the SOBA scale.

4.3.5 Data analysis

The data analysis was carried out with a linear mixed-effects model (Brown, 2015) in SPSS (version 27.0, 2017; IBM Corp, Armonk, New York).

The dropout analysis was conducted with the Mann-Whitney U-test (Knapp, 2017). The Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) checklist was utilized (Des Jarlais et al., 2004).

4.4 DATA SYNTHESIS OF EVIDENCE COLLECTED WITH SUB-STUDIES I-III

Evidence synthesis employs precise and stringent techniques to compile data from various studies on a particular subject, offering a comprehensive overview of the existing knowledge on the topic in question (Beecher et al., 2022). Since the sub-studies of this dissertation utilized both qualitative (sub-study I) and quantitative data analysis methods (sub-studies II and III), a narrative synthesis using a convergent integrated approach (Lizarondo et al., 2024) was used. Narrative synthesis aims for a reasonable interpretation of the effects and circumstances, is a flexible method, and allows for the heterogeneity of evidence. Additionally, the approach offers a clear and accessible methodology, grounded in well-defined guidelines for systematically identifying, collecting, analyzing, and evaluating evidence on a specific topic. (Madden et al., 2018)

As a distinct stage from synthesizing results, descriptive data extraction serves to structure the dataset and inform the direction of synthesis and reporting. It provides the essential groundwork for integrating findings (Majid and Weeks, 2020) First, the results of each sub-study were extracted. Next, the extracted quantitative data were converted into qualitative form. This involved transferring the quantitative data into textual, narrative descriptions. After data qualitizing (Stern et al., 2020), a narrative evidence synthesis was conducted (Munn et al., 2014; Stern et al., 2020).

5 RESULTS

5.1 CONTINUING EDUCATION FOR ADVANCED PRACTICE NURSES – A SCOPING REVIEW (ORIGINAL PUBLICATION I)

5.1.1 General description

Altogether, 1534 papers (647 duplicates) were identified, and 21 studies were selected for the scoping review based on the inclusion criteria (inter-rater reliability ranging between almost perfect or perfect, and substantial agreement). A summary of the selected articles can be found in the original publication I. The studies were written in English and conducted in the US, Australia, and Canada, and primarily addressed continuing education for NP roles.

5.1.2 Summary of the study findings

Existing continuing education interventions for APNs: The review found that most studies (71%) focused on the development and effectiveness of continuing education interventions for APNs. The interventions encompassed a diverse array of themes, such as techniques for health evaluation (e.g., Anderson, 2014; Choma and McKeever, 2015), patient care and disease prevention strategies (e.g., Boesl and Saarinen, 2016; Roberts et al., 2023), medication prescribing practices (e.g., Bednarczyk et al., 2022), leadership (e.g., Johnson, 2014), and genomic science (Zureigat et al., 2022).

Most interventions were delivered online, except one at the 2015 annual pharmacotherapy conference (Carron et al., 2018). While NPs were the main target group of these interventions, five were tailored for other advanced practice nursing roles or a wider group of healthcare providers, including physicians, RNs, and licensed practical nurses.(Azotam, 2017; Buriak et al., 2015; Choma and McKeever, 2015; Claiborne, 2016; Zureigat et al., 2022). Learning was assessed using pre- and post-test scores, and

some studies also used evaluation questions. Participants in all intervention studies showed improved knowledge about continuing education topics (Anderson, 2014; Bednarczyk et al., 2022; Boesl and Saarinen, 2016; Buriak et al., 2015; Carron et al., 2018; Choma and McKeever, 2015; Claiborne, 2016; Hessler, 2015; Hoffmann et al., 2018; Johnson, 2014; Klein and Bindler, 2022; Pietras et al., 2023; Roberts et al., 2023, 2022).

APNs' continuing education needs and preferences: Several studies incorporated needs assessments to shape the design of their interventions. For instance, survey data were used by Choma and McKeever (2015), Johnson (2014), and Roberts et al. (2022) to inform content development. Roberts et al. (2023) based their COVID-19 vaccination confidence webinar on prior research findings. Other interventions drew on initial literature reviews to guide their content (e.g., Anderson, 2014; Bednarczyk et al., 2022). Barnes et al. (2017) identified three key educational areas for nurse NPs in relation to psoriasis: evaluating severity, selecting appropriate treatments, and assessing comorbidity risks. Factors influencing the selection of continuing education programs included the relevance of the topic, quality of content, availability of credits, and alignment with clinical practice. (O'Brien Pott et al., 2021). Pietras et al. (2023) used the theory of planned behavior to develop an intervention for obstructive sleep apnea screening.

Among primary healthcare nurse practitioners, pharmacotherapeutics emerged as the most frequently attended continuing education course, whereas Mental Health in Primary Health Care attracted the fewest participants. Courses focusing on lab test interpretation, pain management, narcotic prescribing, and cancer screening were considered particularly engaging by NPs. (Baxter et al., 2013) Most participants preferred online, self-directed formats and electronic information sources (Buckley et al., 2015). Common barriers included time, family obligations, finances, and fatigue (Baxter et al., 2013). However, live activities were also highly preferred for their subject matter and regional availability (O'Brien Pott et al., 2021).

Limitations of the research concerning continuing education for APNs: The authors of the selected studies stated both sample-related and measurement-related issues. The former included a small sample size (e.g., Azotam, 2017), selection bias (e.g., Claiborne, 2016), lack of randomization (e.g. Klein and Bindler, 2022), and demographic representation (e.g. Anderson, 2014). The latter included self-report measures (e.g. Claiborne, 2016), lack of follow-up reminders (e.g. Roberts et al., 2022), instrument validation issues (e.g. Zureigat et al., 2022), a short time between pre- and post-tests (e.g. Carron et al., 2018), technical issues (e.g. Buckley et al., 2015), and non-generalizability of the intervention (e.g. Bednarczyk et al., 2022). For more detailed information, see the original publication III.

5.2 FINNISH VERSION OF THE SPECIALIST OUTCOMES AND BARRIERS ANALYSIS SCALE - EVALUATION OF PSYCHOMETRIC PROPERTIES (ORIGINAL PUBLICATION II)

5.2.1 General description of the demographic background

Content validation study: Among the five experts on the panel, four were women. Three held master's degrees in health sciences, while the remaining two had earned PhDs. Their average age was 43. The group included three CNSs and two academic professionals with expertise in instrument development and advanced practice nursing roles.

Construct validation study:
Participants were nurses working in the WSCNS in Finland. Most respondents were women, with a mean age of 44 years. RN was the most common professional title in both groups. The intervention (n = 35) and the control group (n = 44) were found to be similar in the preliminary statistical analysis.

5.2.2 Summary of study findings

The content validity and cultural adaptation of the Finnish version of the SOBA instrument: The expert panel and EFFICACY project team assessed the instrument translation for its suitability in the Finnish context, confirming that it preserved idiomatic, conceptual, and experiential equivalence. The I-CVI values ranged from 0.4 to 1.0, with 16 items receiving an I-CVI below the preferred value of 1. After a thorough review, one item was omitted from the scale due to a low CVI (difficult physician personality, CVI = 0.4). The overall S-CVI/Ave for the scale was 0.92.

Evaluation of the psychometric properties of the Finnish version of the SOBA instrument: The 44 translated items in the outcomes section were assessed as culturally sound and valid. The few items with double loadings were assessed based on theoretical reasoning and assigned to the components explicitly presented in the original publication II. In the barriers section, two items were omitted due to low communalities (lack of personal expertise = 0.213 and patient/family resistance = 0.151), in addition to the one item that was omitted due to its low CVI (difficult physician personality), leaving 12 items in the Finnish barriers section of the instrument. The components of the translated instrument are presented in Table 6.

Table 6: The Finnish version of the SOBA instrument

	Component	Number of items	Cronbach's alpha
Outcomes	Organizational processes	12	0.946
	Patient and family response to care	11	0.921
	Research processes	7	0.906
	Cost of care	7	0.860
	Consultative/interdisciplinary processes	7	0.901
Barriers	Organizational and interpersonal barriers	7	0.814
	Workflow-related barriers	5	0.725

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.55 for the outcomes section (Barlett's test of sphericity p = 0.000) and 0.74 for the barriers section (Barlett's test of sphericity p = 0.000), which were deemed acceptable (Stuart-Hamilton, 2007). The analysis of the outcomes section identified five principal components, which accounted for 67.6% of the total variance. According to our data, Cronbach's α for the entire outcomes scale was .958. The remaining 12 items in the barriers section revealed two principal components, accounting for 50.6% of the total variance. According to our data, Cronbach's alpha was .821 for the whole barriers scale.

5.3 OUTCOME EVALUATION OF A CLINICAL NURSE SPECIALIST CONTINUING EDUCATION PILOT PROGRAM: AN INTERVENTION STUDY (ORIGINAL PUBLICATION III)

5.3.1 General description of the demographic background

Sixty-nine nurses responded to the web-based survey before the intervention, 33 after the intervention, and 21 one year after the intervention. Descriptive statistics were examined separately for each measurement point (for more information, see sub-study III in the original publications section). Most participants were women and worked as an RN. At baseline, 43% of the intervention group nurses had received additional specialized nurse education, 65% at the second measurement point, and 60% at the third. In the control group, 33.3%, 30.8%, and 33.3% received additional specialized nurse education, respectively. The mean age of the respondents across all measures ranged from 43.6 to 48.5 years. All participants had been working in their current profession for an average of over eight years.

During the 2-year program, 12 EFFICACY students (34 %) dropped out, and six control-group members (14 %) could no longer be located, resulting in fewer responses in the post-intervention surveys conducted in 2023 and 2024. The intervention and control groups had similar characteristics across the three measurement points, except that the intervention group

included more nurse managers at the second (35 %) and third (40 %) measurement points than the control group (15,4 % and 16,7 %, respectively). Furthermore, the intervention group had more specialized nurse education at the first (43,3 %), second (65 %), and third (60 %) measurement points than the control group (33,3 %, 30,8 % and 33,3 %, respectively).

5.3.2 Summary of study findings

Nurses' self-reported practice outcomes and barriers before, immediately after, and one year after the EFFICACY pilot intervention: The self-reported practice outcomes in the intervention group (Figure 4), as measured by the SOBA instrument, showed a decline throughout the measurement period. This trend was also observed at the control group's first and second measurement points (Figure 5). However, all self-reported outcomes in the control group increased in the final round at one-year post-intervention.

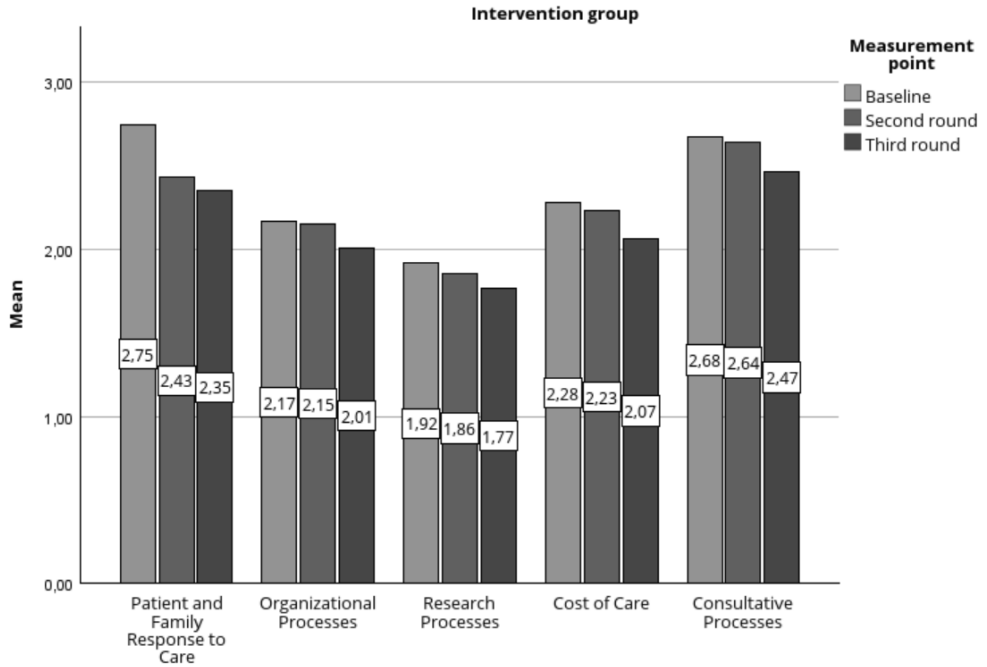

Figure 4: Mean scores of the self-reported practice outcomes in the intervention group.

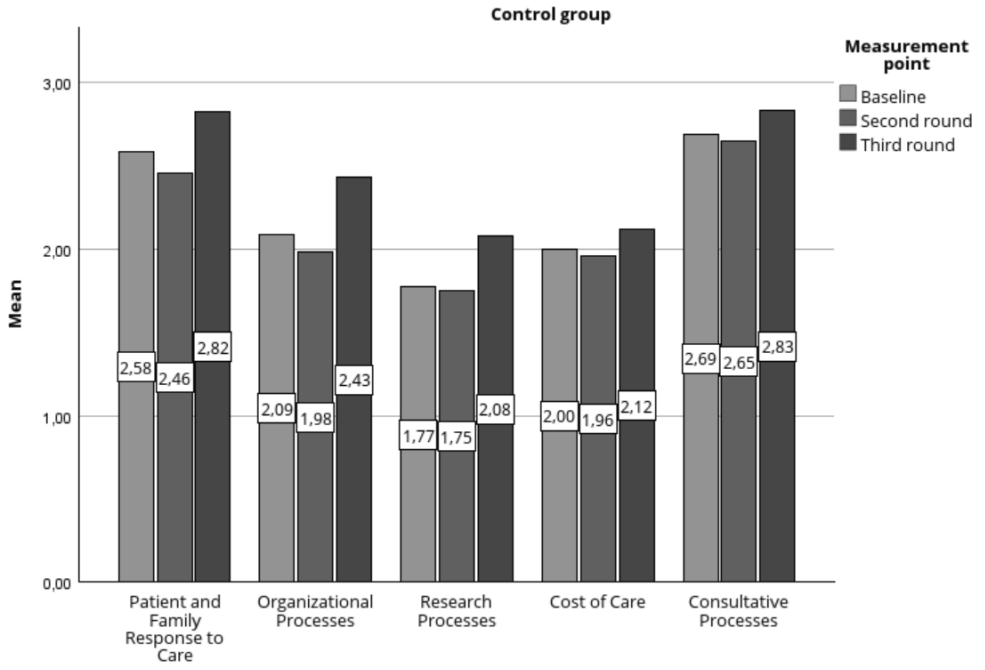

Figure 5: Mean scores of the self-reported practice outcomes in the control group.

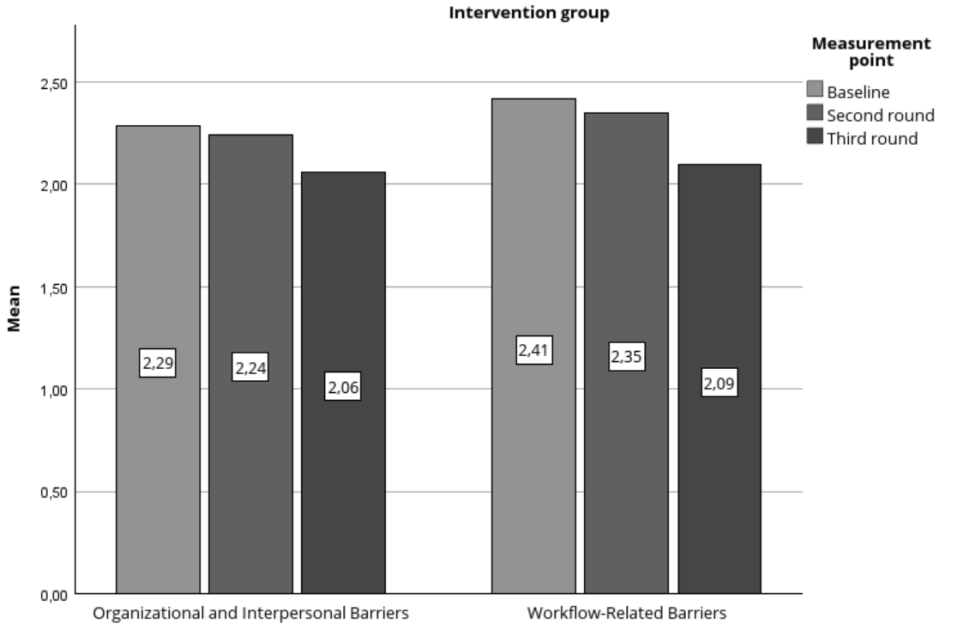

Figure 6: Mean scores of the self-reported practice barriers in the intervention group.

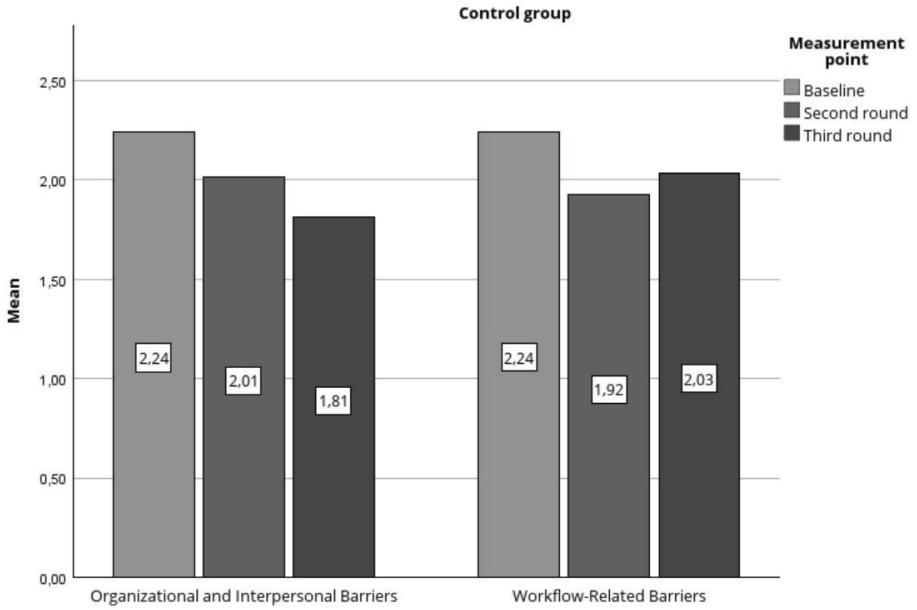

Figure 7: Mean scores of the self-reported practice barriers in the control group.

All self-reported practice barriers (Figure 6) decreased in the intervention group throughout the measurement period. Specifically, organizational and interpersonal barriers dropped from a mean score of 2.29 to 2.06, and workflow-related barriers decreased from 2.41 to 2.09.

In the control group (Figure 7), organizational and interpersonal barriers declined, from a mean score of 2.24 to 1.81. However, workflow-related barriers in the control group increased by the final measurement point, with mean scores changing from 2.24 (baseline) to 1.92 (post-intervention) and then to 2.03 (one year post-intervention).

Predictors associated with nurses' self-reported practice outcomes and barriers: The linear mixed-effects model analysis did not identify any statistically significant relationships in the nurses' self-reported practice outcomes. Gender, however, was a statistically significant predictor in the nurses' self-reported practice barriers sub-scales (organizational and interpersonal barriers, $p = 0.005$; workflow-related barriers, $p = 0.031$). Men reported lower mean scores (mean = 1.50) than women (mean = 2.10), indicating that male nurses faced fewer organizational and interpersonal

barriers than female nurses. This trend was also observed in the workflow-related barriers sub-scale, where men again reported lower scores (mean = 1.68) than women (mean = 2.21).

There was a statistically significant association between organizational and interpersonal barriers and measurement point ($p = 0.019$). Both the intervention and control groups had higher mean scores at baseline (intervention group mean = 2.01; control group mean = 1.93) compared to immediately after the intervention (intervention group mean = 1.93; control group mean = 1.73) and one year post-intervention (intervention group mean = 1.74; control group mean = 1.47). This suggests that self-reported practice barriers decreased over the course of the study.

Association between CNS core competencies and job satisfaction in relation to nurses' perceived practice outcomes and barriers: We identified statistically significant correlations between all sum-variables of the CNS-CoCos and SOBA outcomes, except between patient and family response to care and clinical nursing leadership competence (Table 7). This implies that when CNS competence evolves, so do self-reported nursing practice outcomes.

The only statistically significant association between CNS competency and self-reported nursing practice barriers was between the sum variables patient competence and organizational and interpersonal barriers, suggesting that these barriers also increased with higher patient competence. The lack of a statistical relationship between CNS competency and self-reported practice barriers suggests that CNS competency does not appear to influence self-reported nursing practice barriers.

Table 7: Clinical nurse specialist core competencies in relation to nursing practice outcomes and barriers

		Clinical Nurse Specialist Core Competencies			
		Patient Competence	**Clinical Nursing Leadership Competence**	**Organizational Competence**	**Scholarship Competence**
Specialist Outcomes and Barriers Analysis	**Patient & Family Response to Care**	**p < 0.001** **E = 0.020** **SE = 0.003**	p = 0.218 E = 0.003 SE = 0.003	**p = 0.002** **E = 0.008** **SE 0.003**	**p = 0.010** **E = 0.008** **SE = 0.003**
	Organizational Processes	**p = 0.039** **E = 0.007** **SE = 0.003**	**p < 0.001** **E = 0.017** **SE = 0.002**	**p < 0.001** **E = 0.018** **SE = 0.002**	**p < 0.001** **E = 0.015** **SE= 0.003**
	Research Processes	**p < 0.001** **E = 0.011** **SE = 0.002**	**p < 0.001** **E = 0.008** **SE = 0.002**	**p < 0.001** **E = 0.012** **SE= 0.002**	**p < 0.001** **E = 0.013** **SE = 0.002**
	Cost of Care	**p < 0.001** **E = 0.011** **SE = 0.003**	**p = 0.004** **E = 0.007** **SE = 0.002**	**p < 0.001** **E = 0.009** **SE = 0.003**	**p = 0.040** **E = 0.006** **SE = 0.003**
	Consultative & Interdisciplinary Processes	**p < 0.001** **E = 0.012** **SE = 0.003**	**p < 0.001** **E = 0.009** **SE = 0.002**	**p < 0.001** **E = 0.012** **SE = 0.002**	**p = 0.003** **E = 0.008** **SE = 0.003**
	Organizational & Interpersonal Barriers	**p = 0.047** **E = 0.005** **SE = 0.002**	p = 0.573 E = -0.001 SE = 0.002	p = 0.609 E = 0.001 SE = 0.002	p = 0.522 E = -0.002 SE = 0.002
	Workflow-Related Barriers	p = 0.260 E = 0.003 SE= 0.003	p = 0.431 E= 0.002 SE = 0.002	p = 0.218 E = 0.003 SE = 0.002	p = 0.239 E = 0.003 SE = 0.003

The linear mixed-effects model includes main effects for time and study group, along with their interaction. Statistically significant values bolded; E = Estimate; SE = Standard Error

Two job satisfaction factors (motivating factors of the work and participation in decision-making) were significantly associated with self-reported nursing practice outcomes, including patient and family response to care, organizational processes, research processes, and consultative and interdisciplinary processes (Table 8). When either of these job satisfaction factors increased, so did the mentioned self-reported nursing outcomes. A similar association was found between the working environment and consultative and interdisciplinary processes.

Table 8 shows that various job satisfaction factors, as measured by the KUHJSS, were significantly associated with self-reported barriers to nursing practice. Sum-variables requiring factors of work, working welfare, and sense of community were associated with both self-reported nursing practice barriers (organizational and interpersonal barriers, workflow-related barriers), indicating that when these aspects of job satisfaction increased, these barriers were reduced. In addition, sum-variables in leadership, working environment, and participation in decision-making had a similar association with organizational and interpersonal barriers, but not with workflow-related barriers. For more detailed information, check publication III in the original publications section.

In the sub-study III, the instrument reliability was assessed as excellent. The Cronbach's alphas were 0.97 for the CNS-CoCos, 0.91 for the KUHJSS, and 0.96 for the SOBA scale.

