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Differences Between Nurse-Led Intervention Topics, Longevity, Changed Practices, and Sustainability Planning

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Walden University
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Abstract

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by

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DNP, Walden University, 2017

MSN, Case Western Reserve University, 1994

BSN, University of Akron, 1984

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Though health care providers use evidence-based interventions (EBIs), a knowledge gap exists regarding lasting change associated with doctorate-prepared nurse interventions and sustainability planning. This quantitative cross-sectional descriptive design guided by the five pillars of the United Nations sustainable development goals (SDGs) was used to examine the differences between doctorate-prepared nurses' sustainable EBI topics, intervention longevity, changed clinical practices, and sustainability planning. The dynamic sustainability framework, the adult learning theory, and the social learning theory framed this study. The design included a survey of 1,365 nurse anesthesiologists using a questionnaire composed of the Program Sustainability Assessment Tool (PSAT) version 2 and the Clinical Sustainability Assessment Tool (CSAT). Data were collected via an electronic survey service and analyzed using SPSS. Response to the survey was limited (N = 113), and although not enough data were collected to run inferential statistics, the study results indicated that participants' scope-of-practice intervention topics (n = 12) clustered in post-procedural, information technology, and policy categories. Intervention longevity (n = 3) ranged from 1 to 4 years. The overall PSAT score (n = 6) of 5 and CSAT score (n = 3) of 5 signified a practice implication for strengthening sustainability in nurse-led EBIs, supporting positive social change through better health outcomes. Future nursing research recommendations include designing the next steps for actionable awareness, integration, and evaluation of the SDGs in nursing education and practice.

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Dedication

I dedicate this body of work to my son, Parker. I encourage you to reach for the stars, cultivate all your dreams, achieve your greatest potential, and positively impact the universe.

Acknowledgments

I thank my family and colleagues who have supported me throughout this dissertation process, providing encouragement and strength whenever I needed it along this journey. I also thank Dr. Nancy Moss, Walden University faculty, my dissertation committee, and especially Dr. Susan Hayden. Their expertise has helped me reach this point in my academic scholarship.

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Chapter 1: Introduction to the Study

Sustainable evidence-based nursing interventions (EBIs) are encouraged with the future of the nursing profession leading change, advancing health, and charting a path to health equity (Institute of Medicine [IOM], 2010, 2011; National Academies of Medicine, 2021). This intervention sustainability study (ISS) added to the scientific body of knowledge, illuminating sustained nurse-led EBI topics, changed clinical practices, sustainability planning, and the longevity of interventions led by doctorate-prepared graduate nurses, such as nurse anesthesiologists, in their daily practice. Further empirical studies are needed on developing and measuring sustainability in nursing and nursing education beyond an ecological focus (Anåker & Elf, 2014). Because of insufficient data, I will describe the EBI topics that self-identified doctorate-prepared nurse anesthesiologists have led, noting intervention longevity, changed clinical practices, and sustainability planning in this paper. The results of my study can inform the nursing profession about the significance of sustainability planning in educational curriculums, with implications for subsequent implementation design in ongoing scholarly EBI topics and the inclusion of long-term interventions into actual practice.

This chapter's major sections include the study's background, problem statement, purpose, research questions and hypotheses, theoretical and conceptual frameworks, the nature of the study, and definitions. Other sections include the assumptions, scope and delimitations, limitations, and significance. The chapter ends with a summary.

Background

This study focused on what was known about the longevity of interventions, changed clinical practices, and sustainability planning efforts. Nurses are advancing critical research and policy efforts to achieve the United Nations Sustainable Development Goals (SDGs) within the next decade (Osingada & Porta, 2020). Longstanding problems with inconsistent definitions and measurements of sustainability continue to affect sustainability planning in health care as a branch of implementation science (Braithwaite et al., 2020). Examples of these terms include but are not limited to *sustainability*, *sustainable*, *continuance*, *maintenance*, *follow-up*, *adoption*, *following* (as in post-trial, intervention, phase, program, project, training, design, inception, initiation, enrollment, establishment, assessment, funding, completion, testing), *routine*, *institutionalization*, *durability*, *scalability*, and *scale-up*. There is no consensus on a singular, succinct word to describe or clarify sustainability.

A secondary problem has been that less than 20% of sustainability studies have included theoretical or conceptual frameworks, and even fewer used sustainability-specific frameworks (Braithwaite et al., 2020). Third, early sustainability authors believed that the longer a program was in place, the less likely it would sustain or be evaluated by real-life clinicians. This phenomenon, called voltage drop, was not due to routinization but rather the traditional pharmaceutical linear approach to interventions providing an incomplete explanation of the lack of sustainability in non-pharmaceutical evidence-based interventions. There is recognition in the literature and agreement that

sustainable interventions require adaptation and ongoing evaluation (Chambers et al., 2013).

Multiple authors have also categorized barriers and facilitators to intervention implementation and sustainability, describing factors contributing to intervention sustainability. For example, Geerligs et al. (2018) grouped hospital-based intervention barriers and facilitators into three main domains: system, staff, and intervention. Lennox et al. (2017) noted 12 key factors to identify risks and actions increasing chances of sustainability: commitment, engagement, resources in place, skills and capabilities, leadership, team functioning, progress monitored by feedback and learning, evidence of benefits, robust and adaptable processes, alignment with organizational culture and priorities, support for improvement, and alignment with the external political and financial environment. Schalock et al. (2016) categorized three organizational factors driving sustainable interventions using social cognitive theory to develop a sustainability model depicting: accountability drivers affecting efficiency and effectiveness, organization drivers affecting high-performance teams coupled with quality improvement, and leadership drivers affecting transformation and strategic execution. These three drivers determine an organization's ability to adapt successfully and provide service delivery opportunities and practices that result in valued outcomes (Schalock et al., 2016).

Further, researchers like Hodge and Turner (2016) created a conceptual framework based on program-supporting factors influencing evidence-based

implementations: innovation, capacity, process, and interaction. Innovation factors included:

- Program benefits and burden.
- Program fit.
- Program adaptive ability.
- Program familiarity and competencies.

Capacity factors included:

- Workplace climate and cohesion.
- Workplace support.
- Integration of the program.
- Leadership style.
- Staff mobility and turnover.
- Supervision and peer support.

Process and interaction factors included:

- Engagement.
- Training.
- Key program champion.
- Technical assistance and ongoing support.
- Evaluation and feedback.
- Collaborative partnerships.
- Sustainment planning.
- Funding and policy.

Chambers et al. (2013) similarly developed a framework that identified interventions, practice settings, and the broader ecological system as domain categories intending to maximize the fit between the domains over time. The inclusive framework provides a foundation for research, policy, and practice supporting the development and testing of hypotheses, and the continuation of learning to advance the implementation, transportability, and impact of health services research.

Another problematic area has been the design and planning phases. Though careful intervention design is imperative, there is no agreement on which design planning phase is most critical to sustainability. For example, some authors implicated pre-implementation design (Chambers et al., 2013; Walugembe et al., 2019), whereas others indicated post-implementation follow-up (Ament et al., 2014). The complexities of the implementation stage are culprits in sustainable intervention competency (Schultes et al., 2020). A commitment by leadership when conducting intervention projects may increase the likelihood of effective and sustainable implementations and, subsequently, the longevity of interventions in both educational and practice experiences (Dols et al., 2017; Fleiszer et al., 2015; Hooshmand et al., 2019; Kruk et al., 2018; Tuzzio et al., 2019).

Evidence from the literature indicates that the gap in doctorate of nursing practice (DNP) intervention sustainability planning may begin in the nursing education curriculum, widen in subsequent practice (Ketron, 2019), and may render diminished significance to interventions led by nurses. In the ISS, I confirmed the knowledge gap about EBI topics led by doctorate-prepared nurse anesthesiologists, including time spans identifying the longevity of these interventions, meaningful changes in clinical practices

that improve patient outcomes, and strategic sustainability planning in nursing practice. Nursing educators, clinical practice doctorate-prepared nurses, organizational administrators, and governing policymakers need the ISS to inform them about sustainable EBI topics, the longevity linked with these topics, and the associated changes in clinical practices, including sustainability planning.

Problem Statement

Though health care EBIs remain increasingly implemented at the front lines of care, definitive knowledge about lasting change and sustainability planning associated with doctorate nurse interventions has been limited. Currently, health care literature is limited in sustainability conceptualization, planning, or measurement (Braithwaite et al., 2020). Sustainability is the continuation of beneficial programs after initial implementation efforts, staff training periods, or funding has ended (Wiltsey-Stirman et al., 2012). Sustainability has five constructs: (a) after a defined time, (b) the program, clinical intervention, or implementation strategies continue to be delivered, (c) individual behavior change (i.e., clinician, patient) is maintained, (d) the program and individual behavior change may evolve or adapt while (e) continuing to produce benefits for individuals/systems (Moore et al., 2017).

Studying sustainability planning is important to evaluate critical strategic components nurses use to achieve and document long-term goals to continue the programs, activities, and partnerships to improve population health (Shirey et al., 2020). The lack of information available in the literature on doctorate nurse-led intervention sustainability undermined the significance and validation of this practice discipline's

meaningful legacy of leading and sustaining positive social change. For example, there was no discussion on intervention sustainability planning in the 2019 report on *Scholarly Work for Practice Doctorate Nurse Anesthesia Programs* (Council on Accreditation, 2019). Education programs are not adequately preparing DNPs to ensure they can implement sustainable programs, representing a gap in the preparation of doctorate nurses for subsequent scholarly practice.

The longevity of nurse-led doctorate-prepared interventions has become increasingly appreciated by researchers and funders challenged to evaluate the implementation of interventions without planned sustainability in the program design (Walugembe et al., 2019). For instance, the lag in changed clinical practices is fundamental to understanding the persistent research-to-practice gap, which translates to 17 years of suboptimal care, exposure to avoidable harm, and excessive health care expenditures (Hailemariam et al., 2019). Therefore, sustainment planning is a relevant, missing step in documenting and measuring the effective impact of doctorate-prepared nurse-led interventions on population outcomes over time.

Purpose of the Study

This non-experimental quantitative study was conducted to describe doctorate-prepared nurse-led intervention topics and examine the relationships between the longevity of interventions, changed clinical practices, and sustainability planning. The independent categorical variable was the nurse-led intervention topics. The dependent variables were the longevity of interventions, changed clinical practices, and sustainability planning. The study informs academic and practice communities regarding

factors in sustainability planning that challenge the endurance of EBIs. Implementation scientists have prioritized studying the effective integration of interventions relative to contextual practice settings (Braithwaite et al., 2020). DNP programs educate nurses to lead evidence-based practices and quality improvement changes, preparing graduates for systems leadership roles (American Association of Colleges of Nursing, 2020). However, programs are not teaching how to maximize sustainment or evaluate the sustainment of the projects these graduate-level nurses develop. Educating future nurse leaders to address various clinical problems requires nurses to acquire the reproducible skills to lead sustainable change aligned with the aim and scope of practice of doctorate-level scholarly work (American Association of Colleges of Nursing, 2019; Chambers et al., 2013). The DNP program curriculum content may need updating to include EBI dynamic sustainability planning and faculty facilitation (e.g., coaching, mentoring, and scaffolding). Based on my study findings, future DNP project leaders may expect to incorporate sustainability planning beginning at the proposal level with a dynamic, contextually adaptive perspective.

However, skill acquisition may be affected by multi-factorial issues involving faculty satisfaction and challenges identified by Dols et al. (2017) that eventually impact the educational preparation of DNP learners. The DNP program curriculum content may need updating to include EBI dynamic sustainability planning and faculty facilitation. Faculty facilitation includes coaching, mentoring, and scaffolding skills to carry out dynamic, clinical, and contextually-adaptive projects later in real-life practice. Based on my study findings, future DNP project leaders may expect to incorporate sustainability

planning beginning at the proposal level with a dynamic, contextually adaptive perspective.

Research Questions and Hypotheses

The overarching aim of this study was to determine, based on participants' sustainable intervention topics, the differences in longevity of doctorate nurse interventions, measurements of changed clinical practices, and sustainability planning. From the study aim, I developed three research questions:

RQ 1: Based on doctorate nurse-led sustainable intervention topics, what is the difference in the longevity of the interventions?

$H_0$1: There is no difference in the longevity of interventions across intervention topics.

H_a1: There is a difference in the longevity of interventions across intervention topics.

RQ 2: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention changed clinical practices?

$H_0$2: There is no difference in changed clinical practices across intervention topics.

H_a2: There is a difference in changed clinical practices across intervention topics.

RQ 3: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention sustainability planning?

$H_0$3: There is no difference in sustainability planning across intervention topics.

H_a3: There is a difference in sustainability planning across intervention topics.

Theoretical and Conceptual Framework for the Study

The theories and concepts that ground this study included the dynamic sustainability framework (DSF; Chambers et al., 2013), the andragogical adult learning theory (ALT; Knowles et al., 2015), and the social learning theory (SLT; Bandura, 1977; Bandura, 1997; Bandura, 2004). The dynamic sustainability framework involves the following concepts: continued learning and problem-solving, the ongoing adaptation of interventions with a primary focus on the fit between interventions and multi-level contexts, and expectations for continued improvement instead of diminishing outcomes over time (Chambers et al., 2013). The framework has the core principles of personal, practice, and organizational realms affecting intervention implementation and sustainable adaptation. The framework informed the dynamic processes of intervention sustainability planning, including intervention adaptation and time as an ongoing continuum within the theory conceptualization.

Adult learning theorists Knowles et al. (2015) identified six assumptions about adult learning to include (a) need to know, (b) self-concept, (c) prior experience, (d) readiness to learn, (e) learning style, and (f) motivation to learn. Understanding life-long learning theories aligns with the professional educational development of nurses in clinical communities of practice. The adult learning theory explains the impact of individual student differences on their higher education learning outcomes and the impact of learning outcomes in real-life professional practice affecting patient outcomes.

The social learning theorist Bandura (1977) described self-efficacy and self-esteem as different but related concepts. Self-efficacy occurs when a person believes in

their ability to reach a goal, whereas self-esteem occurs when they sense self-worth (Bandura, 1997). Bandura (2004) explained that behavior changes are situational and a product of the interaction between personal characteristics and the environment. These interactions represent Bandura's concepts of self and collective efficacy or confidence that groups can take collective action to bring about social change. Self-efficacy and self-esteem are attributes nursing clinical practice leaders need to impact positive social change. Chapter 2 provides a more detailed analysis of these three guiding theoretical and conceptual frameworks.

Nature of the Study

To address the research questions in this quantitative study, I approached the cross-sectional descriptive correlational design using a questionnaire. In a cross-sectional study, the investigator measures the outcome and the incidence of the study participants simultaneously, and participant selection is based on inclusion and exclusion criteria set for the study (Setia, 2016). A cross-sectional design was appropriate because I surveyed simultaneously the baseline incidence of post-graduate doctoral nurses who led these interventions. A secondary reason for the cross-sectional design was that it was a relatively inexpensive design that I completed in a timely manner.

The homogenous convenience sample of doctorate-prepared nurse anesthesiologists was feasible for the ISS because I could reach a significant number of doctorate-prepared nurses eligible to participate. The independent variable for the ISS was nurse-led evidence-based interventions. The dependent variables included the longevity of interventions, changed clinical practices, and sustainability planning. A list

of variables is in Appendix A. The questionnaire was a baseline survey gathering descriptive data from real-life doctorate-prepared nurse anesthesiologists on their intervention topics while assessing the prevalence of long-term changed clinical practices and efforts in sustainability planning. I needed an online survey service provider and the email survey invitation service by the national nurse anesthesiology professional organization (NNAPO) for the initially planned research design. I encountered difficulty recruiting a large enough sample due to a poor national survey response rate. Though permissions were granted to me from IRB for these recruitment efforts and the length of the recruitment spanned 1 full year, participants in the survey remained limited.