Table 8: Nurses' job satisfaction in relation to specialist outcomes and barriers

		Kuopio University Hospital Job Satisfaction Scale						
		Leadership	**Requiring Factors of Work**	**Motivating Factors of the Work**	**Working Environment**	**Working Welfare**	**Participation in Decision-Making**	**Sense of Community**
Specialist Outcomes and Barrier Analysis	**Patient & Family Response to Care**	p = 0.621 E = 0.038 SE = 0.076	p = 0.618 E = 0.049 SE = 0.097	**p = 0.005** **E = 0.325** **SE = 0.113**	p = 0.191 E = 0.117 SE = 0.089	p = 0.433 E = 0.093 SE= 0.118	**p = 0.005** **E = 0.228** **SE = 0.079**	p = 0.196 E = 0.101 SE = 0.077
	Organizational Processes	p = 0.516 E = 0.052 SE = 0.079	p = 0.148 E = 0.146 SE = 0.100	**p < 0.001** **E = 0.409** **SE = 0.116**	p = 0.106 E = 0.150 SE = 0.092	p = 0.433 E = 0.093 SE = 0.118	**p < 0.001** **E = 0.375** **SE = 0.077**	p = 0.188 E = 0.108 SE = 0.081
	Research Processes	p = 0.997 E = 0.000 SE = 0.064	p = 0.863 E = 0.014 SE = 0.082	**p = 0.006** **E = 0.271** **SE = 0.098**	p = 0.194 E = 0.098 SE = 0.075	p = 0.808 E = 0.025 SE = 0.102	**p < 0.001** **E = 0.260** **SE = 0.063**	p = 0.446 E = -0.050 SE = 0.065
	Cost of Care	p = 0.459 E = 0.055 SE = 0.074	p = 0.579 E = 0.053 SE = 0.095	*p = 0.079* *E = 0.200* *SE = 0.113*	p = 0.386 E = 0.075 SE = 0.086	p = 0.858 E = 0.021 SE = 0.115	p = 0.110 E = 0.127 SE = 0.079	p = 0.507 E = 0.050 SE = 0.076
	Consultative & Interdisciplinary Processes	p = 0.732 E = 0.024 SE = 0.071	p = 0.841 E = 0.018 SE = 0.092	**p = 0.006** **E = 0.305** **SE = 0.109**	**p = 0.043** **E = 0.168** **SE = 0.082**	p = 0.246 E = 0.131 SE = 0.112	**p = 0.004** **E = 0.219** **SE = 0.074**	p = 0.751 E = -0.023 SE = 0.073
	Organizational & Interpersonal Barriers	**p = 0.006** **E = -0.161** **SE = 0.057**	**p < 0.001** **E = -0.370** **SE = 0.066**	p = 0.256 E = -0.102 SE = 0.089	**p < 0.001** **E = -0.272** **SE = 0.064**	**p = 0.020** **E = -0.211** **SE = 0.089**	**p = 0.012** **E = -0.159** **SE = 0.063**	**p < 0.001** **E = -0.246** **SE = 0.057**
	Workflow-Related Barriers	p = 0.221 E = -0.079 SE = 0.064	**p = 0.007** **E = -0.218** **SE = 0.079**	p = 0.430 E = 0.078 SE = 0.099	*p = 0.065* *E = -0.138* *SE = 0.074*	**p = 0.035** **E = -0.211** **SE = 0.098**	p = 0.158 E = -0.099 SE = 0.069	**p = 0.005** **E= -0.185** **SE = 0.065**

The linear mixed effects model includes main effects for time and study group, along with their interaction. Statistically significant p-values bolded; near-significant p-values in italics; S = Estimate, SE = Standard Error.

5.4 SYNTHESIS OF THE STUDY RESULTS (SUB-STUDIES I-III)

Figure 8 depicts the synthesized results and conclusions of sub-studies I-III. The first sub-study, a scoping review, revealed that continuing education interventions for APNs primarily target NPs, focus on clinical competency, and are evaluated using unstandardized instruments. Thus, there was a need for CNS-focused continuing education, which is measured with standardized and reliable instruments. However, no instrument was already available in Finnish to measure specialist outcomes.

To reliably measure the EFFICACY pilot intervention outcomes, possible instruments were mapped. The SOBA instrument, developed by Smith & Waltman (1994), was deemed appropriate and chosen for translation into Finnish, which was carried out in sub-study II. The Finnish version of the instrument omitted three items from the original barriers-subscale, and the scale was found to be excellent in content validity and adequate in construct validity. Additionally, two more standardized instruments were used to measure other aspects of the intervention outcomes, namely CNS-related competency (CNS-CoCos) and job satisfaction (KUHJSS). Both of these instruments were developed and validated in the Finnish context (Jokiniemi et al., 2021c; Kvist et al., 2012).

The effectiveness of the EFFICACY pilot intervention was assessed using a longitudinal design (before, immediately after, and one year post-intervention) and the above-mentioned standardized instruments. The self-reported nursing practice outcomes showed no positive increase throughout the study process, and no statistically significant predictors were identified in the data analysis. However, self-reported practice barriers showed a desirable decrease throughout the study process. Gender and measurement point were identified as statistically associated predictors.

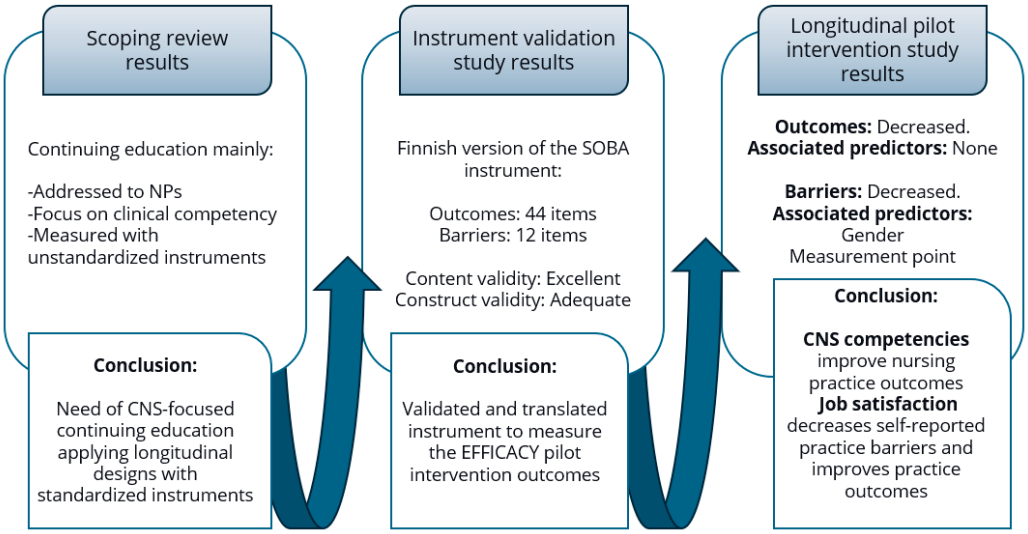

Figure 8: The synthesized results of the study process (sub-studies I-III)

Figure 9 presents the associations between CNS competencies, job satisfaction, and nursing practice outcomes and barriers in more detail. The upper part of Figure 9 illustrates all statistically significant associations observed between CNS competency areas and self-reported nursing practice outcomes and barriers. The only negative association is highlighted in red and was observed between patient competence and organizational & interpersonal barriers. The remaining statistical associations were positive (highlighted in green), indicating that as CNS competency increased, so did the self-reported nursing practice outcomes. The lower part of Figure 9 illustrates the same analysis for job satisfaction, self-reported nursing practice outcomes, and barriers.

As Figure 9 shows, CNS competencies positively affected nursing practice outcomes, with one exception: clinical nursing leadership competence was not associated with the patient and family response to care outcome. Two areas of job satisfaction—motivating factors of the work and participation in decision-making—are positively associated with all other self-reported practice outcomes, except for the cost of care.

Regarding the two sub-scales addressing barriers to nursing practice, several areas of job satisfaction were found to be associated with organizational and interpersonal barriers. In Figure 9, these associated job

satisfaction areas are highlighted in green, indicating that these areas decreased the self-reported nursing practice barriers. Requiring factors of work, working welfare, and sense of community reduced both nursing practice barriers measured with the Finnish version of the SOBA instrument. Furthermore, leadership, working environment, and participation in decision-making also decreased organizational and interpersonal barriers.

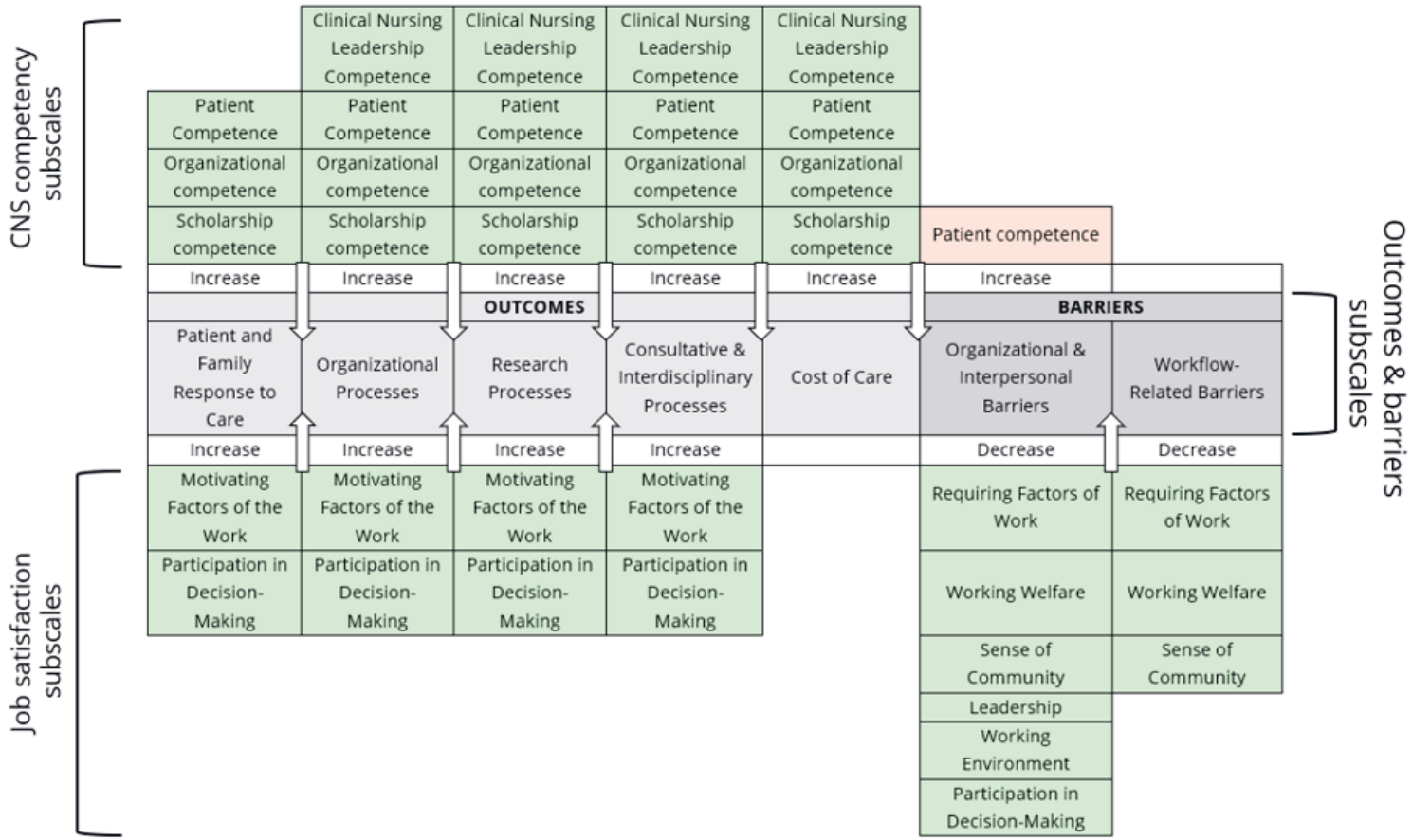

Figure 9: The association between CNS competencies and job satisfaction with self-reported nursing practice outcomes and barriers.

6 DISCUSSION

This study aimed to examine the effectiveness of a continuing education intervention on nurses' self-reported practice outcomes and barriers by: 1) identifying recent literature and research gaps through a scoping review, 2) validating an assessment tool (the Finnish version of the SOBA instrument) for measuring self-reported nursing practice outcomes and barriers, 3) evaluating the impact of the EFFICACY pilot intervention and exploring whether job satisfaction and CNS competencies are associated with self-reported nursing practice outcomes and barriers. The research consisted of three sub-studies: a scoping literature review, an instrument validation study, and a longitudinal web-based survey conducted between 2021 and 2024.

6.1 DISCUSSION OF THE STUDY RESULTS

6.1.1 Continuing education with an APN focus

The scoping review results revealed that continuing education is mainly addressed to NPs. This is also evident in other research areas, as there are multiple studies examining the postgraduate phase of the NP role (Bykowski et al., 2025; Ingram et al., 2025; Kesten et al., 2019), which seems to be an emerging industry (Kesten et al., 2019). Postgraduate education can significantly enhance nurses' roles, ranging from delivering bedside care to shaping healthcare policy at the macro level (Abu-Qamar et al., 2020). Thus, it could be argued that similar studies should be conducted with a CNS focus. Fellowship implementation has been suggested as a means to recruit and retain CNS-related talent within healthcare organizations (Rader et al., 2024).

Although continuing education initiatives primarily focus on enhancing the clinical competencies of APNs, their roles also extend to other essential domains, including teaching, leadership, strategic organizational support, research activities, and the application of evidence-based practices. (ICN,

2020). Therefore, evaluating continuing education needs and creating interventions to address these key competencies is essential. Other researchers have reported similar findings, namely that oncology NPs require more mentorship and leadership training (Triglianos et al., 2024) and APNs require implementation science training (Hebert et al., 2023). The CNSs' needs for continuing professional development are little known, as it remains an understudied phenomenon, thus deserving further research attention.

6.1.2 Instrument validation and utilization

A thorough search of standardized tools was conducted to measure the effectiveness of the EFFICACY intervention, focusing on the highest possible CNS-outcome hierarchy within the intervention framework. The SOBA instrument was selected and translated into Finnish to measure the CNS-related nursing practice outcomes and barriers. Although the content and construct validity of the translated instrument proved adequate, the preferred increase in nursing outcomes did not occur during or after the intervention. Instead, the self-reported nursing practice outcomes decreased throughout the study process. The transition period in Finnish healthcare during the intervention study might have influenced the results (Kangas and Kalliomaa-Puha, 2022). Additionally, the widespread lack of nursing resources in Europe and Finland could be linked to poorer perceived nursing outcomes, as inadequate staffing and resources are significantly associated with higher rates of missed care, which in turn affects the quality of care and practice outcomes (Cho et al., 2020). Furthermore, it is possible that participants in the intervention group acquired a deeper understanding of the CNS competencies and, as a result, rated their self-reported nursing outcomes lower after the intervention. This is a phenomenon also previously recognised by other researchers (Manero-Solanas et al., 2024; Prosen and Ličen, 2025)

However, it could also be argued that the SOBA might not have been the best-suited instrument to measure the outcomes of the EFFICACY intervention, as it was developed in the US, which has a unique healthcare

delivery system that differs significantly from those of other developed countries (Shi and Singh, 2022). In Finland, universal healthcare is mainly provided by the public sector to all citizens (MSAH, 2024). Thus, developing a CNS-related outcome instrument with a Nordic or European context might be beneficial. Furthermore, the participants in this research were not CNSs, but rather RNs who wanted to develop their competencies and steer their careers towards a CNS role. Hence, attending a CNS competency-enhancing continuing education pilot program. Hence, the translated SOBA instrument could also benefit from more exhaustive psychometric testing in the Nordic region to ensure reliability and validity. The research indicates that CNSs working in Finland exhibit less clinical competency and more organizational competency compared to their counterparts in Denmark and Iceland (Jokiniemi et al., 2021a). Thus, after further evaluation of the instrument's validity, examining how these differences in CNS practice patterns influence the connection between CNS competency and self-reported nursing outcomes and barriers would be an interesting area of investigation.

6.1.3 Association between CNS competency, job satisfaction, and self-reported nursing practice outcomes and barriers

Successful implementation of CNS roles results in greater visibility of nursing expertise, enhanced development and integration of nursing processes, improved quality assurance in practice, and facilitated knowledge translation and collaboration within units and among partners (Jokiniemi et al., 2023). Furthermore, the implementation of CNSs' roles has several advantages and has been rigorously researched to yield positive nursing outcomes (Htay and Whitehead, 2021; Kilpatrick et al., 2024). Thus, previous research indicates a strong association between CNS core competencies and nursing practice outcomes, a finding also supported in this study. However, it is surprising that none of the CNS competencies statistically reduced nursing practice barriers, and patient competence seemed to increase organizational and interpersonal barriers.

Nevertheless, due to the small number of participants in the pilot intervention study, this result should be examined with a larger sample.

Modern healthcare challenges significantly influence the evolution of advanced nursing roles. According to Patricia Benner's framework, expert nurses represent the highest level of clinical proficiency and are essential for delivering optimal patient care and achieving strong clinical outcomes. (Gardner, 2012; Healy, 2024) In today's demanding healthcare environment, it is crucial to foster the growth and active involvement of expert nurses—not only to enhance patient care but also to serve as mentors, role models, and leaders for the next generation of nurses (Healy, 2024). These competencies are also central to the roles of APNs. Thus, Benner's model seemed to align well with the findings of this research, as CNS competency had a strong association with self-reported nursing practice outcomes.

Job satisfaction is a well-researched phenomenon in nursing, and research indicates a positive association between competence and job satisfaction (Alshammari and Alenezi, 2023; Kallerhult Hermansson et al., 2024). In this study, two areas of job satisfaction—motivating factors of the work and participation in decision-making—significantly increased self-reported nursing outcomes, except for the cost of care. Other researchers have also indicated the connection between motivation and nursing performance (Gunawan et al., 2019; Zeng et al., 2022). This finding suggests that improving motivating factors of work, such as experiencing work as meaningful and engaging, and characterized by the application of diverse skills and suitably challenging tasks, can enhance nursing competency and performance.

In addition to motivation, participation in decision-making has a positive impact on nursing outcomes. This connection has also been evident in the work of other researchers worldwide (Arends et al., 2022; Pursio et al., 2021). Organizational culture has been found to influence decision-making (Nibbelink and Brewer, 2018), although it requires a supportive working environment (Agure et al., 2024).

Besides nursing outcomes, several job satisfaction factors also decreased nurses' self-reported practice barriers (Figure 9). Lee et al. (2020)

addressed this finding vice versa in a systematic review concerning the facilitators and barriers surrounding the administration's role in employee job satisfaction in long-term care facilities. Barriers to employer job satisfaction included high job demands, understaffing, heavy workload, lack of time, and limited staffing resources (K. Lee et al., 2020), which were also evident in the SOBA instrument items concerning organizational and interpersonal barriers, as well as workflow-related barriers (item list presented in the original publication section). Furthermore, a study by Brendel et al. (2023) found similar results, indicating that intra-organizational barriers negatively impacted job satisfaction. However, contrary to the findings of this research, interaction-related barriers did not affect job satisfaction (Brendel et al., 2023). The results of this study suggest that increasing employers' job satisfaction can effectively reduce self-reported barriers to nursing practice. However, the association should be studied further with a larger sample size.

6.1.4 Fidelity of the EFFICACY pilot intervention

The EFFICACY intervention was carried out according to plan between September 2021 and May 2023. Ultimately, 22 nurses graduated from the pilot intervention. The program experienced a relatively high dropout rate among students, with 12 students formally and one informally withdrawing from the intervention, accounting for 34% of the intervention group. Lack of time and resources, as well as a pressured working environment, were the most frequently mentioned reasons for dropping out of the intervention. Furthermore, the ongoing stress caused by the COVID-19 pandemic might have affected the students' motivation to complete the educational program. The drop-out was managed and prevented with all possible resources. The assignment deadlines were delayed, providing students with additional time to complete their courses during a heavy workload. Individualized formal and informal support was also offered to students, in addition to educational support. Furthermore, despite multiple attempts and reminders, the dropout rate in the control group was higher

than expected, as only six responses were obtained from the control group at the last measurement point (see Figure 3 in Chapter 4.3.2).

While the intervention was implemented thoroughly according to the plan, two courses required amendments. First, Nursing and Its Leadership in Times of Crisis (5 ECTS) was initially intended to be taught in English. However, feedback revealed that some intervention students struggled with foreign languages, so the course was modified and developed into a Finnish version. Secondly, Patient Encounter and Interviewing in Mental Health Nursing (3 ECTS) was initially designed to include formal training in conducting Structured Clinical Interviews for DSM Disorders (SCID) with a certified trainer. Unfortunately, only a few qualified trainers were available, and none were accessible during the course. As a result, the course was revised to focus on motivational interviewing and behavioural change themes. The remaining EFFICACY curriculum courses were completed according to the initial plan.

The intervention evaluation was conducted as described in this study. Additionally, qualitative data were collected from learning journals, course feedback, and focus group interviews; however, as the qualitative data were not part of this research, they were not formally analyzed in this context.

6.1.5 Research impact

Given the multifaceted nature of APN roles, which extend beyond clinical competency to include leadership, education, research, and strategic influence, there is a pressing need to broaden the scope of continuing education interventions. Tailored programs, such as fellowships and mentorship initiatives, should be developed to support CNSs and other APNs in acquiring competencies in implementation science, leadership, and evidence-based practice. Addressing these gaps in continuing education is essential for optimizing the impact of APNs across all domains of healthcare delivery.

Although it was not the main objective of this study, the developed EFFICACY curriculum was simultaneously pilot tested to assess its

suitability in the HEI context. After the initial pilot phase, the following new courses were incorporated into master's level studies in Nursing Science at the UEF: CNS Competency and Scope of Practice (4 ECTS), Basic Pharmacology (3 ECTS), and Nursing and Its Leadership in Times of Crisis (5 ECTS) ensuring that the materials developed and adopted in this pilot intervention are utilized as efficiently as possible in the future.

Continuing education interventions are a vital part of the nursing career progression. However, interventions should be carefully planned to promote collaboration with healthcare organization representatives, ensuring that the continuing education provided is relevant, timely, and addresses current healthcare needs. Besides developing continuing education interventions, pilot studies can also be utilized to test the applicability of the curriculum in the HEI context, ensuring that newly established courses can be effectively integrated into the university setting.

6.2 VALIDITY AND RELIABILITY OF THE STUDY

6.2.1 Scoping review

The scoping review was conducted, adhering to the JBI manual (Aromataris and Munn, 2020), and the PRISMA-ScR guidelines for scoping reviews were followed (Tricco et al., 2018). The database search strategy was planned with an information specialist. The review process was also conducted in accordance with a published review protocol (Wright et al., 2022), and all deviations from the original protocol were reported in the original publication.

To reduce the selection bias, two independent researchers carried out the selection process of the included studies (Stoll et al., 2019). The inter-rater reliability was assessed with Cohen's kappa value and agreement percentage (Landis and Koch, 1977) as almost perfect or perfect agreement, indicating that the selection criteria were reliable.

The studies selected for the scoping review represented the US, Canada, and Australia, indicating a lack of research from multiple countries that utilize APN roles, since 167 responding countries in the recent WHO State

of the World's Nursing report, 62 % reported having APN roles (WHO, 2025). This raises questions about the applicability of the review results to countries with different healthcare system structures. Additionally, the quality of the studies was not assessed, as this is not a standard procedure in scoping reviews (Aromataris and Munn, 2020), leaving the research quality undetermined.

6.2.2 Instrument validation study

While this study highlights the positive impact of APN roles, these roles are still emerging in the Nordic countries. Therefore, the instrument construct validation study respondents were RNs participating in a continuing education program aimed at enhancing CNS competencies. The SOBA instrument was chosen to measure the effectiveness and growth of these competencies among EFFICACY project students, who were mainly entry-level RNs. However, the limited number of APN roles and the specific use of the SOBA instrument may affect the generalizability of the findings. Future studies should replicate the research with a larger and more diverse sample of nurses, or specifically with nurses who are studying to become a CNS.

There were a few notable limitations in the instrument validation study. Increasing the number of expert panelists to six or more could have enhanced the reliability of the content validation process. Although six individuals were invited to participate, only five agreed. Additionally, the use of a small sample size and convenience sampling may limit the generalizability of the findings. To enhance the reporting of the study findings, the STROBE checklist (von Elm et al., 2007) was followed.

6.2.3 Longitudinal pilot intervention survey study

This research was conducted using a longitudinal survey study design, which allowed for assessing the persistence of the pilot intervention's outcomes over time. The TREND checklist was used to enhance the reporting of results (Des Jarlais et al., 2004). All the instruments were standardized and validated in the Finnish language and context, thereby

improving the reliability of the results. Additionally, a statistician joined our author team to ensure the accuracy and fidelity of the statistical analysis.

However, some limitations should be noted. Because the intervention group size was predetermined, no power analysis was conducted. The dropout analysis revealed a discrepancy between participants who left the study and those who remained, specifically in the sum-variable requiring factors of work on the KUHJSS, which had significant associations with the SOBA instrument's barrier sub-scales. Due to the fluctuating dropout group, results related to this variable should be interpreted cautiously. The small sample size, typical for a pilot intervention study, also limits the generalizability of the study's results.

6.3 ETHICAL CONSIDERATIONS

This research adhered to the general principles of the Declaration of Helsinki (World Medical Association, 2013) and ethical guidelines provided by the Finnish National Board on Research Integrity (FINBRI, 2023) throughout the study process. On May 31, 2021, the UEF's Research Ethics Committee (Statement No. 10/2021) accepted the research plan for the broader study, considering the EFFICACY program.

Sub-study I, a scoping review of previously published studies, deemed no need for research permits. Research permits for the survey studies (sub-studies II-III) were obtained from the participating organizations before implementing the EFFICACY pilot intervention. Informed consent was obtained from all respondents who participated voluntarily and could withdraw at any time. This study also complied with the General Data Protection Regulation (EU 2016/679) and the Finnish Data Protection Act (2018/1050).

The instruments (SOBA, KUHJSS, CNS-CoCos) chosen for this research have been developed or validated in the Finnish context. The reliability of the instruments has been previously assessed as modest or excellent. According to the data from this research, all three instruments demonstrated exceptional reliability, evaluated with Cronbach's alpha coefficients. Permits to utilize all three instruments were obtained from the

relevant authorities. Due to the low number of participants, the collected data has not been made available for repositories to ensure the integrity and anonymity of the respondents.

6.4 STRENGTHS AND LIMITATIONS

This study demonstrated several notable strengths that enhance its credibility. Original publication I adhered to a published review protocol (Wright et al., 2022) and was conducted in line with JBI's scoping review methodology. Two researchers independently conducted the study selection and data extraction processes, achieving a level of inter-rater reliability that ranged from substantial to nearly perfect. All publications followed established reporting guidelines such as PRISMA-ScR and STROBE. The translation of the SOBA instrument (original publication II) was strengthened by utilizing certified translation services and validating it through a pilot study involving five expert panelists. The longitudinal design (original publication III), with three measurement points between September 2021 and May 2024, allowed for the assessment of long-term intervention effects. Additionally, the use of standardized and validated competence instruments within the Finnish context, rather than a traditional pre-test/post-test design, added robustness to the findings. Finally, the inclusion of a statistician in the author team ensured the accuracy and reliability of the statistical analysis. All sub-studies underwent a peer review process before being published in international scientific journals.

The study also faced several limitations, including the geographic restriction of the scoping review (Sub-study I) and the use of various methodologies and study designs of the selected papers, which decreased the possibility of comparing study results. Sub-studies II-III, conducted as web-based surveys, also had limitations. The content validation study (sub-study II) involved a small number of expert panelists and consisted of only one round of reviews and roundtable discussions (Polit and Beck, 2006). The newness of advanced practice nursing roles in Finland meant that RNs, rather than CNSs, participated in the construct validation study. Thus, the

Finnish version of the SOBA instrument requires further validation with a larger sample, preferably comprising CNSs. Sub-study III's small sample size limits the generalizability of the pilot intervention results. The dropout analysis indicated that the results should be interpreted cautiously, particularly for the one-sum variable. Although small sample sizes are common for pilot intervention studies, the results should be replicated with a larger sample size to avoid typical missteps in transitioning from pilot/feasibility studies to larger-scale interventions (Beets et al., 2021).

7 CONCLUSIONS

7.1 CONCLUSIONS DRAWN FROM THE MAIN FINDINGS

This study assessed the impact of a continuing education intervention on nurses' self-reported practice outcomes and barriers. It had three key objectives: 1) conducting a scoping review to identify recent research and information gaps, 2) validating the Finnish version of the SOBA instrument to measure nursing practice outcomes and barriers, and 3) evaluating the effects of the EFFICACY pilot intervention while exploring the links between job satisfaction, CNS competencies, and self-reported nursing practice outcomes. The following conclusions can be drawn from the main findings of the research:

1. The current landscape of continuing education in advanced practice nursing predominantly focuses on NPs, with a growing body of literature and structured postgraduate pathways supporting their development. This emphasis has contributed to the emergence of a robust NP postgraduate education industry. However, CNSs remain underrepresented in this discourse, despite their critical role in healthcare systems. The limited research on the continuing professional development of CNSs highlights a significant gap in the literature.

2. Despite a thorough translation process and determining the SOBA instrument's content and construct validity, limitations of using a U.S.-developed tool to measure CNS-related outcomes in Finland are possible. This suggests the need for context-specific instruments and further research into how local healthcare structures and variations in CNS roles influence self-reported nursing practice outcomes and barriers.

3. Essential nursing competence, as well as CNS-specific competence, seems to be associated with self-reported nursing practice outcomes positively. Enhancing nursing competency through CDP is essential in providing patients with the best possible care.

4. Several aspects of job satisfaction decrease self-reported nursing practice barriers. Furthermore, a motivational work community and aspects of autonomy, specifically participating in decision-making, can positively impact nursing outcomes. These factors can be enhanced in healthcare organizations through various actions aimed at improving the quality of the nursing profession and patient care.

7.2 RECOMMENDATIONS FOR FUTURE RESEARCH

In addition to the main conclusions, the following recommendations can be drawn for future research:

1. Future research should focus on identifying the specific continuing education needs of CNSs, examining existing barriers to their professional growth, and developing evidence-based frameworks that support their ongoing development. Such inquiry is essential to ensure equitable support for all advanced practice nursing roles and to strengthen the overall capacity of healthcare systems.

2. The U.S origin of the SOBA instrument highlights the need for further research into the development of context-specific measurement tools that accurately reflect the nuances of Finnish healthcare structures to ensure that evaluation instruments are both relevant and reliable within the Finnish or Nordic context.

3. Subsequent studies should investigate how strategically designed continuing education enhances both general and specialist nursing competencies. Longitudinal studies examining the impact of

targeted CPD programs on clinical outcomes and patient satisfaction would provide valuable insights into optimizing educational strategies for RNs, CNSs, and other advanced practice nurses.

4. Future endeavours should explore how organizational strategies and leadership practices can be optimized to encourage job satisfaction, particularly motivating work environment and professional autonomy through decision-making, in healthcare settings. Long-term and intervention studies could provide more in-depth insights into the causal relationships between workplace culture, autonomy, and clinical effectiveness, thereby informing policies that enhance both nurse well-being and patient care quality.

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ORIGINAL PUBLICATIONS (I – III)

I

Continuing education for advanced practice nurses: A scoping review

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SCOPING REVIEW

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Continuing education for advanced practice nurses: A scoping review

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Abstract

Aim: The aim of the study was to identify the nature and extent of scientific research addressing continuing education for advanced practice nurses.

Design: A scoping review.

Review Methods: The Joanna Briggs Institute's methodology for scoping reviews.

Data Sources: Electronic search was conducted on 17 September 2023 via CINAHL, PsycINFO, PubMed, Scopus, Web of Science, Cochrane Library and the Joanna Briggs Institute's Evidence-Based Practice Database for research articles published between 2012 and 2023.

Results: Nineteen papers were included in this review. Scientific research on continuing education for advanced practice nursing roles (i.e. nurse practitioner, clinical nurse specialist) has primarily been conducted in the United States and mostly addresses online-delivered continuing education interventions for clinical care competency. Most of the interventions targeted nurse practitioners.

Conclusion: Continuing education has a pivotal role in supporting advanced practice nursing competency development. In addition to clinical care, future continuing education research should focus on other advanced practice nursing competencies, such as education, leadership, supporting organizational strategies, research and evidence implementation.

Implications for the Profession and/or Patient Care: Continuing education programmes for advanced practice nurses should be rigorously developed, implemented and evaluated to support the quality and effectiveness of patient care.

Impact: Continuing education for advanced practice nursing roles is an understudied phenomenon. This review highlights future research priorities and may inform the development of continuing education programmes.

Reporting Method: PRISMA-ScR.

KEYWORDS
advanced practice nursing, clinical nurse specialist, continuing education, nurse clinician, nurse practitioner, nurses, nursing, scoping review

1 | INTRODUCTION

In 2021, 18 out of 30 European countries reported nursing workforce shortages (McGrath, 2021).

Health expenditure has been increasing during the last 20 years (The World Bank, 2022). Cost-effectiveness and equitable population health are critical approaches to adopt when tackling wasted money in health system financing (Couffinhal & Socha-Dietrich, 2017). This includes implementing healthcare delivery with an appropriate and sustainable skill-mix of nurses. Thus, there is a need to increase the supply of advanced practitioners (World Health Organization [WHO], 2016). Recent reviews have found several beneficial impacts of advanced practice nursing, such as patient satisfaction (Htay & Whitehead, 2021; Sánchez-Gómez et al., 2019), chronic disease control, efficiency, service cost-effectiveness (Htay & Whitehead, 2021) and patient outcomes (Woo et al., 2017).

The International Council of Nurses (ICN) has published the report 'Guidelines on Advanced Practice Nursing' in 2020 to facilitate a common understanding of advanced practice nursing. Within this guideline, advanced practice nursing refers to expanded and enhanced healthcare services provided by nurses. An advanced practice nurse (APN) is a registered nurse (RN) who has acquired an expert knowledge base, complex decision-making skills and clinical competency through additional education. The scope of practice varies among countries and is dependent on legislation. Clinical nurse specialist (CNS) and nurse practitioner (NP) are the most frequently identified APN roles. A minimum of a master's degree is required for these roles. (ICN, 2020) CNS is defined as a nurse, who 'provides healthcare services based on advanced specialized expertise when caring for complex and vulnerable patients or populations. In addition, nurses in this capacity provide education and support for interdisciplinary staff and facilitate change and innovation in healthcare systems' (ICN, 2020, p. 12). NPs, in turn, are autonomous clinicians educated to diagnose and treat conditions with a focus on treating the whole person (ICN, 2020). NPs are generalist nurses, who 'after additional education (minimum master's degree for entry level), are autonomous clinicians'. (ICN, 2020, p. 18). The level of NPs' practice autonomy is subject to regulatory policies (ICN, 2020).

The ICN (2020) report states that NPs and CNSs can apply clinical and theoretical competencies of advanced practice nursing utilizing research, education, leadership and diagnostic clinical skills, which are periodically reviewed to maintain currency in practice. The scope of practice for NPs and CNSs includes the implementation of research and evidence-based practice in the clinical care of patients, in addition to providing leadership and support of organizational strategic plans (ICN, 2020).

Strengthening APNs knowledge and ongoing competency development can support social and healthcare reform and service delivery; narrow health inequalities; improve customer-oriented approaches, service integration and availability (Ministry of Education and Culture, 2019). The positive connection between professional knowledge development and job satisfaction is indicated in research (Ylitörmänen et al., 2018) and is connected to the attraction and availability of healthcare professions (Kangasniemi et al., 2018). Competency and professional knowledge can be developed through continuing education and strengthening the competency of advanced practice nurses can lead to improved care for patients.

The *Oxford Dictionary of Nursing* defines continuing professional development as 'the concept that learning continues throughout one's life, both through educational courses and work experience and practice. Individuals are encouraged to identify their personal learning needs and to assess their progress in dynamic ways' (Law, 2021, p. 103). Continuing nursing education is defined as 'educational programs designed to inform nurses of recent advances in their fields' (NIH, 1966, p. 1). Continuing education in nursing is stated in many official regulations, such as European Union Directive 2013/55/EU and reports such as Regulated Nursing in Canada (Almost, 2021). In the United States and Canada, continuing education is required for professional registration renewal (De Bortoli Cassiani et al., 2020). In a report addressing the state of the world's nursing, 73 percent of the responding countries reported having continuing professional development systems (WHO, 2020).

A lot of continuing education is designed to target post-registration level nurses (Cato & Dickerson, 2021). Continuing professional development can be achieved through informal and formal learning, both having a central role in nurses' lifelong learning. Informal learning is often voluntary and depends on the self-directed desire to learn, whereas formal learning occurs via courses or workshops (Mlambo et al., 2021). Advanced practice nursing requires formal education beyond general registered nurses (ICN, 2020). Some countries, such as the United States (see, American Association for Nurse Practitioners [AANP], n.d.; Ohio Association for Advanced Practice Nurses [OAAPN], 2023) and Canada (see, CNA, n.d.), have developed advanced practice nursing continuing education courses. However, the nature and extent of continuing education courses available to APNs globally is unknown. This scoping review focuses on scientific research addressing continuing education for advanced practice nursing roles, including CNSs and NPs. To our knowledge, this is the first scoping review about continuing education for advanced practice nursing roles. In this review, continuing education for APNs is defined as educational interventions aimed specifically at APNs or interventions aimed at healthcare professionals including APNs.

2 | THE REVIEW

A preliminary search was conducted in the International Prospective Register of Systematic Reviews (PROSPERO), Cochrane Library and the JBI Evidence-Based Practice (EBP) databases, which yielded no published or ongoing reviews on the subject. This led us to select a scoping review as a suitable review design.

A scoping review is a particularly useful design for examining evidence when it is still unclear what more specific research questions can be posed for evidence synthesis (Tricco et al., 2016). A scoping review can be conducted to identify and analyse knowledge gaps and to examine how research is conducted on a certain topic or in a particular field (Aromataris & Munn, 2020). The objectives,

inclusion criteria, and methods of this review were specified in advance and documented in a protocol (Wright et al., 2022). Study objectives were organized into the categories of population, concept, and context, as presented in Table 1 (Aromataris & Munn, 2020).

3 | AIM

This scoping review aims to identify the nature and extent of scientific research published in the last 10 years addressing continuing education for APNs. In our original study protocol (Wright et al., 2022) we had stated the research question 1. Research question 2 was formulated after conducting the initial searches, as continuing education needs and preferences started to emerge as a theme. Finally, research question 3 was added as it became clear that reported study limitations were an important additional information emerging from the research data. Consequently, the questions are more precise than the original review question stated in the review protocol (Wright et al., 2022).

3.1 | Research questions

What is the nature and extent of the available scientific research addressing continuing education for advanced practice nursing roles?

1. What kind of continuing education interventions exist for APNs?
2. What is known about APNs' continuing education needs and preferences?
3. What limitations did the authors of the selected articles identify in their research?

4 | METHODS

4.1 | Design

This review adheres to the Joanna Briggs Institute's (JBI) manual for evidence synthesis guidelines for scoping reviews (Aromataris & Munn, 2020).

4.2 | Search methods

The systematic search was conducted on 28 September 2022 in the following databases: CINAHL, Cochrane Library, JBI EBP Database, PsycINFO, PubMed, Scopus and Web of Science. The search logic is presented in Table 2.

The search was limited to studies written in English and, to limit the results to the most recent research, published between 1 January 2012 and 17 September 2023. To improve search sensitivity and avoid omitting relevant studies, medical subject headings (MeSH) terms were also used. The systematic search was not subjected to any further limitations to ensure all relevant research on the topic was found. The specific search queries and results are presented in Appendix S1.

TABLE 1 PCC format.

Category	Description
Population	Advanced practice nursing roles, including clinical nurse specialists and nurse practitioners
Concept	Continuing education
Context	Scientific research

4.3 | Inclusion criteria

The following inclusion criteria were used:

a. Research is relevant to advanced practice nursing.
b. Research is relevant to continuing education.
c. Research is in the form of RCTs; quasi-experimental, descriptive, register, intervention, or cohort studies; reviews; qualitative studies.

The inclusion criteria were tested by two independent reviewers (MW & SI) before initiating the study selection process.

4.4 | Search outcomes

A total of 1534 results were identified in the electronic search process. The results were imported to Covidence for screening; 647 of the results were identified as duplicates, leaving 887 for title and abstract-level screening. A total of 41 papers were read on a full-text level; finally, 21 papers met the inclusion criteria. Every step of the screening process was done independently by two reviewers (MW & SI). Conflicts were resolved through discussion. The study selection process is presented as a PRISMA flow chart in Figure 1 (Page et al., 2021). To ensure the inter-rated validity of the study selection process, Cohen's kappa values and agreement percentages were calculated. These are presented in Table 3 (Landis & Koch, 1977).

4.5 | Quality appraisal

Quality appraisal of the included papers was not conducted as it was not deemed relevant to the objectives of this review and is usually not needed in scoping reviews (Aromataris & Munn, 2020).

4.6 | Data abstraction

The data were extracted by two independent reviewers using the data extraction tool presented in the study protocol (Wright et al., 2022). The following information was retrieved: author(s), year, country, title, aims, population and sample size, study design, methods, key findings

TABLE 2 Search strategy.

Advanced practice nursing	AND	Continuing education
OR		OR
"Advanced practice nurs*" "Clinical nurse specialist*" "Nurse clinician*" "Nurse practitioner*"		"Continuing educat*" "Continuing professional educat*" "Further education*" "Further professional educat*" "Lifelong learn*" "Lifelong professional learn*"

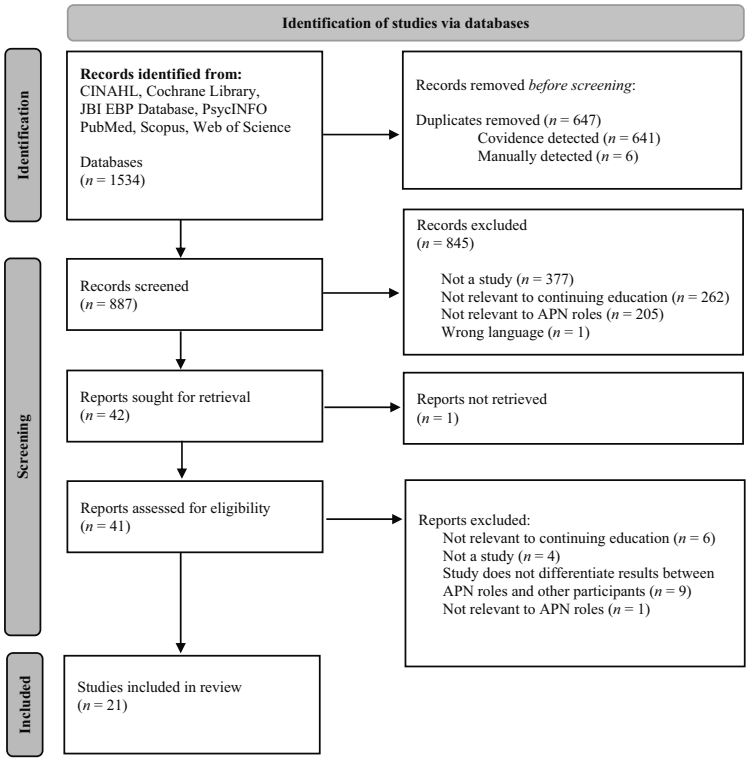

FIGURE 1 PRISMA flow chart.

TABLE 3 Inter-rater reliability of study selections.

	Agreement (%)	Cohen's kappa[a]	Interpretation
Screening titles and abstracts	98.4%	0.85	Almost perfect or perfect agreement
Screening full texts	93.3%	0.87	Almost perfect or perfect agreement

[a]Cohen's kappa: 0.01–0.20 = slight agreement, 0.21–0.40 = fair agreement, 0.41–0.60 = moderate agreement, 0.61–0.80 = substantial agreement, 0.81–1.00 = almost perfect or perfect agreement.

and limitations. This is presented in the table charting the included studies (Table 4).

4.7 | Synthesis

The synthesis of the evidence was conducted by the main researcher but discussed regularly within the research group. Synthesis was done using a narrative, descriptive method (Aromataris & Munn, 2020).

5 | RESULTS

5.1 | General description of the studies

A total of 21 papers met the inclusion criteria for this review. 19 of the included studies (90.5%) were conducted in the United States. One study was conducted in Australia (Buckley et al., 2015), and one in Canada (Baxter et al., 2013). 15 of the studies (71%) addressed the impact of different continuing education interventions

(Anderson, 2014; Bednarczyk et al., 2022; Boesl & Saarinen, 2016; Buriak et al., 2015; Carron et al., 2018; Choma & McKeever, 2015; Claiborne, 2016; Hessler, 2015; Hoffmann et al., 2018; Johnson, 2014; Klein & Bindler, 2022; Nuttall, 2016; Pietras et al., 2023; Roberts et al., 2022, 2023). Five of the studies used a cross-sectional survey design and addressed, for example, different needs and barriers to continuing education and preferred course delivery methods (Azotam, 2017; Barnes et al., 2017; Baxter et al., 2013; Buckley et al., 2015; O'Brien Pott et al., 2021). One paper was a scoping review on interventions aimed at improving nurses' competency in genetics and genomics (Zureigat et al., 2022).

Seventeen of the 21 included studies (81%) addressed NP roles. A study conducted by Buriak et al. (2015) also addressed CNS roles but reported their results combined with RN results. The four remaining studies addressed APN roles in general (Azotam, 2017; Choma & McKeever, 2015; Claiborne, 2016; Zureigat et al., 2022). Thus, the continuing education of CNS roles was not specifically addressed in any of the selected studies. Table 4 presents the included studies.

5.2 | Continuing education interventions for APN roles

Most of the studies (71%) included in the review addressed the development and/or effectiveness of continuing education interventions. The topics of these interventions were varied and are presented in Table 5. The interventions addressed health assessment methods (Anderson, 2014; Choma & McKeever, 2015; Claiborne, 2016; Pietras et al., 2023), patient care and prevention of illness (Boesl & Saarinen, 2016; Buriak et al., 2015; Carron et al., 2018; Hessler, 2015; Hoffmann et al., 2018; Klein & Bindler, 2022; Nuttall, 2016; Roberts et al., 2022; Roberts et al., 2023), prescribing medication (Bednarczyk et al., 2022), and leadership (Johnson, 2014). Furthermore, a scoping review on educational interventions aimed at improving nurses' competency in genetics and genomics found four interventions addressing APN roles: a mobile support app, a 3-h workshop, a targeted educational module and a three-phase multimodal intervention (Zureigat et al., 2022).

Almost all of the interventions were delivered online. Only one did not utilize web-based continuing education delivery and was delivered during the 2015 annual pharmacotherapy conference (Carron et al., 2018). The most common target population was NPs. Five of the interventions were designed for a larger group of healthcare professionals, including physicians, registered nurses and licensed practical nurses (Bednarczyk et al., 2022; Buriak et al., 2015; Choma & McKeever, 2015; Claiborne, 2016; Roberts et al., 2022).

Learning was assessed with pre- and post-test scores throughout the studies. In addition, evaluation questions were used in the studies conducted by Anderson (2014), Bednarczyk et al. (2022), Johnson (2014), and Klein and Bindler (2022). Improved knowledge about continuing education topics was evident in participants of all intervention studies (Anderson, 2014; Bednarczyk et al., 2022; Boesl & Saarinen, 2016; Buriak et al., 2015; Carron et al., 2018; Choma & McKeever, 2015; Claiborne, 2016; Hessler, 2015; Hoffmann et al., 2018; Johnson, 2014; Klein & Bindler, 2022; Pietras et al., 2023; Roberts et al., 2022; Roberts et al., 2023). While some continuing education interventions were found to be high quality and usable (e.g. Nuttall, 2016), another reported no significant differences in the observed outcomes (Azotam, 2017). Furthermore, some studies ($n=4$) assessed participants' continuing education satisfaction, noting a positive evaluation of pedagogic methods and participants' overall intervention satisfaction (Anderson, 2014; Bednarczyk et al., 2022; Boesl & Saarinen, 2016; Choma & McKeever, 2015). Buriak et al. (2015), Carron et al. (2018), Claiborne (2016), Hessler (2015), Hoffmann et al. (2018), Johnson (2014), Klein and Bindler (2022), Nuttall (2016), Pietra et al. (2023), Roberts et al. (2022), and Roberts et al. (2023) did not specifically assess participation satisfaction in their intervention studies.