I collected categorical, nominal, and ordinal data from quantifying implementation topics, intervention longevity, clinical practice changes, and practice sustainability. The data were collected using the Clinical Sustainability Assessment Tool (CSAT; Washington University, 2019) and the Program Sustainability Assessment Tool version 2 (PSAT v2; Calhoun et al., 2014; Luke et al., 2014). I assessed changed clinical practices relative to the EBI topics ordinally using the domain categories of workflow and integration, implementation and training, and monitoring and evaluation from the CSAT tool. I assessed intervention sustainability planning ordinally using the domain for strategic planning from the PSAT, which included the subdomain of sustainability planning. Both tools, with confirmed validity and reliability, which I will discuss later in the methodology chapter, are specific to improvement projects and align with doctorate-prepared nursing practices to improve patient health outcomes.

I reported the total overall CSAT or PSAT score from the mean of all scores, excluding non-applicable responses, and the subdomain scores consisting of the simple mean for the five questions in each subdomain ranging from 1 to 7. Higher scores indicated the clinical settings or programs meeting the criteria to a higher degree. The tools have an open-ended question for respondents to give nominal data about their EBI PICOT question. Participants were to indicate the category of nurse anesthesiologists' scope of practice best describing their PICOT question to quantify the category topics. Intervention longevity was determined by respondents selecting an ordinal timeframe.

Definitions

The operational definitions of the main concepts used in the dissertation study are listed in this section.

Changed clinical practices: Dynamic, continuous processes in which practitioners align their actions to both the principle of change and the situation. At the same time, they adjust these actions as needed in ongoing change or developing situations (Slaghuis et al., 2011).

Longevity: Refers to the long-term persistent viability of an intervention measurable by time (Bowman et al., 2008).

Nurse anesthesiologist: Refers to the title of advanced practice registered nurse fitting the position statement by the AANA, which recognizes the following descriptors to identify nurse anesthetists: "Certified Registered Nurse Anesthetist," "Certified Registered Nurse Anesthesiologist," "CRNA," "nurse anesthetist," and "nurse

anesthesiologist (American Association of Nurse Anesthetists, 2019; Merriam-Webster, n.d.-b).

Sustainability planning: The processes guiding an EBI program's sustainable direction, goals, and strategies (Luke et al., 2014).

Sustainability: Comprehensively defined as including five constructs: (a) after a defined time; (b) the program, clinical intervention, and implementation strategies continue to be delivered; and (c) individual behavior change (i.e., clinician, patient) is maintained; and (d) the program or individual behavior change may evolve or adapt while (e) continuing to produce benefits for individuals or systems (Moore et al., 2017).

Assumptions

Without the following basic assumptions, the research problem in the ISS would not have existed. A common assumption in research in general, and in this study, was that I protected participant anonymity so that I could presume study respondents answered the ISS truthfully and confidentially, protecting the identities of contributors. Privacy, anonymity, and confidentiality are vital ethical factors in online surveys (Roberts & Allen, 2015). Anonymity is 75% effective versus confidentiality alone (25% effective) for eliciting respondent truthfulness (Ong & Weiss, 2000). It was imperative for me to trust the self-reported data collected from the survey.

Specific to this study, I assumed the academic preparation of DNP graduates would continue to be necessary to society and the United States health care system stakeholders. The study results will likely be meaningful to DNP learners, graduates, and those who prepare them. Similar researchers have explained that implementation science

aims to expand the use of EBIs as broadly as is appropriate and feasible to foster the most significant public health impact (Aarons et al., 2017). Though the literature supports that EBIs have a history of jeopardized sustainability, it is plausible that the societal need to implement EBIs may expand and evolve in ways that are not known. Intermingled with the changing context of health care practice, interventions by clinicians will continuously be refined and improved over time to be sustainable (Chambers et al., 2013).

I believe EBIs will be needed beyond assisting or mentoring other nurses to fulfill their educational requirements. Without improved awareness of stewardship presented through this study, scarce health care resources required in doctorate-prepared nurse-led EBIs may be exhausted. When health care EBIs do not sustain, then investments are wasted (Aarons et al., 2016). Discontinuation of DNP's participation in EBIs in practice may be counterproductive to health care systems and patient outcomes. The study results may require the professional organization to reassess future competencies and guidelines to lead sustainable EBIs. The IOM (2010, 2011) supports schools of nursing to prepare more students at the graduate level to foster a unified, competency-based approach with the highest possible standards. Advancing the science of nursing education research, or how best to teach students, is significant for the field of nursing education. The IOM recommends imparting emerging competencies in nursing education, such as quality improvement and systems thinking, or developing a more highly educated workforce. According to the IOM, doing so will require a thorough evaluation and redesign of educational content, not just adding content to existing curricula.

Scope and Delimitations

Specific aspects of the research problem addressed in the study involved the convenience sample population of doctorate-prepared nurses who are either DNP or doctorate of nurse anesthesia practice (DNAP) nurse anesthesiologists. Since 2015, the DNP has been the minimum practice requirement for nurse anesthesiologists. I included the DNAP because it is an accepted specialized practice degree in nurse anesthesiology. The study boundary excluded the nurse doctorate degree, the doctorate of nursing science, and the doctorate of philosophy (PhD) nurses because these advanced degrees are research rather than practice-oriented. I chose this specific focus to describe EBI topics implemented by doctorate-prepared nurses in their local practices and to understand more about the longevity of these interventions, changed clinical practices, and sustainability planning. The focus was on topic descriptions of EBIs and the supporting social changes occurring in conjunction with adult learning processes in communities of practice, social group behavior such as changed clinical practices, sustainability planning, and evaluating the longevity of interventions. Leadership theories are related, but I did not include these theories in the study due to my focus on education and future practice. I believed there was potential generalizability of the ISS to other advanced practice nurse specialties that do or may require a minimum practice doctoral degree prerequisite in the future. A more inclusive sample population of doctorate-prepared nurses would give more generalizable results for all nurses with practice doctorates desiring to lead evidence-based interventions sustainably across more subspecialties and contexts.

Limitations

There were several limitations to this study. First, I did not attain the expected survey response rate of 10–15% (see-Shih & Fan, 2009). The limited response rate directly impacted the amount of data collected and subsequent analysis. A participant incentive might have improved participation, mainly if some respondents required a significant amount of time to complete the lengthy survey.

Second, a potential relationship conflict of interest was that I held prior board membership at the state-level association of professional nurse anesthesiologists, but I had separated from this role before embarking on this research study. As a reasonable measure, during the survey, I did not serve on the board of either the state or national professional nurse anesthesiologist associations. I did not use my relationship with my fellow professionals to influence or coerce participation in this study. I also took measures to avoid potential bias since I am presently a professional member of the national and state associations of interest, which may unknowingly and indirectly exert participation pressure on those who know me and work with me. A reasonable measure I took to address this limitation was to avoid discussing the research during conversations with members of my profession. Lastly, I hold a DNP degree but did not participate in the research survey, excluding myself as a potential respondent despite the poor response rate and preventing a biased measurement of sustainability planning in the study.

Further, I initially encountered a challenge in filtering doctorate-prepared nurse anesthesiologists from a baccalaureate or master's preparation; the national professional organization screened the participant list for me but could not confirm that the list

accurately reflected the percentage of doctorate-prepared nurse anesthetists because the information is self-reported. The state association and the LinkedIn post did not filter a participant list. To address this issue, I included a hard-stop question at the beginning of the survey confirming the highest degree of educational preparation. However, providing the hard stop question limited the number of participants and yielded few completed surveys. A potential barrier was the fee for accessing the national professional organizational doctoral membership. I conferred with the organization to obtain a targeted doctorate-level participant survey invitation to limit the associated costs. I began applications for nursing research funding resources once I received IRB approval but did not receive funding.

Significance

In response to changes in the reformed U.S. health care system and practice environments, the IOM required levels of nursing education to reconceptualize nurses' roles to improve understanding and experiences of care management, quality improvement methods, and systems-level change management (Kershaw, 2011). The reconceptualization of nurses' roles led to doctoral nursing programs that provide practice-ready implementors of EBIs in local practice (American Association of Colleges of Nursing, 2015; National League of Nursing, 2020). Specialization guidelines for doctoral-prepared nurse anesthesiologists' educational goals foster graduate reliance on skills beyond tasks, technical skills, and procedures, such as leadership strategy and vision (Starnes-Ott et al., 2020; Wunder, 2016). Specialized nurses, such as CRNAs, as

conversant subject matter experts in anesthesiology, will be needed to lead improvements in anesthesia care.

This study is significant to educational, practice, regulatory, and organizational stakeholders because I sought to address a disparity in the structure of the current academic preparation of future nurse leaders. The specific disparity is a lack of long-term sustainability planning in scholarly work preventing the extension of knowledge implementation and integration as a practice essential (Dang & Dearholt, 2018). The sustainability of EBIs is often ignored, creating one of the most critical gaps in implementation science (Johnson et al., 2019). A deficiency in knowledge existed regarding long-term intervention topics and outcomes of doctorate-prepared nurses. Closing this gap in long-term sustainability planning is relevant to educators who re-assess learning needs, achievements, and outcomes (Knowles et al., 2015). According to Bandura's social learning theory, integrating meaning into practice occurs by learning through observation, imitation, and modeling (Illeris, 2007; Merriam et al., 2007). Without substantiated knowledge about long-term interventions and outcomes, doctorate nursing educators assumed effective modeling of planning lasting interventions, marginalizing student preparation for practice if this learning barrier remained unknown. Closing the intervention longevity gap is important to health care system stakeholders because doctorate-prepared graduates lead change to improve patient care effectiveness and positively impact patient outcomes over time (Starnes-Ott et al., 2020).

The focus of this ISS was the lack of data about the longevity planning of scholarly interventions implemented after doctoral preparation. Surveying practice-

doctorate nurses determined how they use scholarly work skills post-graduation (Council on Accreditation, 2019). As the researcher, I investigated this gap to provide stakeholders' expeditious confirmation of the integration of actual sustainable intervention topics implemented by doctorate nurse graduates and the emerging state of the continuance of implementations in daily practice. This original contribution was three-fold. The study validated the profession's translation of doctorate educational preparedness, implementation of ongoing scholarly EBI topics, and the status of long-term inclusion into actual practice. The study served as an SDG higher-education outcome indicator and a quality outcome indicator for doctorate-prepared nurse-led interventions. Future academic and practice partnerships may significantly contribute to positive social change by preparing doctoral nurse graduates in sustainable intervention planning. The social change model for leadership by Austin (1996) helps frame the position of professional nurses as partners in purposeful, collaborative, values-based processes resulting in ongoing positive change to better society's health. The social change created by nurse educators impacts the development of future doctorate-prepared nurse leaders in daily practice.

Summary

Nurses have been urged to implement sustainable EBIs to impact population health outcomes over time. However, the initial background literature provided evidence that the discipline of nursing had not achieved the sustainability of EBIs. In my study, I took this research opportunity to advance knowledge about EBI topics implemented by graduate doctorate-prepared nurses, describing these topics, intervention longevity,

changed clinical practices, and sustainability planning. In the next chapter, I will explain the literature I reviewed to develop my dissertation further.

Chapter 2: Literature Review

Sustainability in health care requires a balance between using resources to meet current health needs and preserving future beneficiaries' resources. Though research on the sustainability of EBIs has grown, it remains understudied (Shelton et al., 2018). Sustainability research emerged from dissemination and implementation (DI) science—the growing field of study that examines how scientific evidence is adopted, implemented, and sustained in the community or clinical settings (Estabrooks et al., 2018). As a recognized domain of DI science in health care, sustainability is in its infancy (Shelton & Lee, 2019). Sustainment planning remains a relevant but missing step in documenting and measuring the effective impact of doctorate-prepared nurse-led interventions on population health over time. This study addressed doctorate-prepared nurse-led intervention topics and the relationships between the longevity of interventions, changed clinical practices, and sustainability planning. This chapter will explain the literature search strategy, theoretical framework, conceptual framework, and literature review of key variables and concepts used to develop and support this dissertation.

Literature Search Strategy

In reviewing the literature within the scope of the past 5 years on the sustainability of doctorate-prepared nurse-led intervention topics, I focused on the sectors of health care education, nursing education, and post-graduation practice. The keywords and databases searched included Boolean phrases for *nursing education* AND *doctoral* AND *projects* AND *types* OR *topics* AND *sustainability* AND *sustainability planning* AND *sustainment* accessed in Thoreau multi-database using Walden University's

Library. The original search for articles written in English yielded 35 results. I excluded duplicate articles and those that were not peer-reviewed and were unrelated to the dissertation topic. I narrowed the search to six usable peer-reviewed articles between 2015 and 2020. I used the Walden University librarian services and a medical librarian at my workplace to complete an exhaustive search strategy. I obtained additional articles, conference proceedings, and seminal works through Google Scholar, bibliographical data mining, and dissertations.

The problem for doctoral nurses educated in implementing translational EBIs has been documenting sustainable intervention topics, maintaining, and evaluating these initiatives long-term. DI authors continue to call for additional research to identify and assess planned strategies optimizing the delivery of sustainable EBIs impacting population health in real-world practice settings (Johnson et al., 2019; Leviton, 2017; Shelton et al., 2018; Slaghuis et al., 2011). Authors have focused on strategic sustainability planning by using differing frameworks examining sustainability determinants, processes, outcomes, fidelity, adaptation, routinization, institutionalization, facilitators, and limitations individually and in combination but not what balance of these factors was suitable for the sustainability of EBIs (Shelton et al., 2018; Shelton & Lee, 2019). Limitations in sustainability planning identified by DI scientists include measuring sustainability or knowing what types and how much adaptation was acceptable for sustaining interventions, as it is difficult to maintain an intervention that was a poor fit or no longer fits (Shelton et al., 2018; Wiltsey Stirman, 2012). Sustainability is increasingly conceptualized as dynamic and permissive for adaptation in response to new or changing

contextual influences or multi-level factors such as populations, evidence, leadership, and policies (Shelton et al., 2018; Shelton & Lee, 2019). There is a need to understand more about topic fit and the relationships between fit, fidelity, adaptation, subsequent sustainability, over time-points, and measuring outcome impact (Chambers et al., 2013; Jagosh et al., 2015; Kruk et al., 2018; Moore et al., 2017; Shelton et al., 2018; Shirey et al., 2020). Gaps in understanding the factors influencing sustainability include the interrelationships among these factors, the balance between adaptation and flexible fidelity, and even the intervention topics themselves.

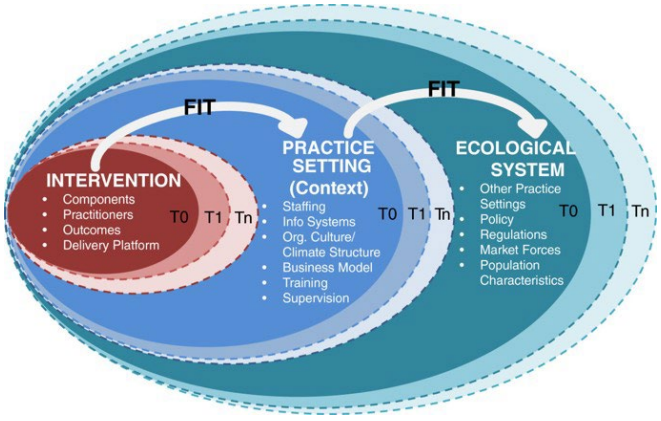
Theoretical Framework

There is a growing scholarly agreement that sustainability is no longer the end-product but rather an ongoing process (Schell et al., 2013). The empirical literature suggests that categories of factors that influence sustainability across settings have dynamic relationships (Chambers et al., 2013; Shelton et al., 2018). The dynamic sustainability framework (DSF; Chambers et al., 2013) provides understanding and guidance for managing these factors and relationships inherent to planning sustainable interventions and change. The central hypothesis of the DSF is that processes of intervention sustainability planning are dynamic rather than static, including contextual intervention adaptation, which affects the overall longevity of interventions. The proposition of permissive adaptation supported this study because the DSF identifies dynamic interventions should have permissible adaptation to fit contextual clinical settings or needs to attain sustained longevity (see Chambers et al., 2013).

The central tenets of the DSF depict a dynamic view of sustainability, allowing for the evolution of an intervention within a continuously changing health delivery system (Chambers et al., 2013). Before the DSF, the health care industry frequently considered sustainability under the assumption that: (a) the intervention had lower benefits moving from efficacy to effectiveness to implementation and sustainability, and (b) deviation from manualized protocols decreased benefit (Chambers et al., 2013). These assumptions limited opportunities to improve care and instead argued for understanding the changing context of health care, continuously refining and improving interventions to sustain over time (Chambers et al., 2013). A significant assumption with the DSF is that intervention fit is a decisive factor connecting an intervention with longevity. Optimizing the topic fit with the context for successful sustainability as an outcome cannot be overlooked in every stage of project management, starting with the planning stage (see Figure 1).

Figure 1

Dynamic Stability Framework



Note. From "The Dynamic Sustainability Framework: Addresses the Paradox of

Sustainment Amid Ongoing Change Where T0, T1, And Tn Represent Different Evaluation Points in Time," by D. A. Chambers, R. E. Glasgow, & K. C. Stange, 2013, *Implementation Science, 8*(1), p. 117. https://doi.org/10.1186/1748-5908-8-117

The intervention adaptations and changing contexts embraced by the authors of the DSF are congruent with nursing theorists who demonstrate the multidimensionality of contexts of environment and health. For instance, Florence Nightingale's beliefs on health recovery and Neuman's adaptive systems model of nursing underscore health as a state of dynamic change. Nightingale's ecological theory emphasizes strong relationships between a person and their environment, health, and nurse, merging well with sustainable global wellness (Dossey et al., 2019). Neuman's system model contains a holistic health perspective with permissive dynamic structures. Neuman viewed resilient reconstitution factors as dynamic and adaptable in various ways (Turner & Kaylor, 2015). Nursing theorists such as Leininger, Levine, and Roy also complement the development of sustainable nursing interventions. Their theoretical conceptualizations used definitions beyond the ecological environment favoring a person's interactive, dynamic holism with their social and global environment. Leininger defined universal cultural nursing concepts supporting different health and illness values, beliefs, and patterns of behaviors. Levine's conservation nursing model excels at teaching human interaction as a central, dynamic concept, and Roy defined nursing as a health care profession that focuses on human life processes and patterns as an inter-related system emphasizing the promotion of health for individuals, families, groups, and society as a balanced whole (Mudd et al., 2020).

Researchers have measured sustainability outcomes quantitatively and, typically, dichotomously. This created difficulties in determining how various program components were sustained, added, or adapted (Chambers et al., 2013). Today, measuring sustainability outcomes remains inadequate, contributing to a growing recognition among health care professionals that the sustainability of EBIs within different contextual settings remains variable and suboptimal (Nadalin Penno et al., 2019). Future researchers should use quantitative and mixed-methods research focused on sustainable health care implementations (Shelton & Lee, 2019).

Related Theories

Additional antecedent theories and concepts that ground this study include the andragogical adult learning theory (Figure 2; ALT; Knowles et al., 2015) and the social learning theory (Figure 3; SLT; Bandura, 1977; Bandura, 1997; Bandura, 2004). Adult learning theories have been significant in designing and implementing academic and professional health care education (Mukhalalati & Taylor, 2019). Understanding life-long learning theories in health care professions is important for several reasons. First, educational philosophies and theories are essential for the professional learners' need to know evidence-based practice (Mukhalalati & Taylor, 2019). Second, understanding different learning theories, contexts, and environments helps educators select the best instructional strategies, learning objectives, assessment, and evaluation approaches. Third, educators who integrate learning theories, subject matter, learning orientation, and professional learner understanding facilitate life-long professional learning in practice.

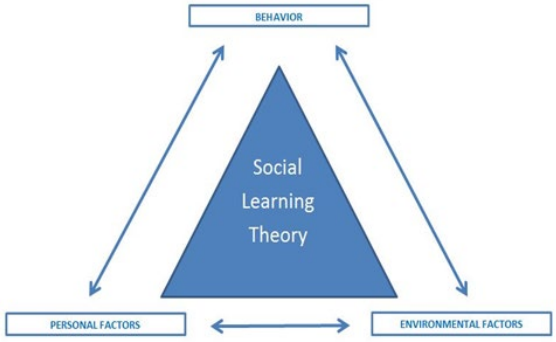
Figure 2

Adult Learning Theory

Note. From *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development* (8th ed.), by M. Knowles, E. Holton, & R. Swanson, 2015. Routledge.

Figure 3

Social Cognitive Theory



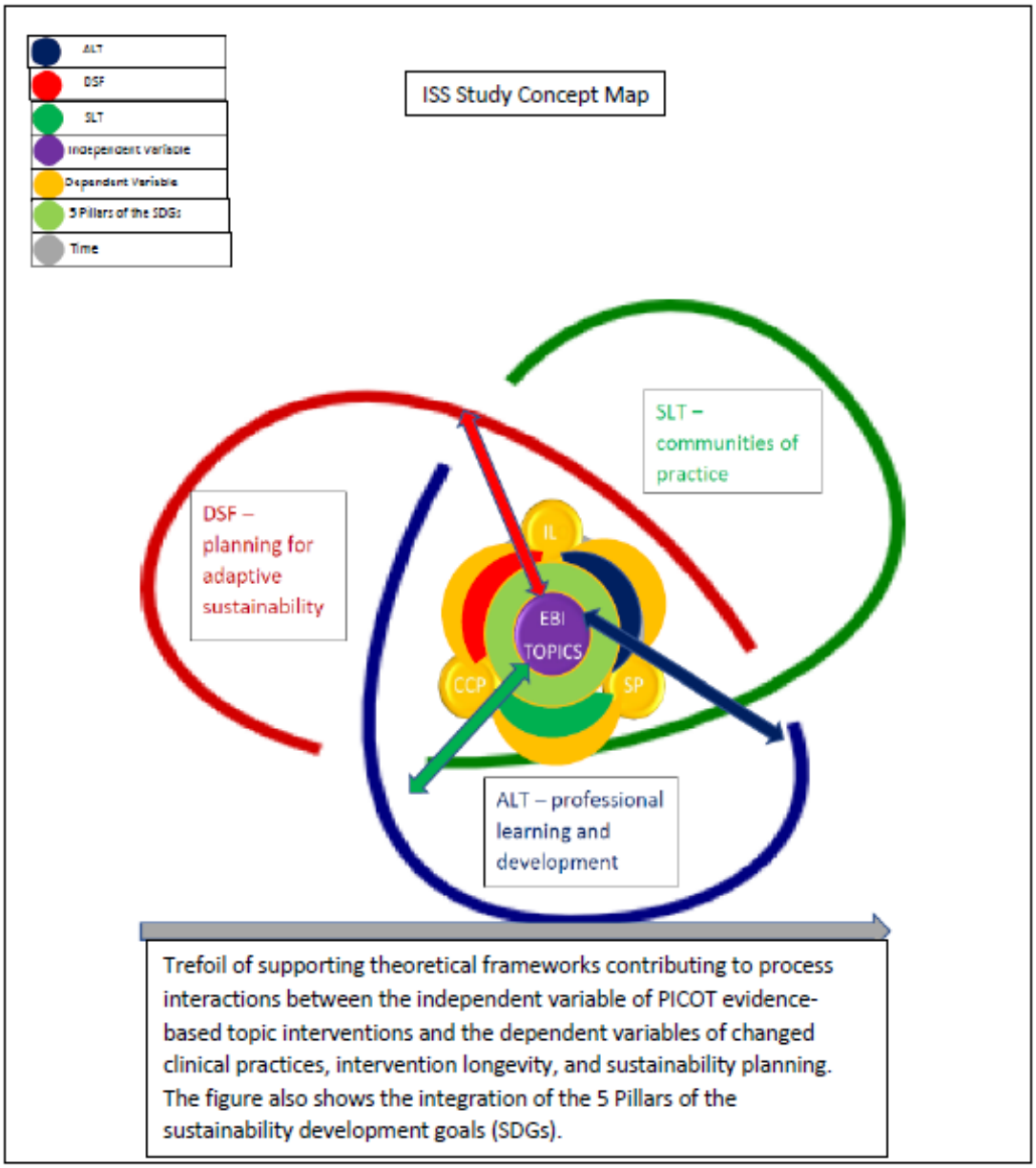
Note. Social Learning Theory, by A. Bandura, 1977. General Learning Press.

The original work by Bandura (1977) on social learning theory emphasized the importance of observing and modeling behaviors, attitudes, and emotional reactions. As Bandura's later work based on social cognitive theory concentrated on self-efficacy, his theoretical foundations for the technique of behavior modeling became widely used in training programs, including nursing academic and practice education (Bandura, 1997). Bandura's social cognitive model contains three factors influencing self-efficacy: behaviors, environment, and personal/cognitive factors (Bandura, 1997). These factors interact with each other, but the cognitive elements are essential in self-efficacy. Self-efficacy develops from mastery experiences in achieving goals through perseverance, overcoming obstacles, and observing others succeed through sustained effort (Bandura, 1997). As Bandura (2004) explained, behavior changes are situational and a product of the interaction between personal characteristics and the environment. Hence, sustained effort or perseverance is a behavior of self-efficacy that becomes important to sustained effort in leading doctoral nurse interventions.

In Figure 4, I show how I conceptualized the ISS variables being informed by and interacting with the ALT, SLT, DSF, and the SDGs.

Figure 4

ISS Concept Map



Conceptual Framework

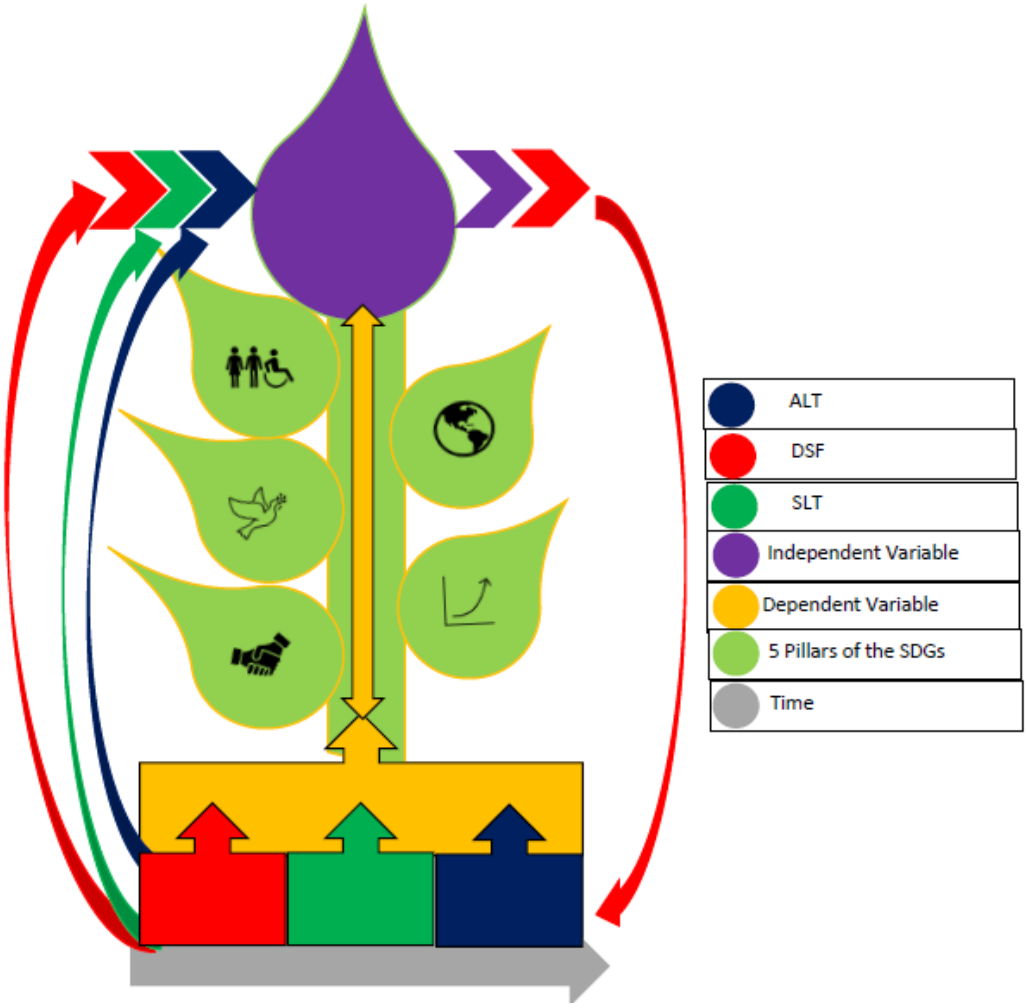
The concept of sustainability can be traced back to Hans Carl von Carlowitz (von Carlowitz, 1713), whose work on reforestation has been expanded and incorporated into numerous social disciplines. However, the current body of health care literature is limited in how sustainability is conceptualized, planned, or measured (Brathwaite et al., 2020). This makes it difficult for nurses desiring to improve sustainability in EBIs. Sustainability has been defined as the continuation of beneficial programs after initial implementation efforts, staff training periods, or funding has ended (Wiltsey Stirman et al., 2012), including five constructs: (a) after a defined time; (b) the program, clinical intervention, and implementation strategies continue to be delivered; (c) individual behavior change (i.e., clinician, patient) is maintained; (d) the program and individual behavior change may evolve or adapt while (e) continuing to produce benefits for individuals/systems (Moore et al., 2017).

The practical, educational, professional, and social landscape of advanced practice nursing is complex, involving adult practitioners who require ongoing education to update ever-evolving evidence-based practice. The DSF involves the following concepts that support sustained intervention topics: continued learning and problem-solving, the ongoing adaptation of interventions with a primary focus on the fit between interventions and multi-level contexts, and expectations for ongoing improvement instead of diminishing outcomes over time (Chambers et al., 2013). The framework has the core principles of personal, practice, and organizational realms affecting intervention implementation and sustainable adaptation.

Drawing on learning theories, clinical educators can better understand individual professional learner differences, potentially impacting lifelong evidence-based practice outcomes. Changes in health care settings involve interprofessional collaborations. Group social interactions, learning, and behaviors are essential in bringing about change involving professional practice. Bandura's ideas are foundational to collective efficacy or confidence that groups can bring about social change, such as changing professional and clinical practices and interventions. In Figure 5, I show how I conceptualized the ISS study variables being informed by and interacting with the ALT, SLT, DSF, and the United Nations SDGs.