5.3 | Continuing education needs and preferences of APNs

Some of the intervention studies utilized needs assessment before developing the continuing education programme. Choma and McKeever (2015), Johnson (2014), and Roberts et al. (2022) used data gathered through surveys to guide the content development of the continuing education modules. Roberts et al. (2023) used previous research in developing their webinar intervention on COVID-19 vaccination confidence. The content of other intervention studies was guided by a preliminary literature search (Anderson, 2014; Bednarczyk et al., 2022; Boesl & Saarinen, 2016; Buriak et al., 2015; Carron et al., 2018; Claiborne, 2016; Hessler, 2015; Hoffmann et al., 2018; Klein & Bindler, 2022; Nuttall, 2016). Barnes et al. (2017) studied NPs' educational needs regarding psoriasis and identified three information gaps: severity assessment, treatment selection and risk assessment for comorbidities commonly associated with psoriasis. Topic, quality of content, availability of credits and clinical practice focus were the most important factors influencing the selection of continuing education courses (O'Brien Pott et al., 2021). Pietras et al. (2023) used the theory of planned behaviour in developing the continuing education intervention of obstructive sleep apnoea screening.

Pharmacotherapeutics was the most attended continuing education course among primary healthcare NPs ($n=83$), followed by Care of the Older Adult, and Rural and Remote Health Care. In turn, the lowest proportion of NPs ($n=6$) enrolled in the Mental Health in Primary Health Care course. NPs rated interpretation of laboratory and diagnostic tests, pain control strategies, prescribing narcotic medications and early detection and screening for cancer to be the most interesting continuing education courses (Baxter et al., 2013).

Baxter et al. (2013) found that most of the participants preferred an online, self-directed format for continuing education. Electronic information sources were also preferred over paper-based versions in the study conducted by Buckley et al. (2015). Common barriers

TABLE 4 Characteristics of the chosen studies.

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Anderson (2014). Improving adolescent friendly healthcare services: Implementing comprehensive psychosocial histories into practice. *USA*	To develop an online continuing education module in conjunction with the American Association of Nurse Practitioners Continuing Education Center to educate about adolescent psychosocial assessment methods and to provide information to help healthcare providers effectively communicate with the adolescent population.	NPs working in primary care in the frontier counties of North Dakota $n = 328$	Intervention study design
Azotam (2017). The significance of continuing education on the intention of advanced practice registered nurses to report child maltreatment. *USA*	To determine if there are differences among advance practice registered nurses' (APRNs) intended child maltreatment-reporting behaviours based on their voluntary and/or state-mandated child maltreatment continuing education status; and to assess the theoretical-based predictors of intended reporting behaviours.	APRNs from the United States $n = 377$	Descriptive, non-experimental design
Barnes et al. (2017). An assessment of the continuing education needs of nurse practitioners who manage patients with psoriasis. *USA*	To identify and quantify educational needs among NPs related to psoriasis.	Dermatology NPs $n = 54$	Cross-sectional survey design
Baxter et al. (2013). Continuing education for primary health care nurse practitioners in Ontario, Canada. *Canada*	To explore NPs' perceptions of their continuing education learning needs and the most effective method of course delivery, and to determine the general barriers to NP continuing education.	Primary health care nurse practitioners in Ontario $n = 83$	Cross-sectional survey design

Methods	Key findings	Limitations
An evidence-based intervention and evaluation in response to baseline data from the Rural Adolescent Health Survey.	1) Participants reported high levels of acceptance of the continuing education module. 2) Most of the participants would modify their practice as a result of the module. 3) Most of the participants would recommend the programme to their colleagues. 4) The results were positive and demonstrated that the participants experienced learning.	1) Inability to break down the demographic location information by state. 2) Uneven participation across regions. 3) Inability to distinguish demographic differences between participants. 4) Inability to determine if the population was specifically reached. 5) Minor technical issues with the online continuing education programme.
Online survey	1) Most of the APRNs ($n=293$, 80.3%) had at least one experience where they reported suspicions of child maltreatment during their nursing career. Furthermore, many of the participants ($n=280$, 76.7%) identified that there had never been a time when they had not reported their suspicions of child maltreatment. 2) Most of the APRNs in the study had relevant clinical experiences of identifying their role as a mandatory reporter and using clinical acumen to report their suspicions. 3) The most important barrier for reporting was 'feeling uncertain about the evidence'. 4) This study did not reveal any statistically significant differences ($p>.05$) in intention to report child maltreatment among the three APRN continuing education groups. The continuing education groups under study consisted of those who had received state-mandated child maltreatment education, voluntary child maltreatment-specific education, or those who did not identify any child maltreatment-specific continuing education. 5) Most of the participants had received child maltreatment-related continuing education.	1) Non-experimental, comparative, cross-sectional perspective study without manipulation of any of the independent variables. 2) Inability to send follow-up reminders to participants. 3) Self-report measures. 4) Low response rate.
A case vignette survey (online survey), a validated method of assessing clinician practice patterns. The survey instrument presented two patient cases followed by questions presenting choices for severity assessment, treatment approach, and assessment of comorbidity risks.	1) The study identified gaps in three key areas of patient management: severity assessment, treatment selection, and risk assessment for comorbidities commonly associated with psoriasis. 2) Future educational programmes may address these gaps by encouraging NPs to integrate standardized tools into their approach to assessing psoriasis severity. Additional education may assist NPs in matching modes of therapy to psoriasis severity and monitoring the comorbidities associated with psoriasis.	1) The assessment of psoriasis severity is complex and is partially informed through an active dialogue with the patient that cannot be duplicated with a survey instrument. 2) The number of individuals in this sample who used standardized tools was too low to allow statistical analysis of any relationship between assessment tool use and subsequent approaches to management. It is not possible to ascertain whether standardized tool use would improve severity assessment.
Online questionnaire	1) The majority of NPs had enrolled in the Pharmacotherapeutics course (75%, $n=45$), followed by Care of the Older Adult (25%, $n=15$) and the Rural and Remote Health Care (22%, $n=13$). 2) The lowest proportion of respondents had enrolled in the Mental Health in Primary Health Care course (10%, $n=6$). 3) NPs indicated that they would be interested in continuing education courses that address the interpretation of laboratory and diagnostic tests (82%, $n=49$), pain control strategies (62%, $n=37$), prescribing narcotic medications (52%, $n=31$), and early detection and screening for cancer (48%, $n=29$). 4) The majority of respondents (73%, $n=44$) preferred an online, self-directed format for continuing education courses. 5) Most NPs (83%, $n=50$) indicated that continuing education was extremely important to their practice and 60% ($n=36$) denied experiencing any barriers to participating in COUPN's continuing education courses. 6) The top five barriers to participating in continuing education were identified as: time intensive (50%, $n=12/24$); difficult to get time off work and/or away from patient care (33%, $n=8/24$); family obligations (time away from family) (33%, $n=8/24$); lack of finances and/or financial support (29%, $n=7/24$); and fatigue (21%, $n=5/24$).	1) Small sample size and low response rate. 2) Selection bias may have resulted in only those who were least or most happy with the courses completing the survey. 3) The psychometric properties of the online survey tool were not tested prior to data collection.

(Continues)

TABLE 4 (Continued)

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Bednarczyk et al. (2022). A large-scale, online, multiprofessional opioid prescriber training programme. *USA*	To answer the question: Would a large-scale, enduring, online training programme administered in an academic environment be feasible?	All licensed professionals authorized to prescribe controlled substances Module 1 *n* = 6511 Module 2 *n* = 29,450	Action research
Boesl and Saarinen (2016). Essential oil education for health care providers. *USA*	To evaluate the effectiveness of the dissemination of current information on essential oils to health care practitioners through a continuing education module.	Health care practitioners *n* = 231	Intervention study design
Buckley et al. (2015). Sources of information used to support quality use of medicines: Findings from a national survey of nurse practitioners in Australia. *Australia*	To investigate the sources, both print and electronic formats, which Australian NPs currently use to obtain information regarding the quality use of medicines (QUM). An additional aim was to document NPs' preferences for continuing education in relation to QUM.	Australian NPs 2007 (*n* = 68) and 2010 (*n* = 209)	Cross-sectional survey design
Buriak et al. (2015). Using a predictive model of clinician intention to improve continuing health professional education on cancer survivorship. *USA*	To identify what barriers were perceived by course participants and what demographic factors influenced intention to provide care.	Course participants were clinicians voluntarily seeking online continuing education. *n* = 8997	Intervention study design

Methods	Key findings	Limitations
An online training programme was developed. The programme consisted of a pre-test, post-test, and programme evaluation for knowledge and programme satisfaction. Programme satisfaction was measured with an online survey.	1) NPs ($n=4663$, 14.6%) had the second highest pre-test and post-test mean scores in module 1. 2) NPs ($n=4271$, 14.5%) had the second lowest pre-test scores and the lowest post-test scores in module 2. 3) Programme satisfaction results were not differentiated between participatory groups, but the multiprofessional programme addressing opioid prescribing was well accepted, with evidence of increased knowledge across disciplines through pre- and post-training assessment.	1) Construct of the post-test. 2) Participants were permitted three attempts at receiving a pass. Only the final score was included in the analytics, where an analysis of first attempts may have been instructive. 3) Adapting the content of this (or any other large-scale educational initiative) would require some adjustment for regional practices, in this case specifically those caused by the laws varying from state to state.
The research team developed and implemented a continuing education module on essential oils in collaboration with the AANP Continuing Education Center and evaluated its effectiveness.	1) Participants scored higher on the post-test for all four objectives. 2) Participants were also given an opportunity to provide feedback related to the continuing education module. Many participants left comments stating that the continuing education module was good, great, and/or informative. 3) Several negative comments were made related to technological difficulties and delayed ability to download the module.	1) Awareness of the educational opportunity would likely be low because most practitioners seek continuing education credits through their own professional organizations.
Cross-sectional survey conducted in 2007 and 2010	1) Over 80% of NP respondents reported gaining their information on QUM from the professional literature, which may include scholarly journal articles, reports, and independent publications. 2) Drug industry marketing was the least mentioned source of medicine information. 3) The results also suggest that NPs prefer to receive their CE on medicines information in an electronic form, rather than a paper-based version, and over time NPs are utilizing more electronic sources than paper.	1) Participants required computer access to participate in the online survey. This limitation may have skewed the reported preference of many of the respondents to access medicine information in an electronic format. 2) While the survey asked respondents which resources they had used for medicines information and QUM, it did not ask them why they chose the resources that they did.
A cancer survivorship primer containing epidemiological information, patient cases, guidelines for clinical follow-up, and reference materials was designed by the authors for delivery through the Web MDTM (Medscape Education) platform. Data were collected from the course participants with a survey.	The study did not differentiate results between RNs and CNSs. Thus only the results concerning NPs are presented. 1) Lack of survivorship care plans and treatment summaries was the most mentioned barrier to care reported by NPs, followed by lack of education and training on survivorship care. 2) The study did not find an association between ten or more years in practice and intent to provide survivorship care. 3) The results of this study support earlier research showing that the least experienced were less likely to deliver survivorship care or to demonstrate the comfort and confidence to do so. 4) Physician and NP alignment on barrier recognition could arguably be due to similarities in accountability for and volume of patient care. 5) It is clear that primary care clinicians are eager to participate in online educational programmes covering the fundamentals of survivorship care in response to the knowledge gap. 6) Theory of planned behaviour (TPB) constructs are useful in designing educational interventions with a focus on attitudes, perceived barriers, and knowledge/capability in order to promote behaviour change. 7) Focusing survivorship educational interventions towards midcareer clinicians targets those demonstrating the highest intention to care for cancer survivors. 8) In order to reach the highest number of clinicians possible and optimally impact team-based, collaborative care, survivorship educational interventions should be designed to target the learning needs of health professionals from multiple disciplines.	1) The study focused on predictors of intention to provide survivorship care and confirmation of barriers to care but did not report on actual behaviour. 2) Greater control over survey question formats for the collection of 'fill-in' options for additional barriers would have been beneficial.

(Continues)

TABLE 4 (Continued)

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Carron et al. (2018). Improving rural nurse practitioner knowledge about polycystic ovary syndrome through continuing education. *USA*	To determine whether a continuing education programme about PCOS would improve NPs' knowledge about PCOS.	Rural nurse practitioners *n* = 78	Pre-test–post-test design
Choma and McKeever (2015). Cervical cancer screening in adolescents: An evidence-based internet education programme for practice improvement among advanced practice nurses. *USA*	To determine the effects of a web-based continuing education unit programme on APNs' knowledge of current cervical cancer screening evidence-based recommendations and their application in practice.	All registered members of the New Jersey Forum of Nurses in Advanced Practice website were eligible to participate in the pilot programme free of charge. *n* = 48	Intervention study design
Claiborne (2016). Application of a theory-based educational intervention to increase the frequency of performing oral health assessments on children among advanced practice registered nurses and nurses. *USA*	To determine if the use of a theory-based educational intervention would increase the frequency of performing oral health assessments (OHAs) during well-child visits among nurses.	APNRs, RNs and LPNs *n* = 33	Randomized experimental design
Hessler (2015). Self-efficacy and knowledge of nurse practitioners to prevent paediatric obesity. *USA*	To assess the effectiveness of an online intervention to increase the knowledge level and self-efficacy to prevent paediatric obesity in a random sample of NPs across the US.	NPs in the United States *n* = 354	Experimental design

Methods	Key findings	Limitations
A PhD-prepared certified family nurse practitioner and a Doctor of Nursing Practice–prepared certified family nurse practitioner or certified nurse midwife, both of whom have PCOS expertise, developed and conducted a 45-minute continuing education programme. A pre- and post-test survey was used.	1) Many rural NPs did not have the baseline knowledge to diagnose and manage PCOS. 2) This study sheds new light on the value of a continuing education programme on PCOS for NPs: Participants' PCOS knowledge scores for content areas including the Rotterdam diagnostic criteria, laboratory testing, management strategies, and recognizing long-term PCOS consequences significantly increased pre-test to post-test. 3) The programme was successful in educating participants about the newest treatment guidelines for managing PCOS and broadening their perspectives on available treatment options.	1) Small sample size at one regional conference, thus limiting study generalizability. 2) The authors did not use a code to link pre- and post-test questionnaires to protect anonymity. Therefore, it is unknown whether the participants completing the pre-test were the same participants completing the post-test. 3) The study had a short interval of 45 minutes between the pre- and post-test, which could have affected the results.
A web-based pilot programme with narration was developed by the primary author to address the knowledge gaps and current debate on uptake of clinical guidelines among healthcare providers. A pre-test–post-test evaluation with a survey was conducted.	1) Participants increased their knowledge after learning the material. 2) The additional question presented to participants regarding whether changes in practice were made was answered affirmatively by the majority of participants. 3) This project demonstrated how the use of web-based education is valuable for busy clinicians to keep up-to-date with changing practice guidelines.	1) Although the data support the attainment of these goals, the ability to generalize the findings to similar programmes is limited, as the programme's sample size was small and the pilot survey did not undergo formal validity testing.
Using a non-probability sampling frame, a total of 46 participants were recruited and randomized into a control or experimental group. An online survey was used to measure oral health-related practices on children of all participants at pre- and post-intervention.	1) There was a marginal significant relationship with respect to education such that a greater proportion of NPs received prior education related to children's oral health than RNs/LPNs. 2) There was no significant main effect, or difference between the experimental and control groups for frequency of performing oral health assessments on children. 3) While no significant differences were found between groups or interactions for all four dependent variables measured, scores related to knowledge, confidence in performing oral health assessments, and advising parents improved within groups.	1) All participants were female. 2) Selection bias occurred because individuals were not randomly selected from the accessible target population. 3) A non-probability snowballing sampling frame was used to obtain participants for the study. 4) No stratification based on the profession and knowledge level of the participants. 5) The recruitment period could have impacted the total number of participants. 6) Small sample size. 7) Pre-testing sensitization could have occurred during completion of the pre-test survey. 8) Self-reported data.
An experimental pre−/post-test study design using an online continuing education programme focused on the prevention of paediatric obesity in the primary care setting was implemented. Data were collected through a survey.	1) There was a statistically significant increase in participants' knowledge on the post-test when compared with pre-test scores. 2) Factor analysis on the self-efficacy survey revealed two main measurements of self-efficacy: self-efficacy to prevent paediatric obesity; and comfort level in knowledge to prevent paediatric obesity. 3) Ten of the 11 items on the self-efficacy survey revealed a significant increase in self-efficacy.	1) The design of the study cannot rule out the possible effect of testing validity, or the first test having an effect on the second test score. 2) Selection bias is another possible issue.

(Continues)

TABLE 4 (Continued)

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Hoffmann et al. (2018). Oncology nurse practitioner web education resource (ONc-PoWER): An evaluation of a web-enhanced education resource for nurse practitioners who are new to cancer care. *USA*	1) To evaluate the impact of the ONc-PoWER curriculum on the ONPs' cancer knowledge after completion of the five modules. 2) To assess the mentors' ability to measure the ONPs' application of designated skills of oncology clinical practice as presented in the five ONc-PoWER modules. 3) To assess the ONPs' and mentors' evaluation of the ONPs' attainment of the curriculum objectives.	Oncology NPs new to cancer care and their on-site mentors *n* = 79	Experimental design
Johnson (2014). Creation of continuing education modules addressing leadership development components applicable to nurse practitioners in the state of North Dakota. *USA*	1) To survey APRNs in the state of North Dakota to determine both the necessary areas of leadership development and the method by which they would prefer to receive the information. 2) To create and distribute leadership development modules based on the results of the survey that would potentially increase knowledge and increase the likelihood of participation in the areas of health policy, systems leadership, negotiation, and influencing peers to accomplish positive change among nurse practitioners in the state of North Dakota and across the United States.	NPs in the state of North Dakota 1) Survey *n* = 34 2) continuing education modules; sample sizes varied between 11 and 27	Intervention study design
Klein and Bindler (2022). Ask your provider about cannabis: Increasing nurse practitioner knowledge and confidence. *USA*	1) Assess pre- and post-test knowledge of healthcare professionals regarding use of cannabis for medical symptoms. 2) Evaluate potential changes in practice reported after application of continuing education information. 3) Differentiate between health care professionals' suggested uses for cannabidiol (CBD) only versus cannabis products. 4) Increase willingness of health care professionals to communicate with patients regarding cannabis.	NPs registered for a national medical cannabis-focused continuing education programme, April 2020–March 2021 Pre/posttest *n* = 289, follow-up survey *n* = 184	Experimental design

Methods	Key findings	Limitations
Pre-test/post-test measures and course evaluation with an online survey.	1) The difference between pre- and post-programme self-assessment of cancer care knowledge and confidence in delivering cancer care among the ONPs was statistically significant (p = .000). 2) Seventy-nine of the mentors responded 'yes' or 'no' to the 30 questions asking whether or not the ONP could perform core clinical skills. Mentor agreement that the new ONPs were able to successfully perform the 30 core clinical skills ranged from a low of 93% to a high of 100%. 3) Mean scores from the mentors' evaluation of the ONPs ranged from a high of 4.01 to 3.87 (measured on a 1–5 Likert scale) 4) The learning needs attainment mean scores for the ONPs ranged from a high of 3.78 to 3.55 (measured on a 1–5 Likert scale). 5) Continuing education can enhance professional nursing practice upon completion of a basic nursing education and provide essential evidence-based practice information in a format conducive to 'on-the-job' learning. 6) The challenge for continuing education programmes is to provide educational activities that bridge the knowledge gap between formal education and professional practice for all nurses. 7) As demonstrated by this evaluation, ONc-PoWER's five modules provided an effective opportunity for the new ONP to increase his or her knowledge base related to cancer care.	Not mentioned.
The four continuing education modules were evaluated independently through the use of various pre-test, post-test, and evaluation questions.	1) Participants indicated that the online module learning format was an effective means of content dissemination in all topics. 2) The data reveal that learning occurred as a result of completing the online modules. The vast majority of participants correctly answered post-test questions related to the material covered in the presentations.	1) Small sample sizes. 2) Lack of random selection. 3) Participants who began the modules and did not finish them may have affected the results. 4) Information specific to the role of the nurse practitioner is limited; information related to the Doctor of Nurse Practice-prepared nurse practitioner is even more limited. The lack of information required the author to apply general information related to leadership development to the specific role of nurse practitioner in some cases. 5) Inability to determine the specific demographic location of the participants.
A 2-hour continuing education module was developed, mapped, and accredited using an NP/pharmacist educator team and evaluated with a pre-test/post-test and follow-up survey conducted by module participants.	1) New knowledge regarding cannabis and its use was achieved by continuing education completers, 82.6% reporting that they knew less than half of the content before completion. 2) Both the post-test (immediate) and follow-up survey (within three months of completion) assessed changes in attitudes and changes in practice since completing the continuing education module. 3) Regardless of whether respondents had changed their own attitudes or actually recommended cannabis, 92.4% reported now being likely or highly likely to inquire about cannabis use in patients and 81.5% reported being likely or highly likely to counsel patients about cannabis use. 4) Knowledge of cannabis drug–drug interactions, pharmacokinetics, and metabolism content areas saw the largest knowledge increase after completion of this educational programme. Because NPs have prescriptive authority in every state, knowledge and openness to discussing how the cannabis patients are using can impact medications, regardless of whether it is classified as 'medical' or self-initiated, is critical for informed discussion and prescribing decisions.	1) The study design measures a brief time-limited reflection on practice, which may change with context and practice maturation. 2) This study is subject to selection bias, as participants who completed both the CE and follow-up may differ, particularly regarding their attitudes towards cannabis, from those who did not. 3) Although national in nature, the complexity and variance of state law limits the generalizability of these findings. 4) The respondent location collected may not reflect all states of practice as participants can have multiple practice settings and licences. 5) Respondents were asked about their self-identified recommendations for use of cannabis without further prompts to differentiate between whether and how such recommendations aligned with evidence or current state law.

(Continues)

TABLE 4 (Continued)

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Nuttall (2016). Development of an education module on concussions in youth for primary care nurse practitioners in Utah. *USA*	To develop and pilot an evidence-based educational module for primary care NPs in Utah on the evaluation and management of sport-related concussions in children and adolescents under the age of 18 years.	NPs practising in the primary care setting in Utah *n* = 16	Experimental design
O'Brien Pott et al. (2021). What influences choice of continuing medical education modalities and providers? A national survey of U.S. physicians, nurse practitioners, and physician assistants. *USA*	To explore what influences clinicians in selecting continuing medical education (CME) activities in the United States.	Family medicine physicians, internal medicine and hospitalist physicians, medicine specialist physicians, nurse practitioners, and physician assistants *n* = 500	Cross-sectional survey design
Pietras et al. (2023). Examining changes in knowledge and practice in nurse practitioners after an online educational module on obstructive sleep apnea. *USA*	To investigate primary care nurse practitioner (NP) knowledge and knowledge retention on obstructive sleep apnea screening after an educational in-service	NPs *n* = 30	Quasi-experimental design
Roberts et al. (2022). Measuring the impact of a COVID-19 continuing education programme. *USA*	To describe a continuing education programme developed to address COVID-19 knowledge gaps and to report on the changes in knowledge, competence, and confidence following programme completion.	NPs, Nurse/NP students, RNs, PAs. NPs were the largest group (91.6%) *n* = 2901 (NPs *n* = 2658)	Cross-sectional survey design

Methods	Key findings	Limitations
Education model on concussions was developed and reviewed by clinical experts. Modifications were made accordingly and a pilot study evaluating the quality and usability of the education module was conducted. User satisfaction was measured with a survey.	1) The resulting module has high quality content, is useable, and is tailored to the needs of NPs working in primary care in Utah. 2) This project has resulted in a web-based module that is tailored to NPs working in primary care in Utah.	1) Since the module was tailored to NPs working in in Utah, modification of the module would be required to make it transferable to other settings or NP populations. 2) One limitation of the pilot study is the use of convenience sampling. 3) Another limitation is the unknown effect that this education module will have on each provider's clinical practice and on patient outcomes.
Online survey	Results addressing NPs are presented here. 1) Desirability of different CME modalities: NPs' most desired CME modality was live activity (e.g. lectures), followed by national/regional society meetings, online activities, internet point-of-care, and print/journal-based CME. The least desired modalities were streaming or webcast of a live event or performance improvement CME. 2) NPs reported they would most likely use live activity CME in the next 12 months. 3) The two appeals of online course CME most mentioned by the NPs were 'learn when I have time' and 'lower cost than attending a destination course'. The least mentioned was 'subject matter is best taught through this medium'. 4) The two appeals of in-person course CME most mentioned by the NPs were 'subject matter is best taught through this medium' and 'regionally located'. The least mentioned was 'able to bring family'. Ratings were generally similar across clinician types and age groups: 5) The most important factors influencing selection of CME courses were topic, quality of content, availability of CME credit, and clinical practice focus. 6) Live activities, online learning, and point-of-care learning were the modalities most likely to be considered for future use.	1) Several aspects of the methods and results leave open the possibility that the findings do not represent the larger population of U.S. clinicians, including the relatively low response rate, the short response period, and the internet-only administration. 2) Tailoring items and response options to each provider type could have enhanced relevance within that provider type but would have precluded pooling results across providers and making comparisons between provider types. 3) Although the survey was pilot-tested, some response options could have been interpreted in multiple ways. 4) Self-reported measures.
Pre/post-test surveys (23 items) + follow-up survey (25 items)	1) There was an increase in obstructive sleep apnea knowledge, although minimal, after implementation of the educational module. 2) There was a decrease in knowledge demonstrated over time in the follow-up test, but the mean score remained above pre-test levels, indicating potential knowledge retention. 3) The importance of screening remained very high across all surveys with minimal difference indicating that NPs already understood the importance of screening even before their participation in the study.	1) Limitations to this study are mostly related to study design, sample size, time, and an uncontrolled environment. 2) The educational module was implemented at the end of the workday during a mandatory meeting for NPs: end of workday fatigue 3) There was no control group in this study, so it is impossible to rule out the effect of time on knowledge and knowledge retention since any change may not be the result of only the intervention.
Pre-activity and post-activity questions were used to evaluate clinician knowledge, attitudes, and competence.	1) Development of an ongoing, iteratively updated webinar continuing education programme on COVID-19 prevention, diagnosis, and treatment targeted towards NPs improved knowledge, competence, and confidence among learners. 2) Baseline knowledge of COVID-19 was relatively low, particularly regarding diagnosis, primary care management, and inpatient management. 3) Immediately after completing the continuing education programme, significant improvements were reported for the overall proportion of correct answers on the evaluation and the percentage correct for each individual knowledge-based question. Confidence questions also showed significant improvement between the pre-activity and post-activity evaluation. 4) More than two thirds of learners reported that they planned to implement strategies learned from the continuing education programme. 5) NPs seemed to be more knowledgeable regarding topics related to primary care (e.g. COVID-19 prevention guidance, testing, risk factors for severe disease) compared with inpatient management (e.g. pharmacotherapies, hospital-based PPE recommendations).	1) No post-activity follow-up survey was conducted to determine the retention of knowledge from the activity. 2) There is an inherent selection bias in the study due to the inclusion of only learners who completed the activity. 3) A proportion of the data included in this analysis were collected from learners who attended more than one webinar, which may affect the proportion of correct answers in webinars 2 and 3.