Figure 5

The ISS Variable Interactions with Supporting Theories and the Five Pillars



Note. In this longitudinal view, I show that on a time continuum, the DSF, SLT, and ALT inform the ISS study by interacting with the dependent variables of clinically changed practices, intervention longevity, and sustainability planning. The dependent variables interact with the five pillars of the SDGs (people, planet, peace, prosperity, and partnerships) and the independent variable (PICOT evidence-based interventions). As antecedents, the DSF, SLT, and ALT also inform the actual interventions, as noted by the

long arrows on the left side of the graphic. Consequences of an intervention not possessing a good fit with a contextual setting (the purple arrow on the right of the graphic representation) may stipulate refinement by practitioners (the long red arrow on the right side) by further application of the learning theories and the DSF as time goes on. Using the DSF, it is acceptable for all graphic concepts to be viewed as dynamic, thus replicating real-world practice.

Literature Review

In the focused literature review, four areas of study emerged regarding what is known about EBI topics with strategic sustainability planning in health care education and practice: (a) global health care, (b) health sciences higher education, (c) nursing education programs, and (d) post-graduation scholarly practice.

EBI Topics in Global Health Care and Sustainability Planning

Research on implementation science has increased significantly over the past decade as authors aim to bridge the gap between what we learn in health care science and education and what we practice as providers (Franks & Bory, 2015). Overall, the current evidence in the literature shows increasing global interest in health care intervention sustainability, but the path to actualization is still in development. The developing phase remains in the design stage for sustainability planning standardization of health care EBIs. More efforts at sustainability planning appear in the literature on global platforms versus local realms. The existence of more global action substantiated by Lam et al. (2019) prompted his guidance and empirical examples for designing intervention strategies in scarce real-world contexts, especially at the level of locally integrating

initiatives. The interpretation is that the design of local translational EBIs remains scarce, meaning that local care processes have a long way to go to minimize variability and enhance standardization.

Nevertheless, some evidence of progress is emerging globally. For example, as international health care leaders, the National Academy of Medicine, the National Institutes of Health, the World Health Organization, the United Nations, and many multi-level partnerships and organizations strongly support healthy lives and promote well-being worldwide (United Nations, 2015). Accordingly, global health practitioners desire to improve population health with EBIs, but various barriers inhibit successful intervention endurance. Several authors have identified and elaborated on these barriers affecting intervention endurance (Braithwaite et al., 2020; Leviton, 2017; Shelton & Lee, 2019). Examples of these barriers include sustainability planning, theoretical approaches, methods of evaluation, and stakeholder fiscal constraints.

Additionally, improvement initiatives offer a valuable mechanism for delivering and testing innovations in health care challenges inherent to contextual variances such as countries, resources, health care organizational systems, educational systems, policies, leaders, and providers' restrictive initiatives (Lennox et al., 2018). The United Nations Sustainable Development Goals (SDGs) of 2030 directly addressed these contextual challenges using an agenda targeting five pillars in their action plan (United Nations, 2015). I used the pillars as a guideline to integrate a holistic literature synthesis evaluating the current state of EBI topics from the contexts of higher education, nursing education, and post-graduate practice. Later, I used these same pillars to analyze the

dissertation data collected. Once I identified intervention topics, I evaluated the alignment of the fit of the topics with the pillars and assessed changed practices, sustainability planning, and intervention longevity.

The components of the five pillars served as a guide to analyzing intervention topic-fit with contextual variances on sustainability. The pillars include:

- people - ensuring that all human beings can fulfill their potential with dignity, equality, and in a healthy environment;
- peace - fostering peaceful, just, and inclusive societies that are free from fear and violence;
- planet - protecting the world from degradation, including through sustainable consumption and production, sustainably managing its natural resources, and supporting the needs of the present and future generations;
- prosperity – ensuring that all human beings can enjoy prosperous and fulfilling lives and that economic, social, and technological progress occurs in harmony with nature; and
- partnerships - mobilizing a revitalized spirit of strengthened global solidarity, focused on the needs and voices of the poorest and most vulnerable with the participation of all countries, all stakeholders, and all people (Figure 6; United Nations, 2015).

Figure 6

United Nations Five Pillars for the 2030 Sustainable Development Agenda

Note. From "Transforming Our World: 2030 Agenda for Sustainable Development," by United Nations. Department of Public Information.

Although the current body of health care literature remains limited in how sustainability is conceptualized, planned, or measured, the United Nations SDGs of 2030 include pillars of an agenda template that includes global health care goals. Once the ambitions across the United Nations agenda are fully realized, there is an international agreement that the lives of all will be profoundly improved, and the health of the world will be transformed for the better using social change principles (Brathwaite et al., 2020; United Nations, 2015).

Findings from multiple studies validate that conceptualizations of sustainability in global health care and nursing have historically rendered a variety of definitions and synonyms, lacking agreement on the term (Braithwaite et al., 2020; Johnson et al., 2019; Lennox et al., 2018; Moore et al., 2017; Proctor et al., 2015; Scheirer, 2013; Shelton et al., 2018; Shirey et al., 2020; Walugembe et al., 2019). Unfortunately, this only impedes understanding of intervention sustainability. In a recent study, Johnson et al. (2019) sought to advance the understanding of intervention sustainability, exploring how implementation researchers conceptualized and planned for the sustainability of their implemented interventions in population health. The authors found significant gaps in global health care long-term planning and measurements for implementation interventions. The National Health Service reports that up to 70% of organizational change is not sustained (Silver et al., 2016). Using the five pillared agenda (United Nations, 2015) as a template, people and partnerships are frequently mentioned in global health care literature, whereas peace, the planet, and prosperity are mentioned the least. Nine articles in the literature review did not entail the specific pillar words of people, planet, peace, prosperity, or partnerships. Of the remaining articles, none had all pillar words.

Component Gaps in Global Health Care

In this section, I will explore the state of the five pillar sustainability component gaps in global health care.

People. Of pillar components, people received the most mentions in the articles reviewed. The authors mentioning people most frequently included Kruk et al. (2018),

Rosa et al. (2019), Geerligs et al. (2018), and Jagosh et al. (2015). The number of mentions was 179, decreasing to 13, nine, and nine times, respectively. International health organizations helping people are generally divided into three groups: multilateral organizations, bilateral organizations, and non-governmental organizations (NGOs). The prominent multilateral organizations are all part of the United Nations; however, other non-UN organizations are also at the forefront of mitigating numerous global health challenges (Borgan Project, 2017b). Examples of multilateral organizations include the World Health Organization (WHO), the World Bank, and The United Nations Children's Fund (UNICEF). The WHO unites countries by forming common goals to tackle disease and achieve better global health (World Health Organization, 2020a). The World Bank is a leading institution for investments in health and development, playing a critical role in shaping global health policy (World Bank, n.d.). UNICEF is a leader in child health initiatives, prioritizing the world's most vulnerable children (United Nations Children's Fund, 2020).

Bilateral organizations are government agencies or not-for-profit organizations based in a single country and provide funding to developing countries (Borgan Project, 2017a). An example of bilateral agencies includes the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention [CDC], 2019). As part of the United States (U.S.) Department of Health and Human Services (USDHHS), the CDC is responsible for implementing public health administrative initiatives in the U.S., leveraging its resources to advance global health initiatives (Center for Disease Control and Prevention, 2019). The Peace Corps is an independent agency and volunteer service

run by the U.S. government, providing the opportunity for motivated social and economic changemakers to immerse themselves in communities abroad (Peace Corps, n.d.).

According to the Merriam-Webster dictionary (n.d.-a.), an NGO is any non-profit, voluntary citizens' group organized at the local, national, or international level as a civic organization. These organizations are task-oriented and usually organized around particular health, human rights, or environmental issues. An example of an NGO is Doctors Without Borders/Medicines Sans Frontieres. This organization helps people worldwide where the need is greatest, delivering emergency medical aid to people impacted by conflict, epidemics, disasters, or lack of access to care (Doctors Without Borders, n.d.).

Authors agree that leaders of global health organizations planning for sustainability will need to understand the utility of simultaneous adaptation and alignment of fit with EBI topic areas affecting populations to assure program viability over time (Moullin et al., 2019; Shirey et al., 2020). Understanding the adaptation and fit of EBI topics in global health requires looking at the quality of health intervention performance of low-middle income (LMICs) and high-income countries (HIC). The human right to health is meaningless without good quality care in all countries because global health systems cannot improve health without quality care (Kruk et al., 2018). Quality health care provides evidence-based care, but the quality of care continues to be a global health problem. The current state of quality of health care in LMICs is marginalized since less than half of recommended evidence-based care actions are carried out. Poor-quality care has become an increasingly significant barrier to reducing

mortality compared to insufficient access to care. Only one-quarter of the LMICs' population trust that their health care system works well. LMICs are not alone in quality and trust issues; consistently delivering care that improves or maintains health is a quality issue for HIC because only one-half of people living in HIC believe their health care systems work well. Therefore, for global health care to be for the people, much work is still needed to close gaps in care, such as quality, trust, and intervention topics' fit with the population.

Peace. The pillar of peace remains a neglected component of contextual variance impacting EBI topics and sustainability planning. This dilemma is noteworthy because the SDGs of 2030 indicate that global wellness fosters peaceful, just, and inclusive societies free from fear and violence. Still, there is much silence on the topic in the current scholarly community. Kruk et al. (2018) detailed social injustices that affect stability and peace in health care delivery, like stigma conditions, LMICs, and conflict zones.

Similarly, Rosa et al. (2019) noted ethical injustices based on age, gender, sexual orientation, disability, and other factors affecting global health care today. The numbers demonstrate the enormity of the problems of peace. For example, over 44,000 people are forced to flee their homes daily due to persecution or conflict, with an estimated 68.5 million forcibly displaced people worldwide. Over 1000 human rights activists and journalists have been killed since 2015 in 61 nations where they worked to inform the public and build a world free from fear and want. Hindrances such as these social

injustices only keep humanity from progressing to a higher state of a peaceful world. Exploring EBI topics related to social justice and peace is needed for global wellness.

Planet. The component of the planet is another topic that has not shown robust work in the literature. A compelling argument for the conservation of planetary resources was presented by Chambers et al. (2013), stating that researchers have already recognized that implementing interventions often requires substantial resources. However, the interventions are meaningless without successful long-term use. Rosa et al. (2019) addressed the component of the planet. The authors remark that a healthy planet creates a place for healthy people to thrive across all SDGs for 2030. Expanded efforts are needed to explore EBI topics and nurture a flourishing, healthy planet to improve global wellness.

Prosperity. The pillar component of prosperity is under-developed in the current literature. Global health care prosperity means that care is inclusive of and beneficial for everyone. In the recent 2019 article by Rosa et al., the authors projected that leadership competence in diversity management and performance measuring capability enhances prosperity. Additionally, the authors spoke that building a globally diverse health care workforce increases prosperity through connectedness and unity. Health care providers must not undervalue the importance of inclusion to prosperity. The sparseness of recent discussions on prosperity indicates that a greater focus is needed on this component of contextual variance in future sustainable EBI topics.

Partnerships. Partnerships are the second most frequent contextual variance topic appearing in the literature. The authors mentioning partnerships most frequently include

Jagosh et al. (2015), Hooshmand et al. (2019), Shelton et al. (2018), Dols et al. (2017), and Ketron (2019). The number of times the authors mentioned partnerships was 108, 53, 13, seven, and seven times, respectively. Of the articles reviewed, ten did not specifically address the term partnerships, but four conveyed collaborations. Hailemariam et al. (2019) stated that inadequate collaborative efforts hinder sustainability processes and interactions. From a global viewpoint, partnerships strengthen the solidarity of participation of all countries, stakeholders, and people. The component of partnerships as a contextual variance has been a topic of great discussion in current scholarly evidence at the global health care EBI level.

My evaluation of the five pillared agenda confirmed component gaps substantiating that continued efforts are needed in all areas to address contextual variances and deficiencies in EBI topic fit globally. Global health care must amplify efforts on the most overlooked components of peace, planet, and prosperity to accelerate sustainable EBI topics in the future and to progress toward meeting the trajectory of the 2030 SDG agenda.

EBI Topics in Health Sciences Higher Education and Sustainability Planning

The collective works of Lewin, Cochrane, and Everett Rogers are well known for providing a solid foundation for the fields of DI health care sciences and outcomes research (Estabrooks et al., 2018). Florence Nightingale was credited with pioneering evidence-based practice in the 1800s, later evolving into evidence-based medicine within the medical community, which has since advanced as evidence-based practice integrated with interprofessional and multidisciplinary team-based care (Mackey & Bassedowski,

2016; Nandiwada & Kormos, 2018). Various health care professionals beyond medicine and nursing, including physical therapy, audiology, speech-language pathology, dentistry, social work, information science, manufacturers of medical devices and pharmaceuticals, medical economists, sociologists, health-sector researchers, and educators, use the framework of evidence-based practice to translate evidence from research into their practice arenas (Hempenstall, 2014). Consequently, the range of topics spanning these EBIs is broad.

Component Gaps in Health Sciences Higher Education

Next, I will explore the state of the five pillar sustainability component gaps in health sciences higher education.

People. Geerligs et al. (2018) performed a systematic review explicitly focused on barriers and facilitators to implementing patient-focused interventions in hospital settings. The study findings grouped barriers and facilitators into three main domains: system, staff, and intervention, akin to the domains in the dynamic sustainability framework (Chambers et al., 2013). Consistent with the concept of topic fit, the study also emphasized the importance of careful intervention design and pre-implementation planning to increase the likelihood of effective and sustainable implementations.

Inconsistent definitions of sustainability and measures of program sustainability for health care limit the body of literature. Braithwaite et al.'s (2020) systematic integrative review described theoretical frameworks, definitions, and sustainability measures applied in published evaluations of health care improvement programs and interventions. In 92 studies, the authors found that over 75 % were considered high

quality. Of the high-quality studies, less than 30% provided definitions of sustainability. The authors found thirty-two different published definitions of sustainability, with terms often used interchangeably. Less than 20% of the studies included theoretical frameworks or conceptualizations, and even fewer used sustainability-specific frameworks. Specified time intervals for evaluating sustainable interventions are sparsely mentioned in the current literature. A strong sustainability theoretical framework with logical conceptual terminology, coherent definitions, and precise evaluation methods is important for detailing intervention outcomes over time.

According to Nyström et al. (2018), attempts to bridge the gap between research and practice have led to funders requesting targeted interdisciplinary and collaborative health care research. Several authors explained that collaborative approaches are important to studying complex phenomena such as sustainability, offering ideas for future approaches to interprofessional education designed for scholar-practitioners and student researchers regardless of specialization (Nyström et al., 2018; Tun, 2019). Walpole and Mortimer (2017) also asserted that educators and student partnerships integrate sustainability into a core curriculum and build learning over time for both partners. The introduction of sustainability planning into a linear nursing curriculum is advocated by Ketron (2019). Tun (2019) detailed the newly mandated inclusion of sustainability principles into the United Kingdom medical curriculum and practice. Barriers to overcome while teaching sustainability in health care include the following:

- The primary problem is the lack of knowledgeable educators of sustainable health care and faculty development.

- Resistance to this new concept from the established health care profession.
- Lack of space in the curriculum.
- Uncertainty of location in the curriculum – ethics/professionalism/leadership/core principles.
- Need for learning resources that are interesting and frequently updated.
- Difficulty in assessing learning.
- Need to keep a positive outlook, as the topic of sustainability can be overwhelming to both the teachers and the learners (Tun, 2019).

Drivers for implementing sustainability in higher health care education included:

- The demand by students is increasing.
- The direction in higher education is to have sustainability.
- A new legitimacy with student outcomes expectations.
- Leadership from other stakeholders – sustainability is a quality domain and a moderator in other quality domains.
- Many sources of support and pedagogies of learning (Tun, 2019).

Peace. Collaborative implementation does not necessarily guarantee success or sustainability. Nyström and colleagues (2018) reported that cooperative partnership research and project management have intrinsic paradoxes, such as the potential to enhance knowledgeable practice and improve health care while challenging the practitioners' and researchers' views, assumptions, and roles. Educating health care leaders and clinicians to temper territorial, non-inclusive disputes and strategize

engagement of the many hierarchical and discipline layers involved increases the chances of EBI programs' success (Nadalin Penno et al., 2019). Using team psychological safety, alternative approaches to temper disputes have an innovative, positive, reassuring, and emancipating effect advancing collaboration and teamwork in health professions (Eichbaum, 2018).

Planet. According to Caniglia et al. (2018), glocal ideology acknowledges how local and global realities are interconnected and can serve as a transformation model in higher education to address sustainability problems. High-quality health care education programs internationally and digitally offer adult learners' skills acquisition and training opportunities. There are unique exchanges in teaching and learning health care fundamentals where an integrated adult and social learning model would facilitate complex, sustainability-oriented learning for the educator and learner. (Caniglia, et al., 2018; Caniglia, et al., 2021; Knowles, 2015). Interdisciplinary learning is a means to share resources and preserve discipline expertise, guiding and building learning experiences and competencies (Nandiwada & Kormos, 2018). Shared resources merit a call to action for the industry of health care higher education, given the forecasted shortages of educators and experiential circumstances. Conservation of limited human resources is vital because educator resources are becoming scarce. Preserving human resources will help ensure that professionals can care for and teach others to care for the current and future population.

Prosperity. Education is well known as one of the social determinants of an individual's health (Office of Disease Prevention and Health Promotion, n.d.).

Sustainability education is a valuable social determinant of evidence-based health care operational prosperity. Health care educators play a catalytic role in scaffolding, fostering, mentoring, and role-modeling the interconnected process of modern care delivery, formulating the necessary networking skills to help drive and influence change to benefit a healthy society.

Partnerships. To meet the changing health needs, growing public expectations for social value, and goals of better health outcomes, health care educators must partner together innovatively to teach, train, and continuously develop a workforce capable of equitable, resilient, and efficient services (Kruk et al., 2018; Rao, 2018). Promoting the learning culture in health care systems brings potential promise for collaborative experiences and curriculum redesign. The redesign may create opportunities for pairing dual-role researcher and clinician or practitioner and Doctor of Philosophy (PhD) students with dual-role faculty mentors in health sciences sustainability education. For example, a dual-role faculty mentor might be an advanced practice nurse with a DNP, a PhD, or both degrees.

EBI Topics in Nursing Education and Sustainability Planning

While a broad spectrum of professionals impacts the educational experiences of nursing students, the power of nursing education's capacity to impact EBI sustainability has yet to be realized. One explanation for this impact is that measuring outcomes has been a critical indicator for evaluating evidence-based practice but measuring sustainability as an outcome remains a challenge (Shelton et al., 2018). Ketron's (2019) research provided recent evidence that the gap in DNP sustainability planning persists

across program curriculums identifying this as an unfulfilled area of expertise potential for nursing educators. Therefore, it is incumbent upon nursing educators to become conscientious about the 2030 Sustainability Development Plan of the United Nations (2015) and advance sustainability planning in nursing program curriculums. Initial exploration by Upvall and Luzincourt (2019) outlines processes for integrating the SDGs into a nursing curriculum by reviewing current guidelines and curriculum standards and providing exemplars from nursing education. The authors crosswalk professional nursing standards and competencies relevant to the SDGs and the alignment of the Consortium of Universities for Global Health competencies with the SDGs, concluding that nursing educator opportunities are pivotal in developing students as global citizens and impacting global health.

Component Gaps in Nursing Education

Now, I will explore the state of the five pillar sustainability component gaps in nursing education.

People. Conduction of a scholarly DNP summative project is a defining requirement for successfully completing a traditional or online DNP program (VanderKooi et al., 2018). However, roughly a quarter of nurse-led projects do not meet full implementation (Minnick et al., 2019). In the Minnick et al. (2019) study, respondents reported activities that were a part of the DNP project in widely varying proportions, including a majority who indicated that the education of health professionals was a part of the project. Less frequently, respondents indicated that education of the patient and their significant others, education of health professional students, and public

education were part of the project. Other activities respondents reported as part of the DNP project were survey development, execution and analysis, program evaluation, program development, tool development other than a survey or interview guide, interviewing, and information technology development. The generalized information that Minnick et al. (2019) provided about broad categories of project foci consisted of clinical practices, care delivery reorganization, evidence-based practice initiatives, and public and professional organizational policy changes, but not specific EBI topics.

Percentages of doctoral student-led EBIs that sustain across all these categories over time remain undefined, but many graduate-level projects do not sustain once students obtain their degree requirements. Though some graduates mentored student-led projects, the authors concluded that those in practitioner roles reported low rates of or no participation in activities related to DNP projects despite years of post-DNP experience (Minnick et al., 2019). Hence, poor graduate and practitioner participation in DNP projects is a significant barrier to sustainable EBIs.

While challenges and barriers related to final projects are studied to some degree, specific sustainable doctoral-led EBI topics have not been documented or studied. Dols et al. (2017) and Bowie et al. (2019) aimed to identify faculty practices and challenges related to final scholarly DNP projects across the United States. The authors found that 87% of program directors and faculty were very dissatisfied with DNP project titles, types, depth, design, execution, challenges, and outcomes; multi-factorial contributing issues included lack of faculty knowledge of evidence-based practice and quality improvement, lack of consensus on DNP projects, lack of faculty resources for DNP

projects, challenges with clinical sites for DNP projects, and students' academic writing skills, all of which may impact projects' sustainment. Also, the authors emphasized the need for program-practice partnerships. Educators' lack of agreement about final scholarly projects supports program-to-practice partnerships in project implementation models.

Since little information is available on the percentage of sustainable projects, the prudent starting point will further examine what percentage of EBI's sustained over time. Once the percentage of sustainable EBIs is known, advancing sustainability in nursing programs might involve deliberate action, as Shelton and Lee (2019) suggested. The measures provide three key areas for teaching sustainability planning:

- refine definitions of sustainability,
- explore adaptive and dynamic sustainability frameworks congruent with nursing paradigms, and
- incorporate innovative pedagogical methods.

Peace. Including sustainability planning as part of nursing education's revised mission and vision addresses current modern-day issues of peace when educating nurses. For example, long-standing injustices in nursing education based on age, gender, sexual orientation, and disability require administrative, policymaker, and educator solidarity in communicating, representing, and embodying efforts for resolution. Nursing educators are compelled to emphasize the core values of nursing, including integrity, altruism, inclusivity, compassion, courage, humility, advocacy, caring, autonomy, humanity, and social justice (American Association of Colleges of Nursing, 2021). Nursing education

leaders must cultivate the role of improving sustainability in EBIs to exemplify these core values.

Planet. Embedding the conversation of sustainability in nursing project management courses may provide learning opportunities in the discipline of nursing about topics focus and fit and the need to consider the conservation of resources during intervention design and implementation. Educators and enterprises must teach students to be resource-sparing when conducting EBIs (Minnick et al., 2019). Teaching the clinical relevance of conservation brought positive learning to students, as did clinicians thinking about sustainable health care (Tun, 2019). Many pedagogies were suitable for introducing sustainability education for medical students in the United Kingdom, including lectures, talks, or seminars; practical projects ranging from a series of half days to a complete 2-week to 6-week blocks; essays, workshops, and case-based scenarios with facilitated small group discussions; and mini QI projects (Tun, 2019). Teleconference and virtual or video learning opportunities have become more routine due to the health and safety concerns of the current global pandemic. The planetary health crisis has led to greater uptake of online learning. As with face-to-face learning, online learning technology facilitates a virtual social learning environment with an active educator and learner presence (Plante & Asselin, 2014). Virtual technology bridges connectedness and engagement in online education during restricted social interactions related to a world pandemic crisis environment.

Prosperity. Economic prosperity through funding endeavors magnifies intervention longevity. The length of time or longevity of interventions is intricately tied

to funding stability (Luke et al., 2014; Shelton et al., 2018). The grant funding system significantly influences decisions and abilities to plan for sustainability, and it can be challenging to measure sustainability within the timeframe of a grant (Johnson et al., 2019). For example, Moore et al. (2017) specified that criteria for time are needed to define future sustainable interventions rather than vague statements such as sustainability ends when funding ends. Establishing time criteria will potentially expand grant and scholarship development funders' timeframes for studying various factors affecting sustainable EBIs. For instance, social asymmetry and exclusion in educating diverse nurses predispose the population to poor-quality care (World Bank, n.d.). Hence, funders' interest in diversity and inclusion in nursing education may eventually impact the longevity of EBIs.

Partnerships. Educating nurses on professional development includes perfecting collaborative practice and advocacy skills such as outreach, networking, communication, grass-roots activism, and volunteerism. Advocating sustainable change with organizational engagement evaluating internal and external contexts and macro-, meso-, and micro-system influences on EBIs have not been a fully realized educational and practice essential of the DNP. Vanderkooi (2018) reported that an enhanced actualized DNP model is one where academic-practice partnerships and intervention group sites upgrade the provided standardized workflow, identifying sustainable project topics. Furthermore, Murphy et al. (2018) suggested that an educational priority for the DNP student is to learn to work within the broader strategic plan of an organization by linking sustainable projects to organizational priorities or ongoing or planned clinical change

initiatives. According to Williams (2017), the future accreditation status of doctoral nursing programs may necessitate robustly coordinating DNP change initiatives to practicum sites or sustainable organizational priorities. Hooshmand et al. (2019) succinctly described that integrating immersive collaborative practice in the curriculum builds students' leadership skills strengthening long-standing bonds among academia, practice, and the community. For example, Dols et al. (2017) commented that facilitating EBP education and implementation is one method to build academia's skill in applying evidence and improving the quality and consistency of care. Coinciding with the current evidence that quality of care and consistency are the greatest problems in global health care today, nursing educators are pivotal in impacting the quality and consistency of care learners carry out later in practice.

EBI Topics in Post-Graduate Scholarly Nursing Practice and Sustainability Planning

An unexpected finding from the literature review was that very few scholarly efforts have contributed to researching the sustainability of EBIs in clinical nursing practice. Any lack of scholarship widens the gap in understanding what EBI topics have been sustainable, emphasizing the importance of these efforts since EBIs directly translate scientific practice recommendations to local practice arenas. Boehm et al. (2020) reviewed implementation science programs, organizations, and literature to analyze differences in the roles of nurses and nurse scientists in translating evidence into routine practice. Findings identified that nurses are uniquely qualified to recognize what implementation strategies are needed to mitigate barriers and improve nursing care in

multidisciplinary practice settings. The authors successfully iterated the adoption and integration of evidence-based practices to enhance the quality of care, reconfirming that nurses are positioned to facilitate long-term improvements for meaningful changes in practice impacting quality in care delivery (Boehm et al., 2020). The continued expansion of doctorate-prepared advanced practice nurses provides favorable research circumstances warranting the study of intervention topics of nurse-led EBIs for baseline descriptive data and exploration of intervention longevity, changed practices, and sustainability planning.

Component Gaps in Post-Graduate Practice

Finally, I will explore the state of the five pillar sustainability component gaps in post-graduate practice.

People. Tun (2019) opined on the magnitude of educational influence on professional practice, describing teachers who relate didactic to clinical practice most significantly impact students' learning. Life-long learning, continuing education, and the immediate use of knowledge in practice are hallmarks of the adult learning theory (Knowles, 2015). Critical issues such as scalability and sustainability continue to vex scholar-practitioners implementing nurse-led improvement projects (Estabrooks et al., 2018). Buckley et al. (2020) researched changes in DNP curriculum foci. The authors changed the curricular program to no longer permit students to independently implement multiple projects under a chairperson and committee direction. Students carried out projects using quality improvement methods and tools under the mentorship of a project faculty advisor and clinical site representative. The integration of quality improvement

models and simultaneous modeling of building academic-practice relationships was illustrated to learners transitioning to real-life practice through course objectives and assignments.

Transitioning from learner to new graduate practice as a novice advanced practice nurse can be overwhelming, even tumultuous, due to increased autonomy and role expansion (Scholtz et al., 2014). The ramifications of these practice obstacles impact costly employment turnover rates contributing to EBI defeat and a cycle that decreases the likelihood of that planned change being smooth, sustainable, and cost-effective (Bratt & Felzer, 2011; Geerligs et al., 2018; Harrison & Ledbetter, 2014; Rugen et al., 2016). Ketron's research in 2019 was instrumental in identifying the gap in nursing education on sustainability planning, noting an apparent lack of research on DNP project sustainability in practice. Ketron's work began the conversation that though the DNP remains the terminal practice degree in nursing, EBI projects often do not endure after graduation. Berta et al. (2019) concurred that research on post-implementation intervention longevity is rare. In this research, I advanced the conversation by addressing sustainability planning in nursing education and its significance in strengthening the endurance of nurse-led EBIs post-graduation.

Peace. Scholar-practitioners are unique in learning, translating, and supporting the uptake, integration, and maintenance of EBIs (Leeman et al., 2017). Conflict in nursing practice may be present when implementing new EBIs because of changed practices and alterations of routines. On the other hand, according to Eichbaum (2018), conflict aversion occurs in health professional teams. Instead, conflict can be embraced and

integrated, serving team interests, stimulating learning and innovation, and improving performance. For example, resistance to institutionalizing a changed practice can occur when implementing any practice change. Ovretveit et al. (2018) examined the sustainability of EBIs and local contextual uptake, finding that contextual variances are integral in routinizing sustainable EBIs.

Though change is integral in nursing, some academic and workplace conflicts exist. For instance, Ziefle's (2018) evidence pointed to generational differences in perceptions of conflict between less experienced nurses and nursing educators. Moore et al. (2016) found that understanding multi-generations helped decrease incivility in the workplace, improving nurses' team-building. Doctoral graduate nurses must assess, analyze, and understand the long-term impact of sustainability planning on practitioners' perspectives and practice, promoting team emotional resilience and psychological safety during change transitions. Productive professional relationships are an essential component affecting sustainable EBIs, the endurance of changed practice, the longevity of EBI, and sustainability planning.

Planet. Informal and formal efforts to preserve health care resources can have a rippling effect over time. Brower (2017) described pooling limited resources with co-workers using journal clubs and poster presentations or informally sharing ideas and knowledge with colleagues and the interdisciplinary team using relationships. Local policy reformation effects can disperse to other local, organizational, or broader community health care services (Jagosh et al., 2015). Multiple models of EBP used in clinical settings captured valuable feedback about leadership and learning while

translating research into practice. Various clinicians and systems adapt the evidence-based guidelines, implement, demonstrate, and communicate strategies, and fully adopt the changes in practice (Titler, 2008). However, little remains known about which models are the best for nurse-led project management and EBI sustainable change (Hailemariam et al., 2019; Shelton & Lee, 2019).