(Continues)

TABLE 4 (Continued)

Author(s), title, year, and country	Aim(s)	Population and sample size	Study design
Roberts et al. (2023). Knowledge and confidence gains after a COVID-19 vaccine continuing education programme developed for nurse practitioners. *USA*	To assess changes in preactivity and postactivity knowledge and confidence and to qualitatively report other learner outcomes on a continuing education series that covered COVID-19 vaccine development, recommendations, administration, and solutions for overcoming hesitancy	The majority (over 96%) of the respondents were NPs. *n* = 3949	Pre-test–post-test design
Zureigat et al. (2022). Educational interventions to improve nurses' competency in genetics and genomics: A scoping review. *USA*	To explore the scope of available evidence on educational interventions aimed at improving nurses' competency in genetics and genomics.	Reviews addressing educational interventions on genetics and genomics Studies addressing APN roles *n* = 4	Scoping review

Abbreviations: AANP, American association for nurse practitioners; APN, Advanced practice nurse; APRN, Advanced practice registered nurse; CME, Continuing medical education; CNS, Clinical nurse specialist; LPN, Licensed practical nurse; NP, Nurse practitioner; ONP, Oncology nurse practitioner; PA, Physician assistant; PCOS, Polycystic ovary syndrome; QUM, Quality use of medicines; RN, Registered nurse.

for continuing education were time, family obligations, lack of finances and/or financial support and fatigue (Baxter et al., 2013). However, in a study conducted by O'Brien Pott et al. (2021), NPs (*n* = 500) rated live activity as the most preferred delivery method, followed by national/regional society meetings, online activities, internet point-of-care and print/journal-based continuing education. The least desired delivery was streaming or webcast of a live event or performance improvement continuing education. The appeal of online courses was that the participating NPs could 'learn when I have time' and the 'lower cost than attending a destination course'. The two appeals of a live activity course most mentioned by the NPs were 'subject matter is best taught through this medium' and 'regionally located'.

5.4 | Limitations reported in the included studies

The authors reported several limitations to their studies. These included sample-related issues, such as small sample size (Azotam, 2017; Barnes et al., 2017; Baxter et al., 2013; Carron et al., 2018; Choma & McKeever, 2015; Claiborne, 2016; Johnson, 2014; O'Brien Pott et al., 2021; Pietras et al., 2023; Zureigat et al., 2022), selection bias (Baxter et al., 2013; Claiborne, 2016; Hessler, 2015; Klein & Bindler, 2022; Roberts et al., 2022; Roberts et al., 2023), lack of randomization (Azotam, 2017; Claiborne, 2016; Klein & Bindler, 2022; Pietras et al., 2023; Roberts et al., 2022; Roberts et al., 2023), demographic representation (Anderson, 2014; Johnson, 2014; Klein & Bindler, 2022) and other sample-related limitations (Anderson, 2014; Carron et al., 2018; Claiborne, 2016; Johnson, 2014; Roberts et al., 2022).

Measurement-related limitations were also reported (Barnes et al., 2017; Bednarczyk et al., 2022; Buckley et al., 2015; Buriak et al., 2015; Claiborne, 2016; Klein & Bindler, 2022; O'Brien Pott et al., 2021; Zureigat et al., 2022). Measurement-related limitations included self-report measures (Azotam, 2017; Claiborne, 2016; O'Brien Pott et al., 2021), no follow-up reminders or surveys (Azotam, 2017; Roberts et al., 2022; Roberts et al., 2023), instrument validation issues (Baxter et al., 2013; Choma & McKeever, 2015; Hessler, 2015; O'Brien Pott et al., 2021; Zureigat et al., 2022), brief response time or short interval between pre- and post-test (Carron et al., 2018; O'Brien Pott et al., 2021), technical issues (Anderson, 2014) and answering requiring a computer (Buckley et al., 2015; O'Brien Pott et al., 2021). Non-generalizability of the intervention was mentioned by Bednarczyk et al. (2022), Klein and Bindler (2022), and Nuttall (2016). Limitations were not reported in the studies conducted by Boesl and Saarinen (2016) and Hoffmann et al. (2018). All reported limitations are presented in Appendix S2.

Methods	Key findings	Limitations
Pre- and post-test surveys	1) Given the significant improvements in learner knowledge, competence, and confidence across these content areas, the researchers believe that this continuing education series addressed ongoing knowledge and practice gaps related to COVID-19 vaccination among NPs. 2) According to self-reported estimates, learners who completed at least one of the three activities selfreported seeing a cumulative 277,422 patients who are eligible for COVID-19 vaccination each month, demonstrating the staggering potential impact of timely continuing education activities. 3) This continuing education programme highlighted both the demand and the need for COVID-19–related continuing education among NPs.	1) No follow-up survey was conducted, thus knowledge retention and actual practice changes were not assessed. 2) Analysis might have been affected by selection bias due to the inclusion of data from learners who completed the programme only. These learners may have more interest in the topic than the general NP workforce, and gains in knowledge, competence, and confidence cannot be generalized to all providers or practice settings. 3) Several limitations inherent to the design of the continuing education programme and outcomes plan.
Scoping review adhering to the Joanna Briggs Institute's method for scoping reviews	Interventions specifically targeting improving the competency of advanced practice nurses included a mobile support app (Smania, 2016) a 3-hour workshop (Edwards et al., 2011), a targeted educational module (Hoffmann et al., 2018), and a three-phase multimodal intervention (Blazer et al., 2011). These interventions improved measured outcomes such as knowledge, skills, and self-efficacy.	1) Some studies included a small number of nurses and were conducted as a pilot intervention. 2) In many of the studies, outcome (i.e. knowledge, attitudes) instruments were developed and used for the first time by the authors, without sufficient information about their reliability and validity. 3) Almost all educational interventions showed some level of increase in outcome measurements immediately afterward. Most studies did not measure the long-term effects of the interventions.

6 | DISCUSSION

Continuing education has been widely studied in the field of nursing science. However, to our knowledge, this is the first review focusing on continuing education for APNs. This scoping review identified the extent and nature of research on continuing education for APNs between the years 2012 and 2023. Out of the 21 studies, 15 focused on continuing education interventions for NPs, while the remaining papers discussed the education needs, preferences and course selections for APNs.

The majority of the intervention studies used a pre-test–post-test design in their evaluation. Although several international standardized instruments measuring nursing competencies are available (see e.g. Baldwin et al., 2009; Flinkman et al., 2017; Sastre-Fullana et al., 2017), these competency instruments were not used when assessing the effectiveness of the interventions. It is also notable that authors listed several limitations to their studies, including sample- and measurement-related issues. Using a standardized instrument would have several benefits in terms of instrument validity and research reliability, and the lack of use of such an instrument complicates reliable comparison of the intervention results.

Most continuing education interventions used online course delivery throughout the studies. Online delivery (Buckley et al., 2015) and live activity (O'Brien Pott et al., 2021) were the most preferred continuing education delivery methods. Similarly, according to a cross-sectional survey study conducted by Dyck and Kim (2018), easy access was found to be one of the primary factors that facilitated participation in continuing education among nursing home nurses. However, in contrast to our findings, synchronous online delivery, such as webinars and conference calls were the most popular delivery method for continuing education programmes (Dyck & Kim, 2018). In a systematic review of the effects of continuing education e-learning on nursing care, Rouleau et al. (2019) found that nurses were satisfied with the use of e-learning and that it increased their knowledge. These findings give support to e-learning as a method of delivering continuing education interventions, as it is cost-effective (Pakdaman et al., 2019), easy to attend (Dyck & Kim, 2018), and environmentally friendly (Walsh, 2018).

Despite many European countries identifying and utilizing advanced practice nursing roles (Martínez-González et al., 2015), none of the included studies were conducted within Europe. One reason might be that advanced practice nursing roles have not been implemented in Europe for as long as they have in the United States and Canada. A lack of studies from European countries reporting advanced practice nursing education and implementation was also highlighted in a scoping review conducted by Torrens et al. (2020), where continuing education was found to be a key factor in fostering confidence to deliver the advanced practice nursing role. As previous research has focused mainly on continuing education for registered nurses, continued efforts to study the phenomenon in the advanced practice nursing context are warranted. Therefore, it is important to conduct future research

TABLE 5 Continuing education intervention studies.

Study	Topic	Intervention type	Target population
Anderson (2014)	Adolescent psychosocial assessment methods	Online module	NPs
Bednarczyk et al. (2022)	Opioid prescriber training programme	Online training programme	Healthcare professionals
Boesl and Saarinen (2016)	Dissemination of current information on essential oils to health care practitioners	Online course	NPs
Buriak et al. (2015)	Clinical intention to provide cancer survivorship care	Online course	Physicians, NPs, and RNs
Carron et al. (2018)	Improving rural nurse practitioners' knowledge about polycystic ovary syndrome	Conference presentation	NPs
Choma and McKeever (2015)	Cervical cancer screening in adolescents	Online programme	APNs
Claiborne (2016)	Oral health assessment in children	Online course	APRNs, RNs, and LPNs
Hessler (2015)	Paediatric obesity prevention	Online programme	NPs
Hoffmann et al. (2018)	Cancer care	Web education resource	NPs new to cancer care
Johnson (2014)	Leadership development components applicable to nurse practitioners	Online modules	NPs
Klein and Bindler (2022)	Improving knowledge, confidence, and willingness to communicate with patients about cannabis	Online course	NPs
Nuttall (2016)	Concussions in youths	Web-based module	Primary care NPs
Pietras et al. (2023)	Obstructive sleep apnea screening	Online module	Primary care NPs
Roberts et al. (2022)	Addressing COVID-19 knowledge gaps	Webinar	Healthcare professionals
Roberts et al. (2023)	COVID-19 vaccination confidence	Webinar series	NPs

Abbreviations: APN, advanced practice nurse; APNR, advanced practice registered nurse; LPN, licensed practical nurse; NP, nurse practitioner; RN, registered nurse.

specifically on advanced practice nursing continuing education needs and preferences in a comprehensive way and to conduct research in other countries that utilize advanced practice nursing roles.

The need and importance of continuing education for APNs has been highlighted by different advanced practice nursing associations, such as AANP and the Ohio Association for Advanced Practice Nurses (AANP, n.d.; OAAPN, 2023). In this scoping review, we found that the majority of these educational interventions aimed to enhance APNs' clinical competency. However, clinical competency is merely one part of advanced nursing practice, which also includes other domains, such as education, leadership, supporting organizational strategies, research and evidence implementation (ICN, 2020). Continuing education facilitates APN role development and should enable APNs to practice at the full extent of their licensure by also covering other advanced practice nursing domains in addition to clinical competency.

It is important to note that almost every paper included in our review addressed the role of continuing education for NPs instead of CNSs, even though the number of CNSs in the United States alone is over 89,000 (Reed et al., 2021), in comparison with the 355,000 NPs (AANP, 2022). Thus, it is important to broaden the research on continuing education for APN roles to CNSs in addition to NPs. A comprehensive systematic review of continuing education interventions could also shed light on the effectiveness of these interventions and the quality of the research and evidence addressing this topic.

6.1 | Strengths and limitations

The included studies were conducted in the United States, Canada and Australia. This affects the generalizability of our results, since advanced practice nursing roles are also implemented in other countries. The included studies were heterogeneous, decreasing the possibility of comparison between them. Quality appraisal of the chosen studies was not conducted as this is not a requirement in scoping reviews; thus, the research quality cannot be determined.

There are several strengths in our review. Firstly, we adhered to our published review protocol (Wright et al., 2022), used PRISMA-ScR guidelines (Appendix S3) to enhance our reporting (Tricco et al., 2018) and conducted our scoping review adhering to the JBI's instructions (Aromataris & Munn, 2020). Study selection and data extraction were done by two independent researchers (MW & SI), and the inter-rater reliability of our selections varied between almost perfect or perfect and substantial agreement.

7 | CONCLUSION

This scoping review identified the nature and extent of scientific research published in the last 10 years addressing continuing education for APNs. 19 articles were identified and included in this review. The scientific research on continuing education for APNs is heterogeneous and mostly addresses different educational interventions such as

health assessment methods, patient care and prevention of illness, medication prescribing and leadership. Moreover, research has mostly been conducted in the United States. No international comparative studies of continuing education needs and/or preferences were found.

The available research mainly focuses on continuing education for the APN role of an NP, and almost none addresses other common advanced practice nursing roles, such as the CNS. This is an important finding and can be used to guide future research on advanced practice nursing continuing education. Finally, the continuing education interventions focused mainly on developing APNs' clinical competency. However, since advanced practice nursing roles include other important domains of practice, such as education, leadership, supporting organizational strategies, research and evidence implementation (ICN, 2020), it is important to assess continuing education needs and develop additional interventions that could cover these pivotal advanced practice nursing competencies. Continuing education facilitates APN role development and enables APNs to practice to their full scope of practice.

AUTHOR CONTRIBUTIONS

Mea Mirella Marjatta Wright, Tarja Anneli Kvist, Sanna Marika Imeläinen and Krista Susanna Jokiniemi made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; involved in drafting the manuscript or revising it critically for important intellectual content; given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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II

Finnish version of the specialist outcomes and barriers analysis scale: Evaluation of psychometric properties

Wright, M., Kvist, T., Mikkonen, S., & Jokiniemi, K.

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Feature Article

OPEN

Finnish Version of the Specialist Outcomes and Barriers Analysis Scale

Evaluation of Psychometric Properties

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Purpose:
To evaluate the psychometric properties of the Finnish version of the Specialist Outcomes and Barriers Analysis Scale.

Design:
This was a cross-sectional survey study.

Methods:
Cultural adaptation of the translation and content validity of the translated instrument were assessed by expert panelists (n = 5) using the content validity index. The construct validity was assessed with principal component analysis using the survey data of Finnish registered nurses (n = 60). Scale reliability was assessed with Cronbach's α values. All study phases were conducted in 2021.

Results:
The items (n = 59) of the scale were critically evaluated by the experts. The full-scale content validity was revealed as excellent (0.92). In terms of construct validity, the scale was analyzed separately for outcomes and barriers. The outcomes section revealed a 5-component structure with an overall Cronbach's α coefficient of .96, and the barriers section, a 2-component structure with an overall Cronbach's α coefficient of .82, indicating adequate reliability of the scale.

Conclusion:
The Finnish version of the scale showed excellent content and construct validity. The Cronbach's α values represented adequate reliability of the Specialist Outcomes and Barriers Analysis scale when measuring nurses' perceived practice outcomes and barriers in the Finnish context.

KEY WORDS:
advanced practice nursing, clinical nurse specialist, nurses, principal component analysis, psychometrics, validation

Globally, there is an increasing demand for chronic disease management and prevention, which could be answered with the deployment of advanced practice nursing roles. The advanced practice nurse (APN) roles were introduced in the United Kingdom and Australia in the late 1980s,[1,2] and around 2000, the APN roles emerged in the Nordic countries.[3] Advanced practice nursing is one of the fastest-growing health professions in the United States,[4] and several European countries are now implementing APN roles.[5] The level of advanced practice autonomy is regulated by country policies and laws.[1] A clinical nurse specialist (CNS) is an advanced practice registered nurse (RN) with graduate preparation (master's or doctoral degree) in nursing science.[1,6] Clinical nurse specialists have extensive nursing knowledge, skills, and clinical expertise in a specialty area[7] and can work in every field of healthcare.[1] The CNS role has been developing in the United States and Canada for more than 60 years.[6,8]

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The role of CNS may meet the unmet needs of diverse healthcare settings, such as the rising health expenditure due to chronic illnesses, as changes in the population and healthcare structures occur.[1] Systematic literature reviews and intervention studies have found several beneficial outcomes of CNS-provided care. These include enhanced quality of life with lower complication rates,[9,10] reduced length of stay and the number of readmissions in hospitals,[11,12] support for early recovery,[13] improved physical and psychological well-being of patients, improved quality of care and access to supportive care through collaborative management[10,11] as well as improved patient satisfaction, and reduction in medication errors.[11] However, a systematic review of controlled trials found inconsistent results of CNS-provided care, due to small sample sizes and failure of true randomization of patients.[14] Thus, high-quality effectiveness research is still needed to reliably assess CNS-sensitive outcomes.

Finnish healthcare is based on public services to which everyone residing in the country is entitled. Healthcare professionals in Finland are divided into licensed professionals and professionals with a protected occupational title.[15] The nurses' career pathway in Finland is presented in Figure 1. Universities of applied sciences (UASs) educate bachelor-level RNs, including midwives, paramedics, and public health nurses. After the bachelor-level education, nurses can acquire additional education in a specified field to become a specialized nurse (SN). To become SN, 30 to 60 European credit transfer system (ECTS) credits of further education are needed and provided by the UASs on different topics, such as wound care.[17] Education preparing for APN roles can be studied in universities and UASs, for example, at the University of Åbo Akademi (2020),[18] University of Oulu (2022),[19] Laurea UAS, and Oulu UAS.[20,21] The minimum education for the CNS role in Finland is a master's degree, which is worth between 90 and 120 ECTS credits.[22] The exact number of SNs and APNs in Finland is unknown. The number of CNSs was estimated to be more than 100 in 2020.[23]

Despite the 2-decade APN role development and initial national APN career model,[24] APN education and continuous education are still in their early stages. To respond to the lack of continuous education and to meet the current challenges in healthcare, a 40-ECTS-credit continuing education (CE) program focusing on the core competencies of a CNS (the EFFICACY [Accessibility, Quality, and Safety for Health Services: Clinical Nurse Specialist Education] project) was developed and piloted at the University of Eastern Finland (UEF). The effectiveness of the EFFICACY project is measured with several reliable instruments. To assess the project's effectiveness on nurses' perceived practice outcomes and barriers, the Specialist Outcomes and Barriers Analysis (SOBA) Scale[25] was translated into Finnish, and its content and construct validity was assessed. Instrument validation is reported in this study.

THE EFFICACY PROJECT

The EFFICACY project is a CE project coordinated by the UEF, Department of Nursing Science (UEF, 2021), and funded by the European Social Fund. This project aimed to develop and implement a modern CE program for nurses to enhance competencies related to the scope of CNS practice. The program curriculum was developed by cross-tabulating international CNS curricula, recognizing emergent themes, and discussions with university lecturers. The CE program is a 2-year curriculum worth 40 ECTS credits. Thirty-five nurses from the Northern Savo area in Finland were accepted and started their studies in the fall of 2021. The CE program consists of 5 main topics, which are presented in Figure 2. The EFFICACY program is piloted between September 2021 and May 2023 (UEF, 2021).[26] The EFFICACY project does not lead to a specific degree but amounts to CE credits. The translated and validated SOBA instrument will be used in assessing the development of nurses' perceived practice outcomes and barriers to their practice during the 2-year EFFICACY program among the program students and a control group. To our knowledge, no other instrument except SOBA exists to specifically measure nursing outcomes and barriers to practice related to the scope of CNSs.

SPECIALIST OUTCOMES AND BARRIERS ANALYSIS SCALE

The SOBA instrument was first developed in 1994 by Smith and Waltman[25] and presented in their study "Oncology Clinical Nurse Specialists' Perceptions of Their Influence on Patient Outcomes." The instrument has since been used

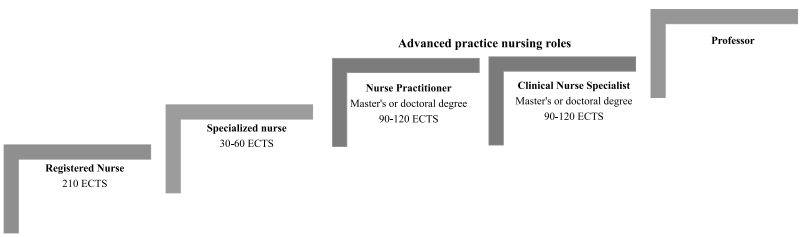

FIGURE 1. Nurses' career pathway in Finland (see, eg, FNA[16]).

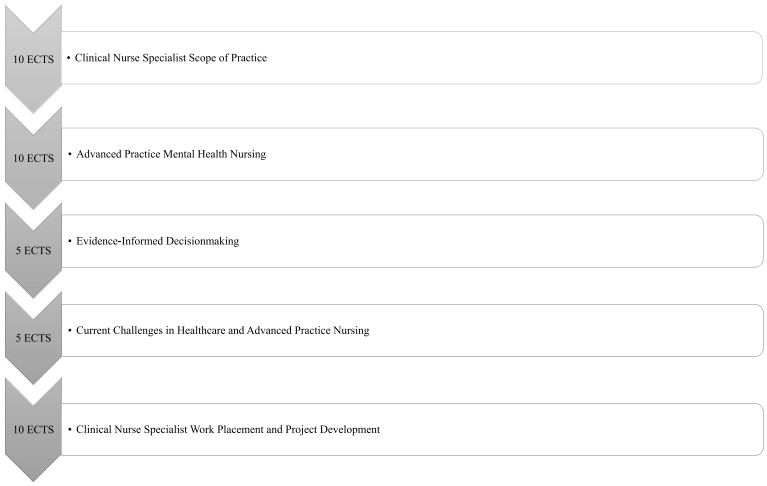

FIGURE 2. The structure of the EFFICACY curriculum (September 2021 to May 2023). Abbreviation: EFFICACY, Accessibility, Quality, and Safety for Health Services: Clinical Nurse Specialist Education.

in studies conducted by Mayo et al[27] and Kilpatrick et al.[7] Smith and Waltman[25] have analyzed the content and construct of the SOBA instrument in pilot studies. Principal factor solution with varimax rotation revealed adequate validity with Cronbach's α coefficient values from .73 to .83 between subscales. Principal component analysis (PCA) with varimax rotation was used by Mayo et al,[27] revealing an 8-factor structure of the outcomes section that explained 68% of the variance and a 4-factor structure of the barriers section that explained 66% of the variance. The Cronbach's α coefficient values were .95 for the outcomes section and .84 for the barriers section of the scale, indicating excellent psychometric properties.

To our knowledge, this is the first study to address the content and construct validity of the SOBA instrument in a European context. Validating the instrument enables measurement of nurses' perception of their influence on patient outcomes in Finland and makes it possible to specifically monitor the perceived impact of different interventions for CNS-sensitive patient outcomes.