Huber (2018) studied the scope of nurse-executive leadership practice demonstrated in health systems' DNP capstone projects. The author concluded that the framework for action was helpful in coaching and evaluating these projects and roles through simulation. The coaching aided in the identification of the learning needs of student nurse-leaders. The author recommended a new competency regarding the impact of DNP capstone projects. Project leadership's impact on long-term health care outcomes beyond the initiation of implementation is a determinant in the sustainability of EBIs. The ISS could be helpful as a guide for chartering specified sustainability planning domains to attend to in a local practice setting, writing a plan of action, developing action steps, identifying resources and stakeholders, executing action steps, tracking progress over time, and reassessing sustainability as an ongoing process.

Prosperity. Evidence-based guidelines in the literature and professional practice are used to formulate and analyze health care policies (Shelton & Lee, 2019). As future scholar-practitioners, the doctorate-prepared nurse is positioned to sustainably ensure prosperity principles through advocacy, inclusion, and diversity, considering these principles at all levels of care impacted by health care policies and governing bodies

(Shelton & Lee, 2019). Von Thiele Schwarz et al. (2019) discussed assessing the value of EBIs, summarizing their innovative value equation's three central propositions:

1. the end-product of implementation efforts should emphasize overall value rather than only the intervention effects.
2. implementation strategies can be construed as a method to create a fit between EBIs and context.
3. transparency is vital, not only for the intervention but also for all value equation terms.

Assessing intervention value recognizes the integral components of contextual variances in EBIs topic fit are essential to sustainability planning.

Partnerships. Scholar-practitioners are educated expert champions facilitating EBIs (Shelton et al., 2018). Minnick et al. (2019) sought to describe the impetus for foci, outcomes, and activities of DNP projects and determine the extent to which projects are a part of advanced practice nurses' post-graduation experiences. Although the authors did not describe specific project topics, the findings indicated that 65.2% of respondents reported that their educational project was their idea and sought an organization to conduct it. Twenty-five percent of respondents stated they did not complete all aspects of the reorganization, initiative, or policy change by graduation. Nearly 58% of participants categorized projects into five generalized project foci, with the majority reporting an EBP initiative or an EBP project involving reorganization in the practice setting. There was a wide variation in the number and combinations of activities reported to be part of advanced practice projects. There was also a wide variation in project foci and activities,

with reports of post-graduation experience by position title. Little remains known about the nature of the DNP project experience and its relationship with the subsequent experiences of graduates. Many partnership opportunities are expected to emerge as coordinating funding, collaboratives, coalitions, associations, and inter-agency initiatives for EBIs continue to transform nursing practice and are likely to demonstrate under-developed or under-utilized in current advanced practice settings such as nurse anesthesiology. The contribution of this information will be useful in assessing the status of and growth potential for partnerships during sustainable nurse-led EBIs.

Summary

In conclusion, the current literature confirms gaps in sustainability planning of EBIs at global health care, higher health care education, nursing education, and post-doctoral graduate practitioner levels. The literature supports the advancement of DNP nurses to envision, frame, design, implement, bridge, strengthen, leverage, adapt, and accelerate the sustainability of EBIs to meet the trajectory of the 2030 SDG agenda (United Nations, 2015). Doctorate-prepared nurses lack sustainability planning in all five pillars of the agenda, especially on the components of peace, the planet, and prosperity. The evidence in the literature has established that trends in sustainable nurse-led EBI topics are not known (Johnson et al., 2019; Leviton, 2017; Shelton et al., 2018; Slaghuis et al., 2011), and gaps in sustainability planning in nursing program curriculums and subsequent practice exist (Ketron, 2019). Filling these identified knowledge gaps highlights the importance of the dissertation research because of investments of time, faculty, student, and clinician effort, expense, and potential long-term effects on the

organizations in which nurse-led EBIs are conducted. Logically, the study results may indicate impairment in the quality of doctorate nurses' preparation for the reality of their future practice. The gaps in the literature indicate unexplored opportunities for unifying people, peace, planet, prosperity, and partnerships by doctorate-prepared nurses leading sustainable EBIs to impact populations' health positively. In the next chapter, I will detail the study methodology.

Chapter 3: Research Method

This non-experimental quantitative study was conducted to describe doctorate-prepared nurse-led intervention topics and examine the differences between the longevity of interventions, changed clinical practices, and sustainability planning. In this chapter, I will discuss the research design and rationale, methodology, and threats to validity. Additional discussion points include the sampling procedures, operationalization of the variables, details of the instruments used in the data collection, the constructs, the data analysis plan, and ethical procedures.

Research Design and Rationale

As there was no treatment, the research design I selected was non-experimental. I used a cross-sectional approach and a time-limited, all-at-once questionnaire to obtain descriptive data about the target population's sustainable intervention topics, endurance timeframes, changed clinical practices, and sustainability planning. Descriptive studies describe the variables relevant to the nursing discipline to generate new nursing knowledge or refine this knowledge (Sousa et al., 2007). The independent variable in this study was sustainable topic categories, and the dependent variables were endurance timeframes in years, changed clinical practices, and sustainability planning. The cross-sectional design helped me answer the research questions about the longevity of interventions, changed work practices, and sustainability planning of doctorate-prepared nurse anesthesiologists by providing a snapshot of interventions categorized by the scope of practice. The cross-sectional design fit my purpose of understanding new information on doctorate-prepared graduate nurses leading change and improving population health

by implementing sustainable EBI projects in daily practice. Nurse leaders may use the new knowledge to allocate or manage resources necessary to improve sustainability planning in nurse-led EBIs. The new knowledge from the descriptive statistics may help nurse anesthesiologist educators and practitioners understand the education-to-practice gap. Future researchers can use the knowledge regarding the difficulties I encountered in recruiting participants to attenuate such issues in further studies. In the following section, I will explain the methodology of the ISS in more detail.

Methodology

In this section, I will explain the details of the ISS methodology of an all-at-once questionnaire delivered through an electronic survey, the population of interest, the sampling and sampling procedures, recruitment, participation, and the data collection plan. Then I will describe the survey's instrumentation tools, the operationalization of constructs, and my data analysis plan.

Population

The target population for this study was all doctorate-prepared nurse anesthesiology graduates currently practicing in the United States who were members of the NNAPO. At the time of the survey, approximately 2% were practice doctorate-prepared, according to the NNAPO. The NNAPO research committee provided email confirmation of 1,365 self-identifying practice doctorate-prepared members leading me to recruit the desired sample size of 161 members for a statistically significant data analysis. More details about the sample size follow in the sampling and sampling procedures.

Sampling and Sampling Procedures

I used a convenience, nonprobability sample of doctorate-prepared graduates from the NNAPO and one SNAPO in the United States, three state nursing license organizations, my LinkedIn page, and the Walden University participant pool. Inclusion criteria were that participants with DNP or DNAP degrees were currently certified and working in the United States. Participants must have implemented EBIs post-graduation from a DNP or DNAP program of study. Exclusion criteria were participants who possess research doctorates rather than practice doctorates, including the nurse doctorate, the doctorate of nursing science, and PhD degrees. Any participant with a DNP or DNAP who had not implemented an EBI after graduation was excluded.

Before conducting the survey, I modified the desired sample size based on subsequent 1,365 doctorate-prepared members identified by the NNAPO research committee. IRB was aware of the potential modification to the sample size and approved this. Power analysis sampling for the 1,365 practice-doctorate members was 161 using G*Power Software 3.1 and a one-tailed t-test (because there was only one sample and no comparison sample population), a medium Cohen d effect size (d = 0.3), and an average desired a priori power of 0.8 (see Faul et al., 2007). Though the feedback from the survey reflects members of the population I targeted, the more appropriate the sample size, the more accurate the results (see Trochim, 2020). With an average survey response rate of 10–15% for external surveys (Shih & Fan, 2009), the expected response rate was 136–204 participants if I only surveyed the practice doctoral membership, potentially not meeting an adequate power sample size requirement. However, I estimated that roughly

19% (10,830 members) of the current NNAPO members might be doctorate-prepared graduates (see Minnick, 2019). Demographic data from Census Bureau (2019) showed that 3,361 (8%) of 43,300 CRNAs in the 2019 census identified as having a doctorate, though the type of doctorate was not differentiated. Once I recalculated the sample size needed based on the 8% incidence of doctorates in the NNAPO population and the 2% incidence of practice doctorates in the sample study group, alpha 0.05, Beta 0.05, and power 0.8, a power sample size of 161 would have been adequate to yield the desired statistical power. G*Power analysis confirmed an estimated sample size of 161 when using a priori F tests, ANOVA fixed effects, omnibus, one-way analysis when α is 0.05, with a small effect size (f) of 0.3, and desired power (1-β error probability) of 0.8. According to Das, Mitral, and Mandal (2016), researchers conventionally set statistical power at 0.80 or 80%, so the desired power of 0.8 to determine the estimated sample size was appropriate for this study.

Application procedures for permission to use the NNAPO services for email delivery of the invitation for participation in the electronic survey required prior IRB approval from Walden University. The SNAPO board of directors authorized the permission to survey the membership before their mail-out service commenced. Participants were recruited from this single SNAPO using a survey-specific hyperlink and survey-specific QR code generated by the online survey service and emailed by the SNAPO to the membership. Additional participant recruitment involved using a survey-specific QR code generated by the online survey service, which I posted on my LinkedIn page, along with an IRB-approved invitation. I continued to have difficulty recruiting

sufficient participants and returned another application to Walden University IRB to expand the survey invitation to other SNAPOs. After I received IRB approval, I sent IRB-approved letters of inquiry to all known SNAPOs requesting an IRB-approved web posting or email invitation to participate in the ISS.

After discussing the recruitment difficulties with my dissertation committee, the committee members urged me to reapply to IRB for permission to use the Walden University participant pool, several state board of nursing APRN contact lists, and state board of nursing CRNA contact lists. The IRB granted permission to proceed with this recruitment. At all times, I recruited all potential participants using IRB-approved invitations and a survey-specific hyperlink and QR code generated by the online survey service. Per their respective policies on email invitations for research participation, the NNAPO sent the invitation twice, whereas the SNAPO sent it once. Emails from me to potential participants on lists from three state boards of nursing were sent in salvo at repeated weekly intervals over the remaining life of the project. The LinkedIn website postings were weekly for 5 months.

I sought IRB approval to alter the order of the initial inclusion criteria questions to avoid excluding a participant from completing the entire survey in the last 12 weeks of the study. However, changing the order of the questions did not ultimately alter the number of completed surveys. After 1 year, the Walden University IRB approval ended, and the dissertation committee felt that my participant recruitment efforts were exhaustive.

Procedures for Recruitment, Participation, and Data Collection

The targeted recruitment was to survey the self-reported 1,365 doctorate-prepared nurse anesthesiologists in the NNAPO, seeking a minimum of 161 respondents. I secured IRB approval from Walden University before commencing recruitment, conducting the study, or collecting data. The primary data sources were doctoral-level members of the NNAPO, recruited through an email invitation sent by the NNAPO coordinating committee on my behalf as a PhD student in nursing education. Embedded within the invitation was a link to the IRB-approved research participant invitation and consent on page one of the survey. The NNAPO agreed to send a reminder email 2 weeks after the initial survey invitation. A secondary source for participants was the SNAPO membership and the recruitment procedure utilized a survey-specific hyperlink and QR code generated from the online survey service and posted once on the SNAPO website and emailed once by the SNAPO to the membership. At this juncture, I had 30 respondents representing an overall response rate of 2% through professional organizations. The procedure for data collection of the third source for participants utilized a survey-specific QR code generated from the online survey service repeatedly posted on my LinkedIn website with a request for volunteer participants for ISS. It was not until later in the survey that respondents answered the LinkedIn invitation. Only two participants completed the entire survey, so it was at this point that the dissertation committee requested that I return to IRB for permission to expand the recruitment process. Other IRB-approved recruitment sources included state board of nursing APRN and CRNA lists. Although IRB approved the Walden University participant pool and

recruitment commenced, no participants responded from this source. I could not recruit via individual SNAPOs, except for my state, due to a failed response to my invitation.

I repeated this recruitment step for the entire year of data collection approved from the outset of the research project implementation. I recruited a total of 113 participants (sample size 113, confidence interval 8.83, 93% confidence level) with these additional sources (continued LinkedIn social media postings, emailing APRNs and CRNAs from lists obtained from state boards of nursing). According to Das, Mitral, and Mandal (2016), 80% power is enough to support the validity of the findings. Therefore, while I chose but did not achieve a 95% confidence level in the survey sample, a 93% confidence level indicates validity in the findings and would mean that if all 113 respondents had completed the survey, then a repeat of the survey would match the results from the actual NNAPO population 93 percent of the time.

The participant invitation and consent notified that participation was voluntary, no questions revealed personally identifiable data, results remained anonymous, and completing the survey served as consent. Additionally, participants were not part of a disadvantaged population. There are two distinct features of vulnerability in human subject research requiring extra protection from risks: certain groups or populations and those who cannot provide their full consent (Gordon, 2020). Examples of vulnerable populations include pregnant persons, fetuses, prisoners, or minors. Participants could also withdraw from the study without any adverse event by not completing the survey even if initiated. The psychological and physical risks encountered in the study were minimal, such as perceived inconvenience or the time necessary for completing the

survey, and not more than those encountered in daily life. I used valid tools without the intent to be erroneous, misleading, or harmful. The benefits of participating in the ISS included validating scope of practice project descriptions of interventions by doctorate-prepared nurse anesthesiologists impacting societal health outcomes over time.

Data collected were saved onto a password-protected computer, software, and web-based application to improve security and confidentiality. I used no internet protocol (IP) addresses or participant email addresses from the SPSS 28.0 data analysis file except for a confirmation that participants in the survey service submitted no duplicate surveys. I am the only person who has the password for accessing the data. A debriefing page came immediately after the last question on the survey. Participants received my gratitude for participation, and information about the purpose of the study was re-iterated. My contact information, as well as the IRB and NNAPO research committee contact information, were provided. Participants were reminded to print a copy of the debriefing form for their records. Participants were given another option to withdraw their data once fully informed about the intent and purpose of the study. If they agreed to have their data used for the study, they clicked the “I Agree” button to submit their data online. If they did not agree to have their data used in the study, they clicked the “I Do Not Agree” button, and their data was not submitted or collected online.

Data collection commenced with the intervention topic information gathered from participant survey responses of ongoing, sustainably implemented topic descriptions. The participants were asked to type their project title as a population, intervention, comparison, outcome, and timeframe (PICOT) question. A PICOT question is an

acronym meant to aid in formulating an answerable, researchable, clinical question guiding a scholar-practitioner's search for evidence (Riva et al.., 2012; Silverman, 2017). Based on the PICOT question, the participants selected the NNAPO scope of practice category best fitting the intervention in their PICOT question. Next, the participants chose the time representing the intervention's longevity from an ordinal question. Afterward, the participants continued with the survey instrument. I used the categorical, nominal, and ordinal data collected from the survey to quantify implementation topic categories, intervention longevity, changes in clinical practices, and sustainability in practice. This manuscript contains the details of the specific recruitment procedures and the rationale.

Instrumentation and Operationalization of Constructs

I included two separate tools in the survey—the PSAT version 2 (Washington University, 2013) and the CSAT (Washington University, 2019). The CSAT assessed clinical practice-change sustainability, and the PSAT v2 assessed overall program sustainability and sustainability planning. All participants received both tools. Open permission to use these tools is available, but I obtained email permission from the authors to use both tools in the ISS (Appendix B).

The PSAT v2

The original PSAT was developed by Luke et al. (2014). The tool has 40 Likert scale questions that take 10–15 minutes to complete. Reliability testing on the original PSAT had a Cronbach's alpha measuring 0.88 (Calhoun et al., 2014; Luke et al., 2014; Stoll et al., 2015). A measurement development study by Luke et al. assessed the

reliability of the PSAT. Program managers and staff (n = 592) representing 252 public health programs used the PSAT to rate the sustainability of their programs. The authors assessed four types of chronic disease programs across these state and community levels: tobacco control, diabetes, obesity prevention, and oral health. The updated version of the PSAT tool is called the PSAT v2 and contains 40 items, across eight sustainability domains, with five items per domain. Confirmatory factor analysis shows a good fit of the data with the eight sustainability domains. The subscales have excellent internal consistency; the average Cronbach's alpha is 0.88, ranging from 0.79 to 0.92.

Preliminary validation analyses suggest that PSAT scores relate to important program and organizational sustainability characteristics. In the updated version (PSAT v2), the authors renamed the political support domain (internal and external environments that support a program) to environmental support (having a supportive internal and external climate for a program; Washington University, 2013). The inclusion of environmental support makes the PSAT v2 a good fit with the five pillars of the SDG. The authors also changed four of the five domain items removing references to politics and policy and focusing on champions and leadership. These changes broadened the relevance of the assessment to programs across different settings. The authors piloted the environmental support domain with 478 participants, 56 departments, and two large intervention programs. Reliability testing showed that the environmental support domain had a good Cronbach's alpha (0.867; Washington University, 2019). The PSAT v2 (Washington University, 2013) was used in the ISS to assess and discover the factors influencing intervention topic categories' capacity for program sustainability.

PSAT v2 Operationalization. The PSAT v2 is operationalized using sustainability capacity, defined as maintaining an intervention project programming and its benefits over time (Washington University, 2013). Therefore, the PSAT v2 measures organizational and contextual domains that can help advance the capacity for maintaining a program. The eight key domains include environmental support, funding stability, partnerships, organizational capacity, program evaluation, program adaptation, communication, and strategic planning. The scoring method described by Calhoun et al. (2014) relates that scores range from 1, indicating little or no extent that the site meets the criteria, to 7, indicating a very great extent. Each of the eight subdomains scores as a mean score (1–7), and the PSAT total score is the average of the total score of each subdomain. In the ISS, the PSAT was the instrument used to assess the overall program sustainability of EBIs. Specifically, I evaluated sustainability planning using the scores from the strategic planning domain from the PSAT.

Environmental support is defined as having a supportive internal and external climate for the program (Washington University, 2013). Funding stability is defined as establishing a consistent financial base for the program. Partnerships are defined as cultivating connections between the program and its stakeholders. Organizational capacity is the internal support and resources needed to manage a program effectively. Program evaluation is assessing a program to inform planning and document results. Program adaptation is defined as taking actions that adapt a program to ensure its ongoing effectiveness. Communication is strategic communication with stakeholders and the public about a program. Strategic planning uses processes that guide a program's

directions, goals, and strategies. Below are a few definitions of terms that are frequently used throughout the tool:

- Program refers to the set of formally organized activities a program manager wants to sustain over time. Such activities could occur at the local, state, national, or international levels and in various settings.
- Organization encompasses all the parent organizations or agencies in which the program is housed. Depending on the program, the organization may refer to a national, state, or local department, a nonprofit organization, or a hospital, for example.
- Community refers to the stakeholders who may benefit from or who may guide the program. For instance, they could include local residents, organizational leaders, or decision-makers. A community does not refer to a specific town or neighborhood (Washington University, 2013).

The CSAT

The authors of the PSAT v2 instrument adapted a second tool named the clinical sustainability assessment tool (CSAT; Washington University, 2019). The CSAT was designed to address differences in and measurements of sustainability factors specific to clinical care. The authors used a concept mapping process to define the conceptual structure of clinical sustainability, incorporating the input of 42 experts in implementation research and clinical medicine. The CSAT has 35 Likert scale questions that take 10-15 minutes to complete. The assessment can be used in various clinical practice settings (e.g., hospital systems, clinics, pharmacies, community health centers,

long-term care facilities, and home health care) and is suitable for individuals and groups. The authors piloted the CSAT with over 120 individuals assessing a clinical practice change and ran extensive psychometric analyses on the pilot data to improve the assessment tool.

The authors tested the CSAT's reliability and determined that the tool helps assess practices in various clinical settings to better understand and plan for sustainability. Additionally, the authors recently validated the CSAT, with Cronbach's alpha reportedly ranging from 0.84 to 0.93 (Malone et al., 2021). The authors recruited 126 practicing clinicians to pilot and evaluate the tool. Individuals were from clinical settings across pediatric (53%) and adult (47%) medical and surgical subspecialties and averaged 11 years in their position. The data were analyzed using confirmatory factor analysis (CFA) to test hypothesized subscale structures in the instrument. The root mean square error of approximation and the standardized root mean square residual was used to assess fit and, thus, the ability of CSAT to measure the identified domains. Results of the concept mapping resulted in seven domains and 47 items. The pilot and CFA resulted in 35 items, five per domain. The root means square error of approximation of 0.084 and the standardized root mean square residual of 0.075 indicated a good fit. The final domains in the CSAT are as follows: engaged staff and leadership, engaged stakeholders, organizational readiness, workflow integration, implementation and training, monitoring and evaluation, and outcomes and effectiveness. The authors concluded that the CSAT is a new reliable assessment tool that allows for a greater practical and scientific understanding of contextual factors that enable sustainable clinical practices over time

(Malone et al., 2021). A review of clinical practices in the United Kingdom's National Health Service (NHS) noted that 33% of quality improvement projects do not sustain for one year after initial implementation in clinical settings. With the increasingly recognized need for clinicians to assess the sustainability of clinical practices over time, the CSAT is a validated and reliable measurement tool to implement across challenging clinical and health care settings (Silver et al., 2016).

CSAT Operationalization. The CSAT is operationalized by using clinical sustainability, defined as maintaining structured clinical care practices over time and evolving and adapting these practices in response to new information (Washington University, 2019). Therefore, the CSAT measures organizational and contextual domains to help build clinical practice sustainability and plan its future. There are seven key domains: engaged staff and leadership, engaged stakeholders, monitoring and evaluation, implementation and training, outcomes and effectiveness, workflow integration, and organizational readiness. The scoring method is explained in Malone et al. (2021), such that scores range from 1, indicating little or no extent that the site meets the criteria, to 7, indicating the site meets the criteria to a very great extent. Each of the seven subdomains scores as a mean score (1-7), and the CSAT total score is the average of the total score of each subdomain. The CSAT was the instrument used in the ISS to assess the overall clinical sustainability of EBIs. Specifically, I assessed changed clinical practices using the scores from the workflow and integration, the implementation and training, and the monitoring and evaluation domains from the CSAT.

Engaged staff and leadership are viewed as having supportive frontline staff and management within the organization (Washington University, 2019). Engaged stakeholders are viewed as having external support and engagement for the clinical practice. Monitoring and evaluation assess practice to inform planning and document results. Implementation and training are learning processes that guide the practice's direction, goals, and strategies. Measuring practice outcomes and impact bring an understanding of positive social change and effectiveness. Workflow integration harmonizes designing the practice to fit existing processes, policies, and technologies. Organizational readiness is viewed as having the internal support and resources needed to manage the practice effectively. Below are a few definitions of terms that may seem like those definitions of terms in the PSAT v2. The difference is that they are practice-oriented instead of program-oriented and are frequently used throughout the CSAT tool:

- Practice refers to the set of formally organized activities desired to sustain over time. Such activities could occur in a variety of clinical settings.
- Organization encompasses all the parent organizations or agencies housed in the practice. Depending on the practice, the organization may refer to a health center or hospital.
- Community refers to the stakeholders who may benefit from or who may guide the practice. Stakeholders could include clinical staff, leadership, care recipients, and families. A community does not refer to a specific town or neighborhood (Washington University, 2019).

The ISS survey used the CSAT and the PSAT v2 tools, providing 15 domains to assess and understand clinical practices, program sustainability, and strategic sustainability planning of EBIs. Once the survey was complete, I transferred the responses to a rating sheet to calculate the overall average raw scores. The researcher and two dissertation faculty members triangulated all raw scores and calculations to ensure they were transferred and calculated correctly. I recorded the score for each item (1-7) or wrote "NA" if the participant selected they were unable to answer. Each domain had a score, and the overall score was an average of the total domain scores divided by the number of domains. The domains with lower average raw scores represented the areas doctorate-prepared nurses could improve clinical practice and program capacity for sustainability planning. I reported overall average raw scores in the ISS.

Variable Operationalization

The independent variables in the research question were the intervention topic categories. The following five topic categories are set forth by the NNAPO in the professional scope of practice:

- preoperative and pre-procedure
- intraoperative and intra-procedure
- postoperative and post-procedure
- pain management
- other services (American Association of Nurse Anesthetists, 2020).

I added a sixth and seventh category for those interventions having the primary aim of administrative, policymaking, advocacy, or information technology rather than a secondary accomplishment:

- administrator, policymaking, advocacy
- information technology.

The dependent variables in the research question were intervention longevity, clinical practice change, and sustainability planning. Longevity was operationalized by time measured in years. Clinical practice change refers to sustainable routinization, adaptations, modifications, or adjustments in professional clinical practice based on evidence-based guidelines or recommendations. Sustainability planning was intentional, strategic planning for ongoing, long-term evidence-based interventions designed to improve patient outcomes.

Data Analysis Plan

I used data cleaning and screening to prepare data for analysis and confirmed no duplicated or improperly formatted data. Missing data detected in the frequencies table included a respondent who selected not applicable and a respondent who did not select a response to every question, showing zeros in the frequency tables. The descriptive statistics were re-analyzed to ensure accurate results. In the screening, I identified but did not exclude outliers so that the results would closely articulate the data. However, the data is not generalizable because the few participants did not reflect enough data to represent the target population (Kovach & Ke, 2016). Following cleaning and screening, I analyzed the data with IBM© SPSS software (Version 28.0) using descriptive statistics,

including central tendency measures. I calculated the raw mean score in SPSS, but I used the results per the ordinal rank scale; therefore, I reported the final overall means as whole numbers for the sustainability score. As the Likert scale surveys are ordinal, I planned a non-parametric statistical analysis if there was enough data.

The three research questions in the ISS were:

RQ1: Based on doctorate nurse-led sustainable intervention topics, what is the difference in the longevity of the interventions?

$H_0$1:There is no difference in the longevity of interventions across intervention topics.

H_a1: There is a difference in the longevity of interventions across intervention topics.

RQ2: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention changed clinical practices?

$H_0$2: There is no difference in changed clinical practices across intervention topics.

H_a2: There is a difference in changed clinical practices across intervention topics.

RQ3: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention sustainability planning?

$H_0$3: There is no difference in sustainability planning across intervention topics.

H_a3: There is a difference in sustainability planning across intervention topics.

The data analysis plan for the research questions was the Kruskal Wallis test, which researchers use when analyzing one independent variable (scope-of-practice) with

two or more levels (in the case of the ISS, there were seven scope-of-practice levels), and an ordinal dependent variable; and ANOVA. The quantitative approach for analyzing my survey data included descriptive statistics for central tendency, distribution, and dispersion using mode and median distributions, while measures of variability included frequency and range (see Trochim, 2020). The survey questionnaire contained two main quantitative closed-ended question types – categorical and ordinal. The ISS categorical survey questions classified dichotomous ('yes or no') participant inclusion criteria in multiple-choice question or checkbox format using predefined information. The survey tools (PSAT and CSAT) with ordinal Likert scales also contain predefined values to choose from on a fixed scale.

Given sufficient survey data, I would have used the scope of practice (grouping categories of intervention topics) in inferential statistical analyses by evaluating ANOVA and correlational patterns of changed clinical practices and sustainability planning. According to Laerd (n.d.-b.), ANOVA is used to determine whether there are any statistically significant differences between the means of three or more independent groups. I wanted to analyze variances using one-way ANOVA tests but did not test due to the limited data. I performed the descriptive statistical analysis and consulted with the Walden University statisticians, who assisted me with questions.

Each doctoral-prepared nurse anesthesiologist identified the EBI topic group in the research study according to the best fit to one of seven scope-of-practice categories so that I could compare data responses. In the ISS, participants identified 14 interventions, but not everyone chose a corresponding scope of practice category. Only three

participants selected the scope of practice categories and identified the longevity of interventions.

Common rank-based non-parametric tests include Kruskal-Wallis (Laerd Statistics, n.d.-c.). Due to the data collection challenges, I could not use these to test the distribution of longevity, changed clinical practices and sustainability planning variances between the scope of practice intervention topics. Likert scores are ordinal and the central tendency is typically reported using modes and means. However, I reported the raw scores in this study because I wanted to correlate the results with the PSAT and CSAT Likert scale scoring. I did not transform ordinal rank; instead, I reported the overall average mean ranks raw score of all PSAT or CSAT surveys. I could not determine statistical differences in clinical intervention changes and sustainability planning across intervention topic categories (scope of practice categories), nor could I perform a Kruskal-Wallis test (see Laerd Statistics, n.d.-a.) to examine the key output, including the *p*-value. To determine the differences between the mean ranks, I would have compared the *p*-value to the (α) level of 0.05 to assess the null hypothesis ("Kruskal-Wallis H test using SPSS Statistics"; Laerd Statistics, n.d.-a.).

The null hypothesis was that no difference existed between the scope of practice topics and longevity, changed clinical practices, and sustainability planning in the means of the population data set. I did not examine correlations between DNAP versus DNP as covariates because I was not investigating differences between the two groups of practice doctorate-prepared nurse anesthesiologists (the researcher used the practice-doctorate categories to exclude research doctorate-prepared participants). The differences between

the scope of practice topic groups' means of changed clinical practice and sustainability planning existence would involve a comparison of the p-value to the significance level denoted in a one-way ANOVA ("One-way ANOVA in SPSS Statistics," Laerd Statistics, n.d.-b.). I wanted to run ANOVA on each topic group. An α of 0.05 would have indicated a 5% risk of concluding that a difference existed when there was no actual difference (Laerd Statistics, n.d.-c). If the *p*-value were less than or equal to α, I would reject the null hypothesis and conclude that not all population means were equal. If the *p*-value were greater than α, I would have had enough evidence that the population means are equal.

According to Luke et al. (2014), the analyses looking at the relationship between the overall sustainability scores and a small set of organizational and individual-level covariates showed that the sustainability scores obtained from the PSAT are significantly related to two important organizational predictors: type of program ($F_{4,587} = 3.33$, $P = .01$), and level of program ($F_{1,590} = 70.6$, $P < .01$). This data provides some discriminant validation evidence that the PSAT instrument is working as intended. This validation is important to my study because the subscale scores vary by level and type of program, suggesting that the PSAT can distinguish among different levels of sustainability that may be driven by program characteristics such as community or state level or focus of the program.