METHODS

Aim

The aim of this study was to evaluate the psychometric properties of the Finnish version of the SOBA instrument in a sample comprising expert panelists (n = 5) and Finnish RNs (n = 60).

Design

The study was conducted in 2 phases: (1) a content validation study with expert panelists (n = 5) using the content validity index (CVI)[28,29] and (2) a construct validation study with Finnish nurses (n = 60) using PCA.[30] This study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement.[31] For further information, see Supplementary File 1, http://links.lww.com/NUR/A50.

Content Validation Study

The research objective was to examine the content validity and the cultural adaptation of the Finnish version of the SOBA instrument.

Construct Validation Study

The research objective was to evaluate the psychometric properties of the Finnish version of the SOBA instrument. The scale reliability was assessed with Cronbach's α values.

Instrument

The SOBA instrument is divided into 2 sections: outcomes and barriers. The outcomes section contains 45 closed questions and 1 open-ended question. All the closed items use a Likert scale varying from 1 to 4: 1 = seldom influence this outcome (0-6 times a year), 2 = occasionally influence this outcome (7-11 times a year), 3 = frequently influence this outcome (1-3 times per month), and 4 = constantly influencing this outcome (at least once a week). The barriers section contains 14 closed items with a Likert scale ranging from 1 to 4: 1 = seldom encountered as a barrier (0–6 times a year), 2 = occasionally encountered as a barrier (7–11 times a year), 3 = frequently encountered as a barrier (1–3 times per month), and 4 = constantly encountered as a barrier (at least once a week). The original version of the instrument also contains a demographic section, which includes 12 questions about the respondent's background (eg, age, gender, and highest level of education).

The instrument was translated into Finnish in spring 2021. The following strategies were used to improve the quality of the translation: (1) translation and back-translation were

performed by a certified translation service; (2) the translation was reviewed by an expert panelist (n = 5) and the EFFICACY project personnel; and (3) the original version and the translated version were compared with maintain conceptual equivalences. The wording and cultural adaptation of the translated items were evaluated by the expert panelists and the EFFICACY project personnel. Instead of the original English demographic section, we formulated our own background questions.

Participants and Data Collection

Content Validation Study

The data were collected in August 2021 from purposefully selected expert panelists (n = 5) who were advanced practice nursing experts. Data were collected by a web-based survey, in which the participants were asked to rate each item based on a 4-point Likert scale (0 = irrelevant, 1 = slightly irrelevant, 2 = relevant, 3 = extremely relevant) on its relevance to the Finnish healthcare system and its cultural adaptation and wording.

Construct Validation Study

The data were collected from Finnish nurses attending the EFFICACY project CE program (n = 34) and a control group (n = 34) consisting of nurses with similar background working in the same organizations as the intervention group. The control group was handpicked by the EFFICACY project collaborators working in the affiliated organizations. The participants are working in university hospital settings, psychiatric inpatient and outpatient care, and somatic inpatient and polyclinic care in the Northern Savo area. Data were collected before the program in September 2021 by a self-administered online survey.

Data Analysis

Content Validation Study

From the expert panelist ratings (n = 5), an item-level CVI (I-CVI) was computed by summing the number of panelists giving a rating of "relevant" or "extremely relevant" for each item divided by the total number of panelists. The I-CVI values ranged from 0 to 1. With fewer than 6 raters, the I-ICV is considered acceptable if the value is 1. The scale-level CVI with average calculation method (S-CVI/Ave) was measured by calculating the sum of the I-CVIs and dividing it by the total number of items. An S-CVI/Ave is considered acceptable with a value of 0.90 or higher.[29]

Construct Validation Study

The construct validity of the Finnish translation of the SOBA instrument was assessed with a cross-sectional survey study (n = 60). The PCA method was used, and the data were analyzed using the Statistical Package for the Social Sciences (version 27.0, 2017; IBM Corp, Armonk, New York). In total, 44 items were analyzed. The goals of PCA are to (1) extract the most important information from the data, (2) reduce the dimension of the data, (3) simplify the data set, and (4) analyze the structure of the observation and the variables. To achieve this, PCA formulates new variables: principal components.[30] To get more interpretable components, oblique promax rotation was applied on the outcomes scale and orthogonal varimax rotation on the barriers scale.[31] Missing values were not imputed (n = 43). Scree plots were used to determine the number of components to extract.

Ethical Issues

The research plan of the broader study considering the EFFICACY program has been evaluated by the UEF on Research Ethics (statement no. 10/2021). Research permits were obtained from the participating organizations as a part of the EFFICACY program. The study was conducted based on ethical principles of the Finnish National Board on Research Integrity.[33] Informed consent was obtained from the respondents. Participation was voluntary, and the respondents were able to drop out at any point of the study. This study also followed general European Union data privacy policy (EU 2016/679) and the Finnish Data Privacy Act (2018/1050).

RESULTS

Content Validation Study

Of the 5 expert panelists, 4 were women, 3 had a master's degree in health sciences, and the rest had a PhD in health sciences. The mean age of the expert panelists was 43, and they worked as CNSs (n = 3) or scholars with experience in instrument development and APN roles (n = 2).

The expert panelists and the EFFICACY project personnel evaluated the translation in a Finnish context, and the translation maintained idiomatic, conceptual, and experiential equivalences. I-CVI values ranged between 0.4 and 1.0. A total of 16 items scored an I-CVI value under 1 (Table 1). After careful consideration by the EFFICACY personnel, items were left in the Finnish translation after the content validity study. The S-CVI/Ave for the whole scale was 0.92.

Construct Validation Study

Twenty-six nurses attending the EFFICACY program and 34 nurses from the control group answered the questionnaire, with a response rate of 87%. The intervention and control groups had comparable demographic and clinical characteristics. Within both groups, the majority of the respondents were women, with a mean age of 44 years. Most of the respondents were titled as RNs in both groups. The demographic information of the participants is presented in Table 2.

Table 1. Items Scoring Under the Preferred I-CVI Value

Item	I-CVI
Cost of stay	0.4
Cost of treatment	0.6
Complication rate	0.8
Prevention of readmission	0.8
Correct medical diagnosis	0.4
Correct medical treatment	0.6
Correct nursing diagnosis	0.8
Earlier start of treatment	0.8
Compliance rate	0.8
Control of treatment adverse effects	0.8
Reintegration of patient to school, work, or community	0.8
Consultation—caregiver	0.8
Referrals to resources	0.6
Staff nurse resistance	0.8
Difficult physician personality[a]	0.4
Lack of secretarial support	0.8

Abbreviation: I-CVI, item content validity index.[28]

[a]*Omitted from the scale because of low CVI value and theoretical reasoning.*

Outcomes Section of the Scale

Forty-four items were analyzed in the outcomes section. The outcomes section revealed 5 principal components, accounting for 67.6% of the total variance. With our data, the Cronbach's α was .958 for the whole outcomes scale. The item loadings varied between 0.446 and 0.916, and all item loadings were greater than 0.3, which is considered acceptable.[34]

When the original factor structures (determined by Smith and Waltman[25] in 1994, represented in Table 3 with letters A-E) were used, the Cronbach's α values were .912 for "patient and family response to care," .836 for "cost of care," .950 for "organizational processes," .842 for "consultative/interdisciplinary processes," and .914 for "research processes." The items loaded onto the original factors, with few modifications (Table 3).

Based on theoretical reasoning (Table 3), the item "A6 patient outcome—prevention of injury" was placed in component 4 despite its loading; item "D7 factors/processes—advocacy for patient/family with physician" was placed in component 3; and items "B7 patient outcome—correct medical treatment," "B6 patient outcome—correct medical diagnosis," and "A2 patient outcome—self-care ability" were placed in component 2. After these alterations, the Cronbach's α was .921 for "patient and family response to care," .860 for "cost of care," .946 for "organizational processes," .901 for "consultative/interdisciplinary processes," and .906 for "research processes." Other items loading onto different components than the original factor structure were

Table 2. Demographic Information of the Construct Validity Study Participants (n = 60)

	Intervention (n = 35)	Control (n = 34)
Response rate	76.5% (n = 26)	100% (n = 34)
Gender[a]	Female = 84.6% (n = 22) Male = 11.5% (n = 3)	Female = 85.7% (n = 30) Male = 11.4% (n = 4)
Mean age, y	43.6 (min, 28; max, 61; SD, 8.3)	44.5 (min, 31; max, 59; SD, 7.3)
Operational level	Unit = 92.3% (n = 24) Division = 3.8% (n = 1) Organization = 3.8% (n = 1)	Unit = 85.7% (n = 30) Division = 5.7% (n = 2) Other = 5.7% (n = 2)
Highest level of education[b]	RN = 85.6% (n = 22) Master's degree, UAS = 7.7% (n = 2) Master's degree, university = 7.7% (n = 2)	RN = 80% (n = 28) Master's degree, UAS = 8.6% (n = 3) Master's degree, university = 8.6% (n = 3)
Profession[b]	Registered nurse = 76.9% (n = 20) Midwife = 3.8% (n = 1) Nurse manager = 11.5% (n = 3) Other = 7.7% (n = 2)	Registered nurse = 74.3% (n = 26) CNS or specialist nurse = 2.9% (n = 1) Nurse manager = 17.1% (n = 6) Other = 2.9% (n = 1)
Years in the current profession, mean	10.5 (min, 1; max, 27; SD, 7.3)	12.3 (min, 1; max, 31; SD, 8.3)
Years in the current unit, mean	7.1 (min, 0; max, 25; SD, 7.1)	6 (min, 0; max, 24; SD, 6.2)
Years in the current organization, mean	11.3 (min, 2; max, 20; SD, 8.6)	13.5 (min, 0; max, 30; SD, 7.8)

Abbreviations: CNS, clinical nurse specialist; RN, registered nurse; UAS, university of applied sciences.

[a]*One missing answer in the intervention and control groups.*

[b]*One missing answer in the control group.*

Table 3. Principal Component Analysis Item Loadings With Promax Rotation and Kaiser Normalization (n = 60)

Item	Component					Cronbach's α if Item Deleted
	1	2	3	4	5	
D6 factors/processes—referrals to resources	**0.903**	−0.012	−0.067	0.001	0.080	.957
C13 factors/processes—involvement in quality assurance	**0.859**	−0.110	−0.180	0.108	0.107	.957
C7 factors / processes—nurse retention	**0.796**	0.016	0.100	0.136	−0.123	.956
C6 factors/processes—consultation-administration	**0.795**	0.091	−0.119	−0.231	0.260	.957
C9 factors/processes—staff productivity	**0.790**	−0.015	0.065	0.020	0.105	.956
C8 factors/processes—nurse satisfaction	**0.780**	0.003	0.156	−0.004	0.052	.956
C12 factors/processes—staff utilization of effective interventions	**0.766**	0.103	−0.029	−0.092	0.149	.957
C2 factors/processes—staff skill	**0.699**	−0.080	0.059	0.007	0.325	.956
D5 factors/processes—support group facilitation	**0.527**	0.230	0.303	0.058	−0.121	.956
C11 factors/processes—improved staff communication	**0.520**	−0.024	0.093	0.215	0.186	.956
C10 factors/processes—testing product effectiveness	**0.485**	−0.163	0.409	0.277	−0.114	.956
A6 patient outcome—prevention of injury[a]	**0.446**	0.231	−0.088	0.403	−0.199	.957
A8 patient outcome—patient/family anxiety level	0.195	**0.916**	−0.359	−0.080	−0.055	.958
A7 patient outcome—compliance rate	0.021	**0.874**	−0.095	−0.034	−0.013	.957
A5 patient outcome—improved coping for the family	0.172	**0.809**	0.058	−0.258	0.083	.957
A10 patient outcome—control of treatment adverse effects	0.036	**0.762**	0.174	0.075	−0.189	.957
A9 patient outcome—patient/family satisfaction	0.000	**0.743**	−0.194	0.210	−0.032	.958
A11 patient outcome—reintegration of patient to school, work, or community	−0.052	**0.740**	−0.070	−0.189	0.206	.958
A12 patient outcome—improved patient/family knowledge	−0.317	**0.694**	0.171	0.067	0.035	.958
A4 patient outcome—improved coping for patient	−0.168	**0.685**	−0.090	0.272	0.209	.957
D7 factors/processes—advocacy for patient/family with physician[b]	0.316	**0.531**	0.343	−0.168	−0.066	.956
A3 patient outcome—correct nursing diagnosis	0.031	**0.523**	0.165	0.247	0.188	.956
B8 patient outcome—earlier start of treatment	0.026	**0.497**	−0.023	0.127	0.361	.957
D3 factors/processes—multidisciplinary cooperation	−0.132	−0.206	**0.911**	0.095	0.108	.957
E1 factors/processes—conducting research	0.055	0.096	**0.895**	−0.270	−0.060	.957
D4 factors/processes—improved interdisciplinary communication	0.105	−0.076	**0.836**	−0.024	−0.103	.957
E2 factors/processes—dissemination of research findings	0.167	−0.188	**0.822**	0.067	−0.047	.957
E3 factors/processes—utilization of research findings	0.214	−0.021	**0.684**	−0.007	0.119	.956
B7 patient outcome—correct medical treatment[c]	−0.263	0.358	**0.502**	0.195	0.150	.957
B6 patient outcome—correct medical diagnosis[c]	−0.078	0.287	**0.466**	−0.066	0.296	.957
B4 patient outcome—complication rate	−0.142	−0.057	0.000	**0.788**	0.127	.958
B1 patient outcome—length of stay/timely discharge	−0.053	0.208	−0.106	**0.762**	−0.050	.958
B9 patient outcome—appropriate care products	0.218	0.167	0.070	**0.703**	−0.285	.957
B2 patient outcome—cost of stay	0.190	−0.340	0.013	**0.679**	0.137	.958
B3 patient outcome—cost of treatment	0.097	−0.266	−0.030	**0.551**	0.448	.957
B5 patient outcome—prevention of readmission	−0.136	0.305	0.015	**0.525**	0.279	.957
A1 patient outcome—comfort level	0.167	0.362	−0.095	**0.493**	−0.124	.957

(continues)

Table 3. Principal Component Analysis Item Loadings With Promax Rotation and Kaiser Normalization (n = 60), Continued

Item	Component					Cronbach's α if Item Deleted
	1	2	3	4	5	
C3 factors/processes—program development	0.541	−0.097	−0.147	−0.023	**0.710**	.957
D2 factors/processes—consultation-caregiver	0.055	0.289	−0.010	0.088	**0.675**	.956
C4 factors/processes—procedure development	0.483	−0.062	−0.102	0.018	**0.675**	.956
C5 factors/processes—improved documentation	0.211	0.125	0.234	−0.153	**0.555**	.957
D1 factors/processes—consultation - physician	0.072	0.439	0.075	−0.174	**0.537**	.956
C1 factors/processes—staff knowledge	0.431	−0.128	0.221	−0.021	**0.464**	.956
A2 patient outcome—self-care ability[c]	−0.147	0.389	−0.057	0.352	**0.455**	.957

Abbreviations: A, patient and family response to care; B, cost of care; C, organizational processes; D, consultative/interdisciplinary processes; E, research processes.
[a]*Despite the loading, item placed in component 4.*
[b]*Despite the loading, item placed in component 3.*
[c]*Despite the loading, item placed in component 2.*

left in the components with the greatest loadings due to theoretical reasoning (Table 3).

Barriers Section of the Scale

Fifteen items were analyzed in the barriers section. Two items with the lowest communalities (lack of personal expertise = 0.213 and patient/family resistance = 0.151) were omitted from the scale. In addition to these, the item with the lowest CVI value (difficult physician personality, CVI = 0.4) was deleted. The remaining 12 items revealed 2 principal components, accounting for 50.6% of the total variance. The components were named as (1) organizational and interpersonal barriers and (2) workflow-related barriers. The item loadings varied between 0.501 and 0.815 (Table 4). With our data, the Cronbach's α was .821 for the whole barriers scale. When the given component structure was used (Table 4), the Cronbach's α values were .814 for component 1 and .725 for component 2.

DISCUSSION

This study aimed to evaluate the psychometric properties of the Finnish version of the SOBA instrument[25] in a sample of Finnish RNs. The instrument has previously been used in the United States and Canada with excellent psychometric

Table 4. Principal Component Analysis Item Loadings With Varimax Rotation and Kaiser Normalization (n = 60)

	Component		
	1	2	Cronbach's α if Item Deleted
Internal regulations (ie, institutional or unit policies or procedures)	**0.825**	0.136	.821
Lack of peer support	**0.715**	0.225	.822
Physician resistance	**0.689**	−0.311	.845
Staff nurse resistance	**0.655**	0.261	.823
Lack of administrative support	**0.645**	0.418	.814
Lack of personnel	**0.545**	0.526	.814
Inadequate space	**0.459**	0.338	.829
Lack of time	−0.011	**0.888**	.826
Multiple job expectations	0.125	**0.670**	.831
Lack of funding	0.099	**0.625**	.834
Lack of secretarial support	0.274	**0.577**	.826
Inconvenient layout of office and/or work areas	0.272	**0.506**	.831

properties.[7,24,25] The content validity of the Finnish version was satisfactory, with 16 items scoring under the preferred value. This may be partly due to strict I-CVI requirements with 5 expert panelists and partly due to the differences between the healthcare systems of Finland and the United States. Finnish healthcare is based on public services: everyone residing in Finland is entitled to healthcare, and private healthcare is only an addition to public services.[15] Healthcare in the United States consists of several systems that serve different segments of the population, with the majority of the population covering their healthcare with private health insurance.[35] After careful consideration, 13 items scoring under the preferred I-CVI value were left in the translated scale, so that the results would be as comparable to previous studies using this instrument as possible. The content validity of the whole scale was 0.92, indicating acceptable content validity.

In contrast to Mayo and colleagues'[25] study with 8 factors, items in our study loaded onto original factors defined by Smith and Waltman,[25] with few alterations. In the outcomes section, 5 items were placed onto different components after theory-based consideration (Table 4). The differences between the Finnish and US healthcare systems were considered at this point. Finnish healthcare is divided into primary care and specialized care, with the latter usually offered at district hospitals and the former at healthcare centers.[15] There was no previous factor structure provided for the barriers section of the scale, so the components were formed and named with the highest item loadings (Table 4).

The scale's reliability was assessed with Cronbach's α values consistent with previous studies. The Cronbach's α coefficients varied from .73 to .83 between subscales in the original instrument development study by Smith and Waltman.[25] Similar to our findings, the outcomes section Cronbach's α coefficients were .95 and .84 in the barriers section in the study conducted by Mayo et al.[27] The scale reliability was assessed with Cronbach's α values, which were high throughout the subscales.

The results of this study can be utilized in the wider advanced practice nursing community. Previous research has indicated a connection between nurses' job satisfaction, nurse retention, and patient outcomes.[36] Insufficient work experience and training possibilities are also connected to nurse turnover and indicated in research.[37,38] The SOBA instrument was found to demonstrate excellent content and construct validity, which is in line with previous research.[7,25,27] The instrument enables measurement of nurses' perceived practice outcomes and barriers to practice in the Finnish context. Future research should examine the possible connection of perceived practice outcomes and job satisfaction in finding new solutions to the nursing shortage by increasing the attraction of the healthcare professions.

Strengths and Limitations

Multiple methods were undertaken to increase the strength of this study. In the translation phase, we used certified translation services and a pilot study of 5 expert panelists to ascertain the soundness of the 2-step Finnish translation of the SOBA instrument.[28,29] To increase the reliability of reporting the results, this study adhered to the STROBE checklist (Supplementary File 1, http://links.lww.com/NUR/A50). However, some limitations should be mentioned. During the translation process, one of the scale items (advocacy for patient/family with departments) was omitted from the Finnish version of the scale by mistake and was left out of the scale. Furthermore, the use of 6 or more expert panelists would have probably increased the reliability of the content validation study: 6 panelists were asked, but only 5 agreed to participate. The sample size in our study is rather small, and the convenience sampling may limit the generalizability of our findings.

Although the positive effects of advanced practice nursing roles are indicated in research, these roles are still developing in the Nordic countries. Because there are still very few of these roles (>400 NPs, >100 CNSs) in Finland,[24] the respondents in this study were RNs. The respondents are, however, attending a CE program aimed to enhance CNS competencies. We chose this instrument because it will be used to measure the effectiveness and the growth of these competencies among the EFFICACY project students, who were mostly RNs at the entry level of the program. The SOBA instrument has been developed and previously used to measure CNS outcomes and barriers, and this may also limit the generalizability of our findings. The study findings should be replicated with a larger sample and different population of nurses in the future.

CONCLUSION

A 2-phase study was conducted to evaluate the psychometric properties of the Finnish version of the SOBA Scale. The SOBA instrument has not been widely used since its development in 1994 despite research finding excellent psychometric properties. We found evidence of validity and reliability for the Finnish version of the SOBA instrument in a sample comprising Finnish RNs. In total, 3 items were omitted from the Finnish version of the scale. The SOBA Scale may be used to examine nurses' perceived practice outcomes and barriers and to support the evaluation of effective nursing practice within healthcare systems. This study also strengthens the reliability of the SOBA Scale, which has now been found to have acceptable psychometric properties in 3 languages (English, French, Finnish) in studies conducted in 3 different countries (United States, Canada, Finland).[7,25,27]

Principal component analysis is a good tool for validating this type of scale and can specifically be applied on data of smaller sample sizes. If the number of observations

were higher, confirmatory factor analysis could be used to confirm the results. This could be a task for a subsequent study.

Relevance to Clinical Practice

To our knowledge, there has previously been no instrument in the Finnish language to measure SNs' perceived practice outcomes and barriers. A translated and validated SOBA Scale will enable standardized measurement of perceived nursing practice outcomes and barriers in Finland. This study also strengthens the reliability of the SOBA Scale developed in the United States in 1994.

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III

Outcome evaluation of a clinical nurse specialist continuing education pilot program: An intervention study with three repeated measures

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Outcome evaluation of a clinical nurse specialist continuing education pilot program: an intervention study with three repeated measures

Mea Wright[1*], Tarja Kvist[1], Santtu Mikkonen[2] and Krista Jokiniemi[1]

Abstract

Background Nurses must stay current on various professional requirements and advancements to deliver safe and effective patient care. Continuing education is essential for maintaining nursing competency, promoting job satisfaction, and upholding high standards in healthcare. This study aims to assess the effects of a continuing education pilot program on nurses' perceived practice outcomes and the barriers they face. Additionally, we sought to explore the possible links between job satisfaction, clinical nurse specialist core skills, and perceived practice outcomes and barriers.

Methods This is a pilot intervention study with three repeated measures. A web-based survey was administered to Finnish nurses in both an intervention group ($n=35$) and a control group ($n=44$) at three time points: before the intervention, immediately after the intervention, and 1 year later. A linear mixed-effects model was used to analyze the data.

Results The intervention had no statistically significant positive effect on nurses' perceived practice outcomes. Nurses' gender ($p=0005$) and measurement point ($p=0.019$) had a statistically significant association with organizational and interpersonal barriers, which decreased throughout the study process in the intervention group. Gender was also statistically associated ($p=0.031$) with workflow-related barriers. The clinical nurse specialist-specific competency had a strong positive association with nursing practice outcomes, whereas job satisfaction had a positive association with the perceived nursing practice barriers.

Conclusion This pilot intervention study highlights the complexities of nursing practice amidst healthcare transitions and resource constraints. Addressing systemic issues and fostering a supportive work environment are essential for enhancing nursing practice and reducing barriers to it. Further research is needed with larger sample sizes, targeted populations, and additional research methods.

Keywords Continuing education, Continuing higher education, Nursing, Clinical nurse specialist, Job satisfaction, Competency, Nursing practice outcomes, Nursing practice barriers

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Introduction

It is the responsibility of nurses working in clinical settings to stay up to speed on clinical practice guidelines, equipment upgrades, legislative needs, the most recent research, and other workplace requirements [1]. Advances in science and technology, in conjunction with the growing expectations and requirements of patient care, present difficulties for nurses in terms of keeping up their knowledge and enthusiasm to participate in the ongoing education necessary to deliver safe patient care [2].

The nursing profession is crucial to providing patients with high-standard healthcare [3]. Achieving the highest possible patient outcomes depends heavily on nurses who possess the necessary competencies and who are satisfied in their jobs [4]. Although reviewing nurses' activities offers opportunities for competency assessment, performance and perceived practice outcomes also verify the level of competence. Thus, it is also essential to assess nurses' perceived practice outcomes when evaluating competence [5]. Continuing education enables nurses to enhance their competency and keep their knowledge and skills current [1].

Background

Continuing education and nursing competence

Continuing professional development is defined as "the concept that learning continues throughout one's life, both through educational courses and work experience and practice. Individuals are encouraged to identify their personal learning needs and to assess their progress in dynamic ways" [6]. Numerous official directives, such as the European Union Directive 2013/55/EU, and publications, like *Regulated Nursing in Canada* [7], specify the importance of continuing education for nurses. To renew a professional registration, continuing education is required, for example, in the United States and Canada [8]. According to an assessment of the status of nursing worldwide, 73% of the responding nations have structures in place for ongoing professional development [9].

Evaluating continuing education is a pivotal part of improving the quality of educational activities [10]. Assessment of learning enables us to understand whether or not nurses meet the desired learning outcomes and provides feedback for improving educational experiences [11]. To improve the quality of continuing education, one should match the educational goals with the needs of learners, enhance the quality of continuing education and teaching techniques, and optimize the scope of these programs [12]. Continuing education is also pivotal for advanced practice nursing roles, such as clinical nurse specialists (CNSs) and nurse practitioners (NPs), and their competency development [13]. Advanced practice competencies for CNSs can be measured with the Clinical Nurse Specialist Core Competency (CNS-CoCos) scale [14].

Advanced practice nursing

Advanced practice nursing encompasses a diverse range of responsibilities that are integral to modern healthcare systems worldwide [15]. As defined by the International Council of Nurses (ICN), advanced practice nursing refers to enhanced healthcare services delivered by nurses who possess advanced decision-making skills, clinical competencies, and an extensive knowledge base acquired through additional education and training [16]. In this research, we adhered to the ICN definitions of APNs, CNSs, and NPs.

While NPs have a more widely recognized role globally, CNSs are gaining prominence due to their increased involvement in non-clinical activities, such as education and research [16, 17]. CNSs possess advanced nursing knowledge and skills, enabling them to make informed decisions and positively impact care outcomes. They lead in advancing nursing practice, mentoring others, and ensuring the delivery of evidence-based care [16]. Despite this, a recent review found that continuing education often focuses more on NPs, with learning typically assessed through pre- and post-test scores rather than standardized competency instruments [13]. Further research is needed to understand the development of advanced practice nursing roles after graduation [18].

In Finland, the roles of CNSs and NPs are recognized as advanced practice nursing roles, and a master's degree is required [15]. Approximately 120 CNSs were working in Finland in 2022 [19]. The CNS competency has been divided into four areas: patient competency, clinical nursing leadership competency, organization competency, and scholarship competency through rigorous research [14, 17].

Nursing outcomes

Nurse-sensitive outcomes are defined as patient outcomes that fall within the purview of nursing practice and are directly affected by nursing interventions and actions [20]. A nursing-sensitive outcome is defined as "an individual, family, or community state, behaviour, or perception that is measured along a continuum in response to a nursing intervention(s)" [21]. The concepts of providing care and being caring, communicating effectively, and the critical abilities of teamwork and coordination throughout the care experience were all acknowledged as being essential to assessing the results of nursing practice in a Delphi study conducted in 2018 [22]. Nurses want more than safety outcomes to be used in evaluating their practice. In addition to assessing medical errors, falls, and pressure injuries, the characteristics of a working environment and patient experiences also play a pivotal role

in evaluating nurse-sensitive outcomes [22]. A higher number of missed nursing activities has been found to correlate with understaffing [23]. Furthermore, poor staffing and a high number of missing nursing activities have been negatively associated with quality of nursing care, job satisfaction, patient safety, and intention to leave [23, 24]. Patient-perceived nurse staffing adequacy is also a central factor for patients' experiences [24].

The implementation of CNS roles has been perceived as having a positive impact on nurse-sensitive outcomes like improved quality and safety of care, strengthened cooperation, improved staff skillset, and integration of best practices [25], and patient satisfaction [26]. CNS-specific outcomes have been measured with the Specialist Outcomes and Barriers Analysis (SOBA) instrument, initially developed by Smith and Waltman in 1994 [27].

Job satisfaction

Job satisfaction has a significant impact on overall quality of life, affecting social relationships, family connections, and perceived health status. It also affects job performance, work absenteeism, and employee turnover [28]. Job satisfaction is an attitude towards work that indicates how employees feel about their job and their work environment. Employees can experience overall job satisfaction or specific satisfaction with various aspects such as salary, promotion opportunities, their supervisor, or the tasks they perform [29]. In a concept analysis by Liu et al. [30], the key elements of nurses' job satisfaction were defined as (1) the fulfillment of desired needs within the workplace, (2) happiness or gratifying emotional responses to working conditions, and (3) employment value or equity. These qualities are influenced by antecedent conditions such as demographics, emotions, work characteristics, and environmental variables [30]. Furthermore, the impact of nurses' job satisfaction is essential not only for nurses but also for patients. The components of job satisfaction have been rigorously researched internationally and in Finland [31, 32]. The Kuopio University Hospital Job Satisfaction (KUHJSS) scale [31], which was developed in Finland but has since been validated in several languages, has been widely used when measuring nurses' perceived job satisfaction [33].

APNs' job satisfaction has been assessed in previous research. Having a broad scope of practice is viewed as rewarding and challenging. Other factors related to APNs' job satisfaction were age, time in the current position [34], and professional recognition [35]. Lack of respect from physicians and supervisors [34] and unclear responsibilities [35] have been identified as the main barriers to job satisfaction. Improving the work environments and relationships with physicians and administrators can lead to improved job satisfaction and reduce APNs' intent to leave [36]. Job satisfaction, in addition to supervision, pay scale, and person–organization fit, is a significant factor affecting organizational commitment [37].

Improved CNS role satisfaction has been significantly correlated with clinical, research, scholarly, and professional development, as well as consultative activities. However, CNS occupations that were primarily focused on consultation have shown a detrimental effect on intent to stay; the only activities that increased role satisfaction and indirectly impacted the intention to stay were academic and professional development activities [38].

Foundations of the research

Pilot intervention studies, typically characterized as small-scale investigations conducted in preparation for larger research endeavors, are vital precursors to high-quality clinical trials. Pilot studies provide critical insights into the design and execution of subsequent trials, playing a pivotal role in managing the development and dissemination of interventions [39]. Feasibility and pilot studies are essential in the formulation and assessment of effective implementation strategies. They address uncertainties concerning design and methodology, evaluate the potential effects of these strategies, and uncover possible causal mechanisms [40]. Previous research found a gap in the literature concerning how different delivery approaches to higher education regarding institution-provided continuing education are experienced by healthcare professionals [41].

This study emphasizes the importance of nurses staying current with clinical practice guidelines, technological advancements, and legislative requirements to ensure safe patient care. It emphasizes the importance of continuing professional development as a lifelong learning process, supported by various directives and essential for maintaining professional registration. Advanced practice nursing roles require additional education and competencies to influence clinical outcomes and provide high-quality care. Our study also highlights the importance of evaluating continuing education to ensure it aligns with educational goals and enhances nursing practice, with a focus on nurse-sensitive outcomes and job satisfaction, which are essential for both nurses and the delivery of quality patient care.

A 2-year continuing education pilot program called "Accessibility, quality, and safety of health services: Clinical nursing expert training" (EFFICACY) was planned and piloted by the University of Eastern Finland in the North Savo area in Finland to enhance CNS-specific competency. The pilot program was designed to meet the challenges of a changing healthcare sector during the COVID-19 pandemic. Thus, the curriculum was developed to focus on mental health nursing. The data for this research were collected during the EFFICACY program.

In this research article, we report the study results concerning the pilot program's effects on nurses' perceived practice outcomes and barriers, as well as their possible association with self-reported job satisfaction and competence.

The study

Aim

This pilot intervention study aimed to examine the effects of the EFFICACY program on nurses' perceived practice outcomes and barriers. Additionally, this study explores the potential association between job satisfaction, CNS core competencies, and perceived nursing practice outcomes and barriers. The specific objectives were to:

1. Assess how the nurses evaluated their perceived practice outcomes and barriers before, immediately after, and 1 year after the 2-year continuing education program.
2. Explore what predictors were associated with nurses' perceived practice outcomes and barriers.
3. Explore the association between CNS core competencies and job satisfaction in relation to nurses' perceived practice outcomes and barriers.

Methods

Design

This was a longitudinal intervention study with three repeated measures conducted before, immediately after, and one year post-intervention for the students ($n = 35$) and a control group ($n = 44$) within the EFFICACY pilot project.

Study setting and sampling

This study employed an online survey that consisted of three instruments, which measured CNS core competencies [14], job satisfaction [31], and nurses' perceived practice outcomes and barriers [27, 42]. Since the intervention group size was predetermined, no power analysis was conducted regarding the sample size.

Inclusion criteria

To be accepted to the EFFICACY program, the applicant had to be a registered nurse (RN) and work in the North Savo area in Finland. The applicants were required to submit their nursing diploma, a letter of recommendation from their manager, a curriculum vitae, and a motivational letter. Only one applicant was rejected because they did not submit all the attachments needed. The demographic information of the students selected for the EFFICACY intervention is presented at the beginning of the results section.

Study intervention

The intervention curriculum was developed with the following steps: International and national CNS curricula were cross-mapped and evaluated. Additionally, discussions were held with nursing managers regarding the healthcare environment's need for continuing education to support clinical competence. Discussions were also held within the research team, who were highly experienced in CNS practice and research.

The goal of the EFFICACY project was to improve RNs' competencies in the areas of advanced practice mental health nursing, the CNS scope of practice, evidence-based decision-making, current issues in healthcare, and project development. In this program, the University of Eastern Finland in the North Savo region of Finland designed, implemented, and oversaw a 2-year curriculum valued at 40 European credit transfer system (ECTS) credits. The project was implemented between September 2021 and May 2023. The program curriculum was equivalent to continuing education credits rather than a formal degree. The EFFICACY program curriculum themes are presented in Fig. 1.

The courses under the theme Clinical Nurse Specialist Scope of Practice included CNS Competency and Scope of Practice (4 ECTS), Leadership in Clinical Nursing (3 ECTS), and Basic Pharmacology (3 ECTS). The theme Advanced Practice Mental Health Nursing also had three courses: Psychiatry for CNSs (2 ECTS), Patient Encounter and Interviewing in Mental Health Nursing (3 ECTS), and Therapeutic Interventions in Mental Health Nursing (5 ECTS). Evidence-Informed Policymaking included the following courses: Evidence-Based Nursing and Quality Improvement (4 ECTS) and Information Skills in Nursing (1 ECTS). Current Challenges in Healthcare and Advanced Practice Nursing comprised a course titled Nursing and Its Leadership in Times of Crisis (5 ECTS). In addition to theoretical courses, 10 ECTS were allocated to clinical work placement and project management.

Fidelity of intervention

The intervention and designed program were intended to serve as continuing education for nurses holding a master's degree. The aim was to enhance competence in advanced practice nursing, specifically in the CNS role. However, these roles are new in Finnish healthcare, with approximately 120 CNSs working in 2022 [19], and most of the program applicants did not hold a master's degree. The education intervention was planned to form a specialization module for future CNS M.Sc. programs. We therefore evaluated that it could be piloted with RNs. In assessing the results, participants only completed 40 out of 120 ECTS credits from a full master's program.

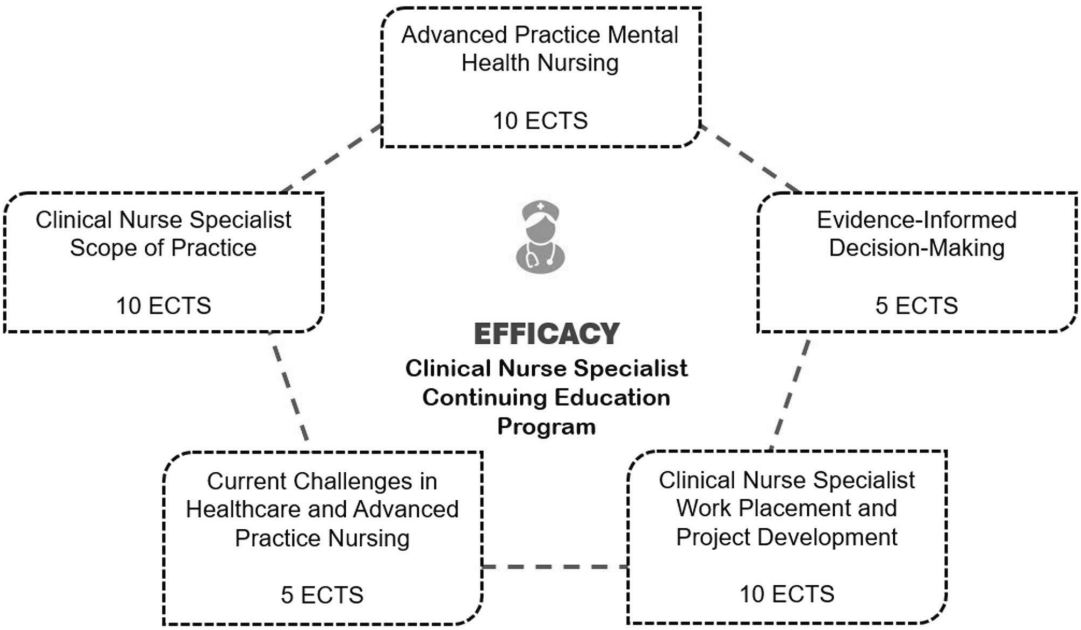

Fig. 1 The EFFICACY pilot project curriculum

Despite this deviation, the key components of the intervention were delivered accurately and consistently as planned.

Instruments with validity and reliability metrics

The intervention was measured with three standardized instruments:

CNS core competencies were measured with the CNS-CoCos instrument [14, 17], which consists of 47 items that measure CNS competency in four areas: patient, clinical nursing leadership, organizational, and scholarship competence. Reliability has been assessed with Cronbach's alpha values from the lowest to the highest sub-scale: 0.86 for nursing competence, 0.89 for patient competence, 0.90 for organizational competence, and 0.92 for scholarship competence [14].

Job satisfaction was measured with the KUHJSS [31]. It consists of 38 items that measure job satisfaction in seven different areas: leadership, requiring factors of work, motivating factors of the work, working environment, working welfare, participation in decision-making, and sense of community. The scale reliability (Cronbach's α ranging 0.64–0.92 between sub-scales) was assessed as modest [31]. After its development, the scale has been widely used and translated into different languages, e.g., the Greek language [43].

Nurses' perceived practice outcomes and barriers were measured with the Finnish version of the SOBA scale [42]. The Finnish version consists of 56 items that measure outcomes in five different areas: patient and family response to care, organizational processes, research processes, cost of care, and consultative/interdisciplinary processes, as well as barriers in two areas: organizational and interpersonal barriers, and workflow-related barriers. The reliability of the Finnish version of the scale was assessed as adequate, with sub-scale Cronbach's alphas ranging between 0.73 and 0.92 in a recent validation study [42].

According to our data, the reliability of all scales was assessed as excellent. The Cronbach's alphas were 0.97 for the CNS-CoCos, 0.91 for the KUHJSS, and 0.96 for the SOBA scale.

Data collection

The EFFICACY program, run by the University of Eastern Finland in the North Savo area, involved RNs ($n = 35$ at baseline, $n = 23$ post-intervention, $n = 21$ one-year post-intervention), as well as a control group ($n = 44$ at baseline, $n = 40$ at post-intervention, $n = 38$ one-year post-intervention). The control group consisted of RNs who were employed by the same healthcare organizations as the students in the EFFICACY project. Since nurse managers in Finland have a background in nursing, they were also qualified to participate in the EFFICACY program and the control group. The intervention and control groups were found to be similar in the statistical analysis.

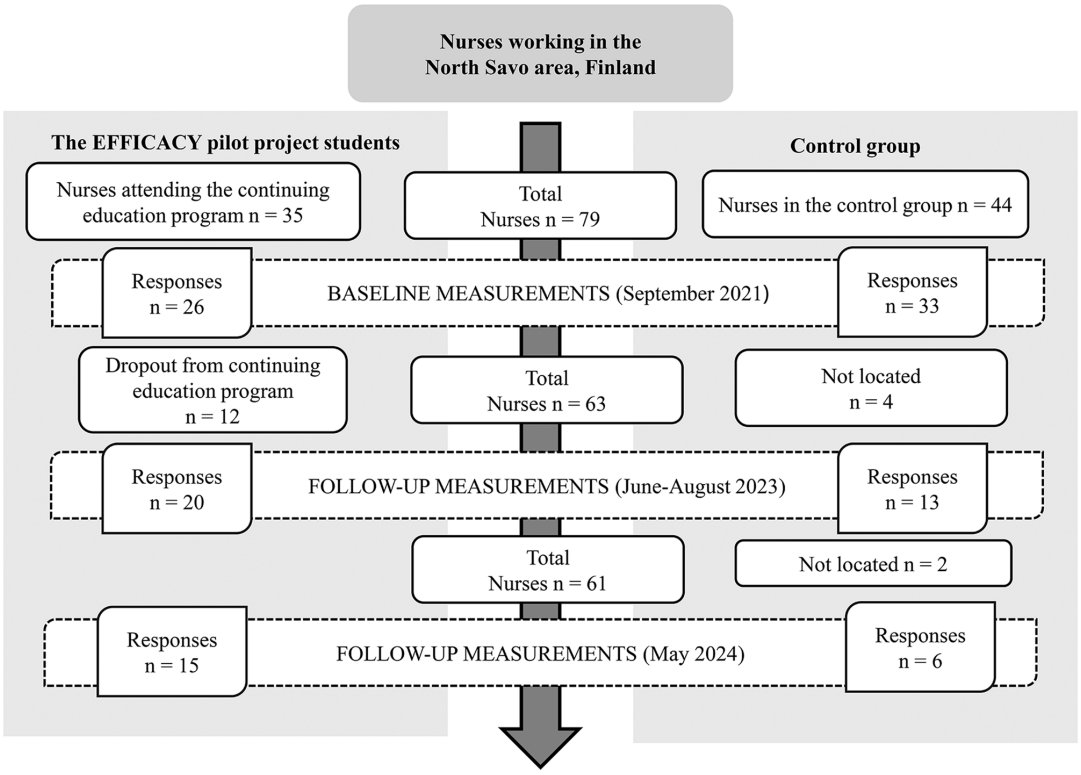

Fig. 2 The intervention study process

During the 2-year program, 12 EFFICACY students discontinued their studies, and six control-group members could no longer be located, resulting in fewer responses in the post-intervention surveys conducted in 2023 and 2024. Figure 2 depicts the procedure of the intervention study.

Data analysis

The data were analyzed with the linear mixed-effects model for repeated measures [44] in the Statistical Package for the Social Sciences (Version 27.0, 2017; IBM Corp, Armonk, New York) and the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement (Supplementary file 1) was utilized [45].

For both the baseline and follow-ups in 2023 and 2024, descriptive statistics (means, standard deviations, and frequencies) were computed independently. Using the histograms as a visual guide, the normality of the residual distributions of the outcome variable was assessed. We included the main effects for time and study group, along with their interaction, in the models after adjusting the data for age groups. To facilitate linear mixed-effects modeling, we divided the individuals into three age groups, as shown in Table 1.

Table 1 Age groups

Age group	Baseline: September 2021 ($n=59$)	Post-intervention: May–August 2023 ($n=33$)	Post-intervention: May 2024 ($n=21$)
≤40	37.3% ($n=22$)	33.3% ($n=11$)	23.8% ($n=5$)
41–50	37.3% ($n=22$)	27.3% ($n=9$)	28.6% ($n=6$)
≥51	25.4% ($n=15$)	39.4% ($n=13$)	47.6% ($n=10$)

To assess potential differences between the participants (n = 40) who left the study after the baseline assessment and the individuals (n = 19) who stayed in the study, a dropout analysis was performed, using the Mann-Whitney U-test [46]. The dropout analysis revealed that the groups were similar in all but one subscale. Some differences were observed in the sub-scale 'Requiring Factors of Work' on the KUHJSS between participants who dropped out and those who remained in this study ($p = 0.045$). The two groups were similar in terms of age and gender. It is possible that the difference was due to randomness, but other possible reasons can

be speculated. There were more nurse managers (20%) among the dropouts compared to those who remained (10.5%) in the study. There were also more University of Applied Sciences (UAS)-educated master's degree holders in the dropout group (10%) compared to those who remained (5.3%).

Ethical considerations

This research was conducted in adherence to the principles of the Declaration of Helsinki [47] and approved by the University of Eastern Finland's ethics board (statement number: 10/2021) on the 31st of May 2021. Research permits were also retrieved from each participating organization. Participation was voluntary, and written informed consent was collected from the participants. The General Data Protection Regulation of the European Union [48], as well as the Finnish Data Protection Act [49], were followed during the collection of research data.

Results

Sample characteristics

Sixty-nine nurses responded before the intervention, 33 immediately after the intervention, and 21 one year post-intervention. Descriptive statistics were calculated separately for each measurement point (Table 2). Most respondents were women and worked as an RN, which was the most frequently reported highest level of education among the participants. At the first measurement point, 43% ($n=11$) of the intervention group had additional specialized nurse education. This increased to 65% at the second measurement point and 60% at the third. The specialized education included qualifications such as a diabetes specialist nurse or a mental health nurse, worth 30–60 ECTS credits. The mean age of participants across all measurement points ranged from 43.6 to 48.5 years, and all respondents had been working in their current profession for over 8 years. As presented in Table 2, the intervention and control groups had comparable characteristics throughout the study process.

Table 2 Demographic information of the study participants

	Baseline: September 2021 ($n=79$)		Post-intervention: May–August 2023 ($n=63$)		Post-intervention: May 2024 ($n=61$)	
	Intervention ($n=35$)	Control ($n=44$)	Intervention ($n=23$)	Control ($n=40$)	Intervention ($n=23$)	Control ($n=38$)
Response rate	76.5% ($n=26$)	75.0% ($n=33$)	89% ($n=20$)	33% ($n=13$)	65.2% ($n=15$)	15.8% ($n=6$)
Gender[1]						
Female	84.6% ($n=22$)	85.7% ($n=30$)	95% ($n=19$)	84.6% ($n=11$)	93.3% ($n=14$)	83.3% ($n=5$)
Male	11.5% ($n=3$)	11.4% ($n=4$)	5% ($n=1$)	15.4% ($n=2$)	6.7% ($n=1$)	16.7% ($n=1$)
Mean age	43.6	44.5	45.2	47.1	48.5	46.7
	Min = 28	Min = 31	Min = 30	Min = 33	Min = 31	Min = 35
	Max = 61	Max = 59	Max = 63	Max = 56	Max = 64	Max = 56
	SD = 8.3	SD = 7.3	SD = 8.3	SD = 7.6	SD = 9.0	SD = 7.3
Highest level of education[2]						
RN	84.6% ($n=23$)	81.8% ($n=27$)	70% ($n=14$)	69.2% ($n=9$)	80% ($n=12$)	66.7% ($n=4$)
Master's degree, UAS	7.7% ($n=2$)	9.1% ($n=3$)	15% ($n=3$)	15.4% ($n=2$)	6.7% ($n=1$)	33.3% ($n=2$)
Master's degree, university	7.7% ($n=2$)	9.1% ($n=3$)	10% ($n=2$)	15.4% ($n=2$)	13.3% ($n=2$)	-
Other	-	-	5% ($n=1$)	-	-	-
Position title						
RN	73.1% ($n=19$)	75.8% ($n=25$)	55% ($n=11$)	76.9% ($n=10$)	53.3% ($n=8$)	66.6% ($n=4$)
Midwife	3.8% ($n=1$)	-	-	-	-	-
Nurse manager	15. % ($n=4$)	18.2% ($n=6$)	35% ($n=7$)	15.4% ($n=2$)	40% ($n=6$)	16.7% ($n=1$)
CNS or specialist nurse	-	3.0% ($n=1$)	-	-	-	-
Other	7.7% ($n=2$)	3.0% ($n=1$)	10% ($n=2$)	7.7% ($n=1$)	6.7% ($n=1$)	16.7% ($n=1$)
Years in the current profession (mean)	10.5	12.3	8.4	11.5	8.9	10.8
	Min = 1	Min = 1	Min = 0	Min = 1	Min = 1	Min = 0
	Max = 27	Max = 31	Max = 30	Max = 32	Max = 30	Max = 33
	SD = 7.3	SD = 8.3	SD = 7.9	SD = 10.3	SD = 8.9	SD = 11.7
Specialized nurse education (30–60 ECTS)	43.3% ($n=11$)	33.3% ($n=11$)	65.0% ($n=13$)	30.8% ($n=4$)	60% ($n=9$)	33.3% ($n=2$)

[1] One missing answer in the intervention and control group; CNS: clinical nurse specialist; SD: standard deviation. [2] One missing answer in the control group; RN: registered nurse; UAS: University of Applied Sciences

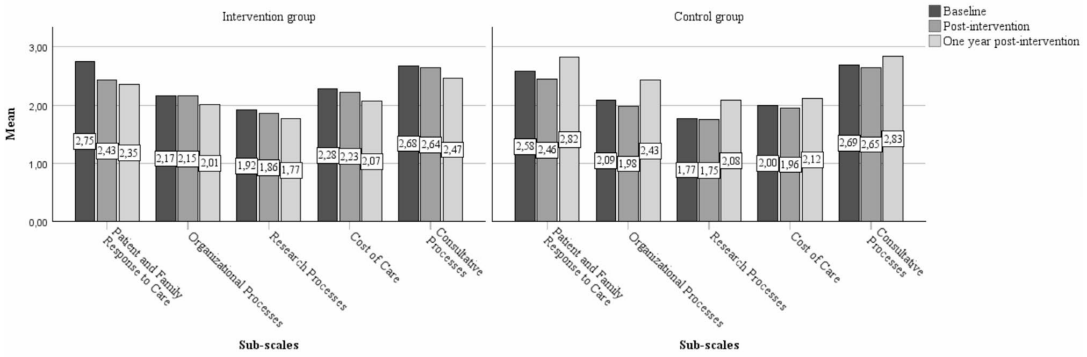

Fig. 3 Mean scores of the perceived practice outcomes in the intervention and control groups

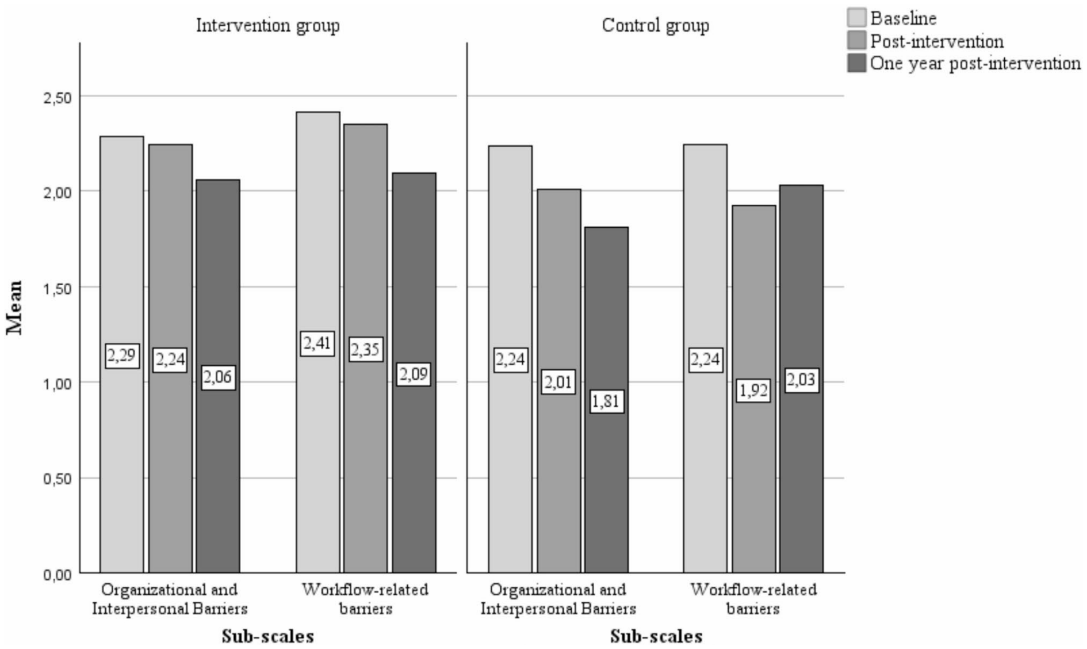

Fig. 4 Mean scores of the perceived practice barriers in the intervention and control groups

Nurses' perceived practice outcomes and barriers in the intervention and control groups before, immediately after, and 1-year post-intervention (Objective 1)

As presented in Fig. 3, the perceived practice outcomes in the intervention group, as measured by the SOBA instrument, decreased throughout the measurement period. This was also evident in the first and second measurement points in the control group; however, all perceived outcomes increased in the final round (1 year post-intervention).

All the perceived practice barriers (Fig. 4) decreased in the intervention group during the measurement period. Organizational and interpersonal barriers decreased from a mean score of 2.29 to 2.06, and workflow-related barriers decreased from 2.41 to 2.09, respectively. Organizational and interpersonal barriers were also reduced within the control group from a mean score of 2.24 to 1.81. Workflow-related barriers, on the other hand, increased by the last measurement point, with mean scores ranging from 2.24 (baseline)

to 1.92 (post-intervention) and then to 2.03 (1-year post-intervention).

Predictors associated with nurses' perceived practice outcomes and barriers (Objective 2)

Table 3 presents the predictor p-values associated with nurses' perceived practice outcomes and barriers. There were no significant associations in the perceived practice outcomes. However, gender was a statistically significant predictor in the barriers' section sub-scales: Organizational and Interpersonal Barriers ($p = 0.005$) and Workflow-Related Barriers ($p = 0.031$). Men reported lower scores (mean: 1.50) compared to women (mean: 2.10), suggesting that the male nurses experienced fewer organizational and interpersonal barriers compared to the women. This was also evident in the sub-scale Workflow-Related Barriers, where men reported lower scores (mean: 1.68) compared to women (mean: 2.21).

Regarding organizational barriers, there was a statistically significant association with the predictor measurement point ($p = 0.019$): Both the intervention and control groups reported higher means at baseline (intervention group mean: 2.01; control group mean: 1.93) than immediately after the intervention (intervention group mean: 1.93; control group mean: 1.73), and 1-year post-intervention (intervention group mean: 1.74; control group mean: 1.47), indicating that perceived practice barriers decreased during the study process.

Workflow-related barriers had a near-significant association with the measurement point ($p = 0.061$). In the intervention group, the means decreased throughout the study process (means at baseline: 2.22, immediately after the intervention: 2.08, and 1-year post-intervention: 1.81). In the control group, the mean first decreased and then increased by the final measurement point (means: 2.00, 1.75, and 1.82, respectively).

The association between CNS core competencies and nurses' perceived practice outcomes and barriers (Objective 3)

We observed statistically significant relationships between almost every sum-variable of the CNS-CoCos and SOBA outcomes (Table 4). Patient competence was associated with all SOBA scale sum variables, except for workflow-related barriers. This indicates that as patient competence increased, patient and family response to care, organizational processes, research processes, cost of care, and consultative and interdisciplinary processes increased, too. Patient competence was also associated with organizational and interpersonal barriers, indicating that as patient competency increased, so did the barriers mentioned above. The four competencies measured with the CNS-CoCos did not have statistically significant associations with the other perceived nursing practice barriers.

Clinical nursing leadership was associated with every SOBA scale outcome sum-variable, except for patient and family response to care. This indicates that as nurses became more competent in clinical nursing leadership, organizational processes, research processes, and cost of care, consultative and interdisciplinary processes were positively impacted. Organizational competence and scholarship competence were also connected to all SOBA scale outcome sum variables, indicating that an increase in either organizational competence or scholarship competence had a positive association with every perceived nursing practice outcome measured with the SOBA instrument.

The association between job satisfaction and nurses' perceived practice outcomes and barriers (Objective 3)

As presented in Table 5, several factors of job satisfaction (leadership, requiring factors of work, working welfare, and sense of community) had statistically significant associations with perceived nursing practice barriers. When leadership increased, organizational and interpersonal barriers decreased. An increase in requiring factors

Table 3 Linear mixed-effects model with three repeated measures

	Predictors, *p*-values				
	Gender	**Age groups**	**Highest education**	**Measurement point**	**Group intervention/control**
Sub-scales of outcomes					
Patient and Family Response to Care	0.186	0.434	0.203	0.062	0.822
Organizational Processes	0.812	0.120	0.205	0.504	0.701
Research Processes	0.189	0.182	0.592	0.317	0.307
Cost of Care	0.714	0.752	0.534	0.294	0.264
Consultative Processes	0.563	0.109	0.411	0.465	0.733
Sub-scales of barriers					
Organizational and Interpersonal Barriers	**0.005**	0.469	0.517	**0.019**	0.176
Workflow-Related Barriers	**0.031**	0.107	0.877	*0.061*	0.252

The statistically significant p-values are bolded; a near-significant value is in italics

Table 4 Clinical nurse specialist core competencies in relation to specialist outcomes and barriers

	SOBA						
CNS-CoCos	**Patient & Family Response to Care**	**Organizational Processes**	**Research Processes**	**Cost of Care**	**Consultative & Interdisciplinary Processes**	**Organizational & Interpersonal Barriers**	**Workflow-Related Barriers**
Patient Competence	***p*** **< 0.001 Estimate = 0.020 Std. error = 0.003**	***p*** **= 0.039 Estimate = 0.007 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.011 Std. error = 0.002**	***p*** **< 0.001 Estimate = 0.011 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.012 Std. error = 0.003**	***p*** **= 0.047 Estimate = 0.005 Std. error = 0.002**	*p* = 0.260 Estimate = 0.003 Std. error = 0.003
Clinical Nursing Leadership Competence	*p* = 0.218 Estimate = 0.003 Std. error = 0.003	***p*** **< 0.001 Estimate = 0.017 Std. error = 0.002**	***p*** **< 0.001 Estimate = 0.008 Std. error = 0.002**	***p*** **= 0.004 Estimate = 0.007 Std. error = 0.002**	***p*** **< 0.001 Estimate = 0.009 Std. error = 0.002**	*p* = 0.573 Estimate = -0.001 Std. error = 0.002	*p* = 0.431 Estimate = 0.002 Std. error = 0.002
Organizational Competence	***p*** **= 0.002 Estimate = 0.008 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.018 Std. error = 0.002**	***p*** **< 0.001 Estimate = 0.012 Std. error = 0.002**	***p*** **< 0.001 Estimate = 0.009 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.012 Std. error = 0.002**	*p* = 0.609 Estimate = 0.001 Std. error = 0.002	*p* = 0.218 Estimate = 0.003 Std. error = 0.002
Scholarship Competence	***p*** **= 0.010 Estimate = 0.008 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.015 Std. error = 0.003**	***p*** **< 0.001 Estimate = 0.013 Std. error = 0.002**	***p*** **= 0.040 Estimate = 0.006 Std. error = 0.003**	***p*** **= 0.003 Estimate = 0.008 Std. error = 0.003**	*p* = 0.522 Estimate = -0.002 Std. error = 0.002	*p* = 0.239 Estimate = 0.003 Std. error = 0.003

Statistically significant p-values are bolded; SOBA: Specialist Outcomes and Barriers Analysis scale; CNS-CoCos: Clinical Nurse Specialist Core Competency Scale

of work decreased perceived organizational and interpersonal barriers and workflow-related barriers. This was also evident with the sum variables of working welfare and sense of community: when either of these factors increased, organizational and interpersonal barriers, as well as workflow-related barriers, decreased.

Working environment had a significant association with consultative and interdisciplinary processes and organizational and interpersonal barriers. It also had an interaction with the other perceived nursing practice barrier sum-variable workflow-related barriers, indicating that as working environment increased, perceived nursing practice barriers decreased, and consultative and interdisciplinary processes increased. Motivating factors of work and participation in decision-making interacted positively with almost every perceived nursing practice outcome, except for cost of care (Table 5), indicating that when either of these increased, so did the perceived nursing practice outcomes.

Discussion

With this pilot intervention study, we sought to explain how nurses evaluated their perceived practice outcomes and barriers before, immediately after, and 1 year after the EFFICACY program. This study also explored what predictors were associated with nursing practice outcomes and barriers and examined the association between core competencies and job satisfaction in relation to nurses' perceived practice outcomes and barriers.

The intervention appeared to have no statistically significant positive impact on nurses' perceived practice outcomes. In fact, the perceived practice outcomes decreased throughout the study process. This might have been due to the transition period in Finnish healthcare during this intervention study [50]. Also, perhaps the well-known lack of nursing resources evident throughout Europe and Finland has an association with worse-perceived nursing outcomes, as poor staffing and deficient resources are significantly associated with higher missed care, which is further associated with lower quality of care and practice outcomes [24]. Previous studies had found that graduate-prepared CNSs influenced practice outcomes more commonly than baccalaureate-prepared CNSs [51] and CNSs with more working experience seemed to achieve more practice outcomes than less-experienced colleagues [52]. This was not evident in our study, however, where the highest level of education and measurement point had no statistically significant correlation with perceived practice outcomes. Perceived practice barriers, however, decreased consistently in the intervention group. This was not evident in the control group, where workflow-related practice barriers increased at the last measurement point. Previous studies that utilized the SOBA instrument found that CNSs with more experience reported fewer practice barriers [52], which was also evident in our intervention study, as practice barriers decreased over time.

Consistent with the intervention not affecting perceived practice outcomes, no statistically significant predictors

Table 5 Nurses' job satisfaction in relation to specialist outcomes and barriers

	SOBA						
KUHJSS	**Patient & Family Response to Care**	**Organizational Processes**	**Research Processes**	**Cost of Care**	**Consultative & Interdisciplinary Processes**	**Organizational & Interpersonal Barriers**	**Workflow-Related Barriers**
Leadership	$p = 0.621$ Estimate = 0.038 Std. error = 0.076	$p = 0.516$ Estimate = 0.052 Std. error = 0.079	$p = 0.997$ Estimate = 0.000 Std. error = 0.064	$p = 0.459$ Estimate = 0.055 Std. error = 0.074	$p = 0.732$ Estimate = 0.024 Std. error = 0.071	**$p = 0.006$ Estimate = -0.161 Std. error = 0.057**	$p = 0.221$ Estimate = -0.079 Std. error = 0.064
Requiring Factors of Work	$p = 0.618$ Estimate = 0.049 Std. error = 0.097	$p = 0.148$ Estimate = 0.146 Std. error = 0.100	$p = 0.863$ Estimate = 0.014 Std. error = 0.082	$p = 0.579$ Estimate = 0.053 Std. error = 0.095	$p = 0.841$ Estimate = 0.018 Std. error = 0.092	**$p < 0.001$ Estimate = -0.370 Std. error = 0.066**	**$p = 0.007$ Estimate = -0.218 Std. error = 0.079**
Motivating Factors of the Work	**$p = 0.005$ Estimate = 0.325 Std. error = 0.113**	**$p < 0.001$ Estimate = 0.409 Std. error = 0.116**	**$p = 0.006$ Estimate = 0.271 Std. error = 0.098**	$p = 0.079$ *Estimate = 0.200 Std. error = 0.113*	**$p = 0.006$ Estimate = 0.305 Std. error = 0.109**	$p = 0.256$ Estimate = -0.102 Std. error = 0.089	$p = 0.430$ Estimate = 0.078 Std. error = 0.099
Working Environment	$p = 0.191$ Estimate = 0.117 Std. error = 0.089	$p = 0.106$ Estimate = 0.150 Std. error = 0.092	$p = 0.194$ Estimate = 0.098 Std. error = 0.075	$p = 0.386$ Estimate = 0.075 Std. error = 0.086	**$p = 0.043$ Estimate = 0.168 Std. error = 0.082**	**$p < 0.001$ Estimate = -0.272 Std. error = 0.064**	$p = 0.065$ *Estimate = -0.138 Std. error = 0.074*
Working Welfare	$p = 0.433$ Estimate = 0.093 Std. error = 0.118	$p = 0.818$ Estimate = 0.029 Std. error = 0.124	$p = 0.808$ Estimate = 0.025 Std. error = 0.102	$p = 0.858$ Estimate = 0.021 Std. error = 0.115	$p = 0.246$ Estimate = 0.131 Std. error = 0.112	**$p = 0.020$ Estimate = -0.211 Std. error = 0.089**	**$p = 0.035$ Estimate = -0.211 Std. error = 0.098**
Participation in Decision-Making	**$p = 0.005$ Estimate = 0.228 Std. error = 0.079**	**$p < 0.001$ Estimate = 0.375 Std. error = 0.077**	**$p < 0.001$ Estimate = 0.260 Std. error = 0.063**	$p = 0.110$ Estimate = 0.127 Std. error = 0.079	**$p = 0.004$ Estimate = 0.219 Std. error = 0.074**	**$p = 0.012$ Estimate = -0.159 Std. error = 0.063**	$p = 0.158$ Estimate = -0.099 Std. error = 0.069
Sense of Community	$p = 0.196$ Estimate = 0.101 Std. error = 0.077	$p = 0.188$ Estimate = 0.108 Std. error = 0.081	$p = 0.446$ Estimate = -0.050 Std. error = 0.065	$p = 0.507$ Estimate = 0.050 Std. error = 0.076	$p = 0.751$ Estimate = -0.023 Std. error = 0.073	**$p < 0.001$ Estimate = -0.246 Std. error = 0.057**	**$p = 0.005$ Estimate = -0.185 Std. error = 0.065**

Statistically significant p-values are bolded; near-significant p-values are in italics; SOBA: Specialist Outcomes and Barriers Analysis scale; KUHJSS: Kuopio University Hospital Job Satisfaction Scale

were found to be associated with perceived practice outcomes. Although the intervention itself appeared to have no positive impact on perceived practice barriers, other predictors, such as gender and measurement point, were found to be associated with organizational and interpersonal barriers, as well as workflow-related barriers. In our study, male nurses reported lower means on these subscales compared to female nurses, indicating that male nurses perceived fewer barriers to their nursing practice. This is somewhat in line with previous research, where male nurses were found to circumvent the barriers and utilize their strengths in the nursing profession [53].

CNS core competencies measured with the CNS-CoCos [14] seemed to have a strong association with every aspect of nurses' perceived practice outcomes. This was also evident in previous studies, where concordance between identified outcomes and CNS practice was verified [54]. Reviews conducted in recent years have highlighted the positive effects of advanced practice nursing, including increased patient satisfaction, improved management of chronic diseases, enhanced efficiency, and cost-effectiveness of services [26]and improved patient outcomes [55]. These outcomes were also evident in our intervention study, but should be confirmed with a larger sample.

Job satisfaction had a strong association in diminishing the perceived practice barriers. Additionally, motivating work factors and participation in decision-making had several positive associations with perceived nursing practice outcomes. This had also been identified in previous research, indicating that participation in decision-making correlates with positive job performance [32, 33].

Improving the motivating factors of work and allowing nurses to participate in decision-making appears to have a positive connection with nursing practice outcomes. This was also evident in previous research, where clinical competence was found to be an essential part of patient safety [56], improved nursing outcomes, and job satisfaction [4].

Strengths and limitations

This study had several strengths, including its longitudinal design with three measurement points between September 2021 and May 2024, which allowed us to evaluate the lasting effects of the intervention over time. Additionally, we used standardized competence instruments instead of a traditional pre-test and post-test design, and all instruments employed in this study had been validated within the Finnish context. Furthermore, a statistician joined our author team to ensure the accuracy of the statistical analysis.

This study also had limitations. Our sample size was relatively small, which is natural for a pilot intervention study. Since the intervention group size was predetermined, no power analysis was conducted regarding the sample size. Additionally, the dropout analysis revealed that the individuals who continued in the study were similar to those who dropped out in all the sum variables, except for the Requiring Factors of Work on the KUHJSS. This sum variable had statistically significant associations with both the SOBA instrument's barrier sub-scales. However, due to the somewhat fluctuating dropout group, the results concerning this sum variable should be interpreted with caution. Furthermore, since the intervention and control groups both operated under the same healthcare organization, it is necessary to identify possible knowledge exchange between the two study groups as a limitation.

Recommendations for future research

Pilot studies are essential and pivotal for developing interventions. Pilot studies are often used as a way of optimizing the intervention's delivery by addressing intervention adherence and fidelity [39]. Future research should investigate strategies to reduce dropout rates in long-term interventions, considering factors such as personal reasons, scheduling conflicts, and work-related pressures. According to a recent review on health and social care professionals' part-time study in higher education, juggling the demands of work life, family, and studies seems a challenging combination [41]. Despite efforts to facilitate participation through hybrid lectures and online learning, one-third of the participants dropped out of the intervention. Intervention research would benefit from timely delivery and primary research during vast organizational changes, which possibly hindered our research, should be avoided. Future research should rigorously explore continuing education outcomes using additional methods, such as interviews, observations, and registry-based research.

Implications for policy and practice

The findings of this study indicate that the developed EFFICACY curriculum is well-suited for implementation in a university setting and has been partially incorporated into master's level studies in Nursing Science at the University of Eastern Finland. The results obtained from this pilot intervention also enable us to improve future continuing education and lifelong learning opportunities provided by higher education institutions. It is necessary to foster collaboration with healthcare organization representatives to ensure that the offered continuing education is relevant, timely, and addresses current healthcare needs.

The EFFICACY program had a positive influence on nurses' perceived practice barriers, job satisfaction, and competency development. As part of a continuing education curriculum where the students were simultaneously working, the program faced difficulties with students' changing work situations and adherence. It is also essential to consider that, although this particular pilot study didn't identify a positive impact on participants' perceived practice outcomes, continuing education in general has been deemed necessary in improving nursing outcomes [1].

Our preliminary results suggest that fostering elements of job satisfaction may help overcome nursing practice barriers. Additionally, participation in decision-making and the motivating factors of the work appear to have a positive influence on nursing practice outcomes. The results of our study also indicate that enhancing nursing competence can have a positive impact on nursing practice outcomes. These findings provide a promising foundation for future research on the potential of continuing education. However, the results of this intervention study should be further investigated with a larger sample size, specifically consisting of CNSs at a national level.

Conclusion

This longitudinal study on the outcomes of the EFFICACY pilot intervention allowed us to critically assess the facilitators and challenges of a CNS competence-enhancing continuing education curriculum. In the current situation, where the European population is aging and the shortage of nurses creates challenges in delivering appropriate healthcare services, the development of advanced practice roles is pivotal. This pilot intervention study has provided valuable insights into the evaluation of nurses' perceived practice outcomes and barriers in relation to the EFFICACY program. Despite the intervention

not yielding statistically significant improvements in perceived practice outcomes, the study did highlight the complexities of nursing practice within the context of healthcare transitions and resource constraints. The findings underscore the importance of addressing systemic issues such as staffing and resource allocation to enhance nursing practice outcomes. Additionally, the study reinforces previous findings that core competencies and job satisfaction are crucial factors influencing nursing practice outcomes and reducing barriers. Results suggest that fostering supportive work environments and enhancing professional competencies are vital for improving nursing practice. Future research with larger sample sizes is necessary to validate these findings further and explore the nuanced relationships between intervention strategies, practice outcomes, and barriers in nursing.

Abbreviations

APN	Advanced Practice Nurse
CNS	Clinical Nurse Specialist
CNS-CoCos	Clinical Nurse Specialist Core Competencies
ECTS	European Credit Transfer System
EFFICACY	Accessibility, quality, and safety of health services: Clinical nursing expert training
EU	European Union
ICN	International Council of Nurses
KUHJSS	Kuopio University Hospital Job Satisfaction Scale
NP	Nurse Practitioner
SOBA	Specialist Outcomes and Barriers Analysis
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1

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Author contributions
MW, KJ, TK, and SM made substantial contributions to the conception and design. MW, KJ, and TK were responsible for the acquisition of data. MW, KJ, TK, and SM were involved in the analysis and interpretation of data, drafting the manuscript, or critically revising it for important intellectual content, and gave final approval of the version to be published. Each author (MW, KJ, TK, and SM) participated sufficiently in the work to take public responsibility for appropriate portions of the content and agreed to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Data availability
The datasets generated during the current study are not publicly available due to participant privacy concerns but are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
This research was conducted in adherence to the principles of the Declaration of Helsinki and approved by the University of Eastern Finland's ethics board (statement number: 10/2021) on the 31st of May 2021. Research permits were also retrieved from each participating organization, and informed consent was obtained from all nurses participating in this study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Publisher's note

MEA WRIGHT

Continuing education is vital for maintaining advanced nursing skills in today's complex healthcare environment. This dissertation evaluates the EFFICACY pilot intervention, which aimed to strengthen Clinical Nurse Specialist competencies in the wellbeing services county of North Savo. The findings contribute to the discourse on advanced practice nursing, providing evidence-based recommendations for academic institutions and healthcare organizations seeking to enhance workforce capacity and deliver high-quality, safe, and cost-effective care.

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