Threats to Validity

Validity is the extent to which a measurement tool measures what it is supposed to measure (Creswell & Creswell, 2018). I considered internal and external validity, as

described by Creswell and Creswell (2018), for possible sources of confounding variables, bias, or imprecision in design, measurement, and analysis affecting study outcomes. Firstly, I chose instruments that measure the construct validity of sustainability. Creswell and Creswell (2018) affirmed that construct validity refers to the extent to which research measures what it intends to measure. In my research, I incorporated the comprehensive definition of sustainability operationalized by Moore et al. (2017) and chose instruments that measure the sustainability of improvement interventions. The tools I selected were used in previous quantitative, qualitative, and mixed-methods research (Calhoun et al., 2014; Luke et al., 2014; Malone et al., 2021; Stoll et al., 2015).

It was conceivable that a respondent had participated in numerous intervention projects for which the ISS did not account. The ISS limited each survey to name the intervention based on the PICOT question, which controlled the misinterpretation of EBIs being multiple interventions in one program. I selected these scales because no standardized intervention sustainability tool exists for doctorate-prepared nurses. However, these two tools provide questions regarding the sustainability of quality improvement projects and programs while aligning with the five pillars of the SGDs of the United Nations (United Nations, 2015). I confirmed the usage of the instruments in prior research. Stoll et al. (2015) published a peer-reviewed, mixed-method application of the PSAT to evaluate the sustainability of four pediatric asthma care coordination programs. Preliminary data from the Malone et al. (2021) study on measuring organizational capacity to promote sustainability in health care with the CSAT indicated

excellent reliability and high internal consistency. Preliminary validation data suggest that the CSAT distinguishes sustainability among different clinical settings. In other words, the two tools answer what I intended to measure in the ISS.

There was a possible threat of interaction of selection treatment of the ISS because the sample consisted of nonrandom volunteer nurse anesthesiologists who are advanced practice nurses. Some EBIs may impact other groups of professionals but may or may not be generalized to different advanced practice settings and all nursing or interprofessional care settings. The study may have a threat of interaction of setting treatment because the participant nurse anesthesiologists practice in various clinical settings. Due to variations in practice settings, some sampling biases could occur when implementations are specific to a specialized setting. For example, implementing a fire safety protocol related to anesthesia impacts all nursing and interprofessional practitioners in the operating room and, therefore, could have inference transferability.

Variations in practice also occur related to participants' roles which may have impacted time availability as a barrier to implementing improvement projects; some participants are sole anesthesia providers, while others are team members. Sole providers may be singularly providing anesthesia and do not have the time to implement improvement projects but benefit from the dissemination of those who have fewer time constraints in practice. I acknowledge that barriers to implementation sustainability related to gender identity and cultural variability have merit for additional research. The threat of history and treatment may impact the generalization of results to past or future situations. I acknowledge that this survey will reveal the current practices of doctorate-

prepared nurse anesthetists. The number of nurses who will be doctorate-prepared will likely increase dramatically due to minimal education practice requirements of subspecialties and strategies of government initiatives contributing to the quality and accessibility of health care (American Association of Colleges of Nursing, 2022; Kreutzberg et al., 2019). Replication of the study is needed for comparison to improve generalizability to future doctorate-prepared nurse populations inside and outside the United States.

Internal validity is concerned with the rigor of the study design. The questionnaire does not provide an alternate, standard, or comparison group to examine in the study, which may weaken the meaningfulness of the reported data. I collected data as a single survey over 52 weeks; therefore, I strove for consistency in my measurement technique by setting up the order of the questions in the survey service. The instruments selected included the PSAT v2 and the CSAT. Prior researchers used these tools to assess intervention sustainability, with the PSAT v2 tool having a reported internal consistency computed with Cronbach's alpha coefficient of 0.86 in the peer-reviewed literature (Luke et al., 2014). The authors of the CSAT have recently reported Cronbach's alpha coefficient between 0.84 to 0.93 across the subscales (Malone et al., 2021). The evidence supports both the validity and reliability of these instruments.

I provided completion time information in the cover letter for the participants to help prevent incomplete surveys. The risk of history existed because of the influence of the current pandemic, which may unduly impact the trends in types of project implementation choices in current practice. I controlled the threat of treatment diffusion

from participant communication with one another, aiming for authentic responses by not allowing the participants to return to their survey to complete it and preventing data changes previously submitted by participants. I wanted to avert accidental participant dropout or attrition by explaining survey access limits. However, multiple individual email invitations for participation and professional organizational website participation links still did not prevent survey mortality from lack of response. The ISS was meant to evaluate post-graduate implementation rather than summative student projects. I explained the meaning of the survey in the invitation, and the survey instructions prevented surveying research doctoral program projects. Some participants did not implement any project since graduation from their doctoral program, limiting the number of surveys returned.

In addition to permission to use the PSAT and CSAT instruments, I requested the expertise of my dissertation committee regarding open-ended question phrasing. They checked my introductory texts, priming questions, and the timing/location of these texts and questions within the surveys. Criterion validity for this study was concurrent, meaning levels of sustainability and changed clinical practices improving patient outcomes were reflected when I executed the PSAT and CSAT tools in the survey and evaluated the results. The Triple Aim of Health Care published by the Institute of Health Care Improvement designates quality as improving the health of populations, enhancing the care experience for individuals, and reducing the per capita cost of health care (see IHI; Stiefel & Nolan, 2012). Scoville et al. (2016) emphasized managerial and health care systems recommendations for sustaining improvements. In my study, reported levels of

under or over-representation of sustainability related to the openness of practice sites to evidence-based initiatives and changes in practice could have been impacted by organizational opportunities for individual involvement in implementations for improvement.

Secondly, I considered external validity, defined by Creswell and Creswell (2018), as the degree that a study's findings can be generalized to which persons, in what places, in what settings, and at what time. Threats to external validity include the inferences of the researcher based on participants' self-reported data. Each doctorate-prepared project leader may have emphasized positive self-reporting responses in the ISS due to knowledge of being surveyed on project sustainability, creating a Hawthorne effect. The exclusion criteria were non-doctorate nurses. Inclusion criteria were post-graduate doctorate nurse anesthesiologists who are members of the NNAPO. I thought this inclusion criterion would provide a thorough, wide-angle population description rather than a snapshot description of a single state organization; however, I acknowledge there are nurse anesthesiologists who are members of the NNAPO and not doctorate prepared or who are in doctoral programs implementing projects which may also benefit patients. Additionally, I acknowledge that about 10% of nurse anesthesiologists elect not to be active members of the NNAPO, but are possibly doctorate-prepared, causing uncaptured, beneficial EBIs in this study.

In the ISS, I explored generalizability and transferability factors (see Creswell & Creswell, 2018) affecting the external validity of the research. These factors included the representativeness of participants due to poor response, survey accuracy, design

effectiveness, and the survey implementation strategy. The primary data sources for the ISS were doctoral-level members of the NNAPO in the United States, whose membership numbers published on the NNAPO website are based on annual membership surveys. However, the actual population of doctorate-prepared anesthetists within the NNAPO was unknown. Although I requested this information from the NNAPO, I calculated an adequate power sample based on subsequent population information. I did not plan this single-time survey to coincide with any seasonal holiday or cyclical NNAPO survey though ultimately, the survey did coincide with holidays since the conduction extended over a whole year. The survey delivery method was via electronic email to doctorate members and recruitment postings to a professional social media website and Walden University participant pool. I conducted a deductive evaluation of descriptive quantitative data using the online survey service and the Statistical Package for Social Sciences® (SPSS) version 28.0. The ISS did not meet statistical conclusion validity because I encountered inadequate sampling despite ensuring adequate sampling procedures, appropriate statistical surveys, and reliable measurement procedures. Recruitment was sparse, and this study's results are not generalizable to the broader doctorate-prepared nurse population.

Ethical Procedures

IRB approval was granted from Walden University for the national and state professional organization and Linked In website application recruitment. After receiving IRB approval, I secured site approval from the national and one state professional organization’s research committees. I was granted additional permission from Walden

IRB to use the Walden University participant pool and state boards of nursing APRN and CRNA email lists. A participant invitation and consent notified recipients that participation was voluntary, that results would remain anonymous, and completion of the survey served as consent. Once initiated, participants could withdraw from the study without any adverse event by not completing the survey. The survey took less than 30 minutes to complete. No intentional coercion or solicitation of individuals to participate in the study occurred. No compensation was provided as an incentive to complete the survey to avoid exerting undue influence on survey participation. There was no need to offset the time and possible inconvenience of voluntarily participating in the ISS because participants were aware of the estimated 20 minutes necessary to complete the survey prior to beginning it. Once participants completed the survey, they exited to the debriefing page, where I thanked them for their participation and reiterated the purpose of the ISS. Also, participants had the opportunity to review the measures to assure the anonymity and security of the data, finally electing to submit or withdraw their participative data collected in the survey. If participants elected to continue submitting their data, they exited to a post-survey page where I thanked them for their submission. Finally, there was a dialogue message that the survey had ended for all participants.

Summary

In summary, the ISS methodology was quantitative, and I used an electronic survey questionnaire design composed of program and clinical sustainability assessment tools. The population of interest was doctorate-prepared graduate nurses, with participants recruited from a nonprobability convenience sample from a national

professional organization, a state professional organization, three state boards of nursing, LinkedIn social media, and the Walden University participant pool. I followed ethical recruitment procedures and offered an electronic informed consent statement before voluntary participants entered the electronic survey. Participants could withdraw at any time and did not provide personal identification. The instruments for the survey were the PSAT v2 and CSAT. The operationalization of constructs contained 15 key sustainability domains. Once I collected the data from the survey service, I analyzed the data using SPSS 28.0 software. In the data analysis, I used descriptive statistics, which I will present as baseline information from the survey in the results chapter.

Chapter 4: Results

The purpose of the ISS was to examine the differences between sustainable EBI topics that doctorate-prepared nurses have led and discover baseline information about their longevity of interventions, changed clinical practices, and sustainability planning efforts. The research questions and hypotheses directly addressed this purpose.

RQ1: Based on doctorate nurse-led sustainable intervention topics, what is the difference in the longevity of the interventions?

$H_0$1: There is no difference in the longevity of interventions across intervention topics.

H_a1: There is a difference in the longevity of interventions across intervention topics.

RQ2: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention changed clinical practices?

$H_0$2: There is no difference in changed clinical practices across intervention topics.

H_a2: There is a difference in changed clinical practices across intervention topics.

RQ3: Based on doctorate nurse-led sustainable intervention topics, what is the difference in intervention sustainability planning?

$H_0$3: There is no difference in sustainability planning across intervention topics.

H_a3: There is a difference in sustainability planning across intervention topics.

In this chapter, I will discuss the ISS data collection, intervention fidelity, results, and a summary of the findings and analysis.

Data Collection

Data were initially collected over 15 weeks, from November 29, 2021, through March 5, 2022, with recruitment through a professional NNAPO email invitation to participate in the ISS, which yielded 12 respondents. Due to recruitment difficulties, data collection changes approved by Walden IRB were necessary to improve the number of respondents. Data collection ended August 15, 2022. Of the final 113 respondents, the study demographics by educational degree type were 43 DNP, 24 DNAP, and 46 neither of these degrees. I did not gather the types of degree information in the "none of these degrees" category. The study focused on only doctorate-prepared practice degrees. At the close of the study, 77 respondents met the inclusion criteria to begin the survey. From these 77 respondents, 14 identified intervention topics, but two were unusable because they were anesthesia university programs instead of evidence-based interventions. One topic was an exact duplicate, but it was unknown if the respondent was the same or a different respondent because there were no duplicate IP addresses in the study. However, the recruitment processes did not yield a representative sample of the population of interest. The final chapter will discuss the average sustainability capacity from the PSAT and CSAT study results and proportionally how representative the sample is of the larger population of interest.

In the ISS, the respondents were to complete the PSAT and CSAT surveys to evaluate changed clinical practices and sustainability planning. Of 12 respondents meeting all inclusion criteria and voluntarily moving on to take the survey, six completed the PSAT Survey, and three completed the CSAT Survey (three did not go forward to

complete either survey). No one took the survey twice with the same scoring profile in either instrument. The overall PSAT score was 5 out of 7 (Table 1). The overall CSAT score was 5 out of 7 (Table 2). In the opinion of the tools' authors, the meaning of the scores correlates with a potential opportunity to improve the respective program and clinical sustainability for these respondents (Washington University, 2013, 2019).

Table 1

Final Overall PSAT Sustainability Score

Domain	Domain Score (n=6)
Environment support	5.2
Funding stability	4.6
Partnerships	4.9
Organizational capacity	5.1
Program evaluation	5.4
Program adaptation	6.0
Communications	5.3
Strategic planning	5.3
Mean PSAT sustainability score	5

Note. 1 = program has this to no extent; 7 = program has to the full extent; NA = not able to answer. Results based on responses to the PSAT, 2012, Washington University in St. Louis.

Table 2

Final Overall CSAT Sustainability Score

Domain	Domain Score (n=3)
Engaged staff & leadership	5.7
Engaged stakeholders	5.2
Organization readiness	5.5
Workflow integration	6.1
Implementation & training	6.2
Monitoring & evaluation	4.0
Outcomes & effectiveness	5.8
Mean CSAT sustainability score	5

Note. 1 = program has this to no extent; 7 = program has to the full extent; NA = not able to answer. Results based on responses to the CSAT, 2019, Washington University in St Louis.

According to the authors of the instruments, though no minimum rating guarantees the sustainability of a program or clinical intervention (Washington University, 2013, 2019), lower ratings indicate opportunities for improvement. Relative to the ISS, lower ratings indicate areas doctorate-prepared nurses may want to focus on when developing sustainability plans for EBIs. The results represent 5 in 100 (67 respondents divided by 1,365) practice doctorate-prepared nurse anesthesiologist participants. Although the data resulted from real-world CRNA practice, the study may not demonstrate external validity because a more representative sample of doctorate-prepared nurses may affect the overall sustainability scores. There were not enough valid cases to perform inferential statistics. However, I will discuss the subdomain scores in Chapter 5.

Intervention Fidelity

Initially, I administered the survey as planned. Though the additional recruitment attempts more than doubled the response rate, there still were not enough participants to yield an adequate sample size. I maintained survey fidelity by collecting data uniformly from participants meeting the inclusion criteria. I examined the individual surveys in the electronic survey application and SPSS (Version 28) files to confirm whether the scores differed across participants. I collected only the data intended, and no para-data (keystrokes, answer changes) were collected. No respondent reported adverse events related to the study.

Results

The descriptive statistics that characterize the small original NNAPO and SNAPO sample showed that of 31 respondents, 17 were DNP prepared, and eight were DNAP prepared, with six participants neither DNP nor DNAP prepared. The original organizational overall PSAT and CSAT means were 4.84, 95% CI [2.86, 5.95] $n = 2$ and 5.37, 95% CI [3.22, 6.25] $n = 2$ (see Tables 3 and 4). I aimed to be consistent with scoring by the PSAT, the CSAT, and with the Likert scale, reporting original PSAT and CSAT scores as 4 (corresponding to neutral on the 7-point Likert scale) and 5 (to some extent on the 7-point Likert scale), respectively. Descriptive statistics on the original organizational survey questions show the data before the researcher's efforts to improve the recruitment of qualified participants:

Table 3

Descriptive Statistics Original Organizational PSAT Survey by Question

	N	Range	Min.	Max.	Mean	*SD*
Champions exist who strongly support the program.	2	1.00	5.00	6.00	5.50	0.71
The program has strong champions with the ability to garner resources.	2	2.00	4.00	6.00	5.00	1.41
The program has leadership support from within the larger organization.	2	2.00	4.00	6.00	5.00	1.41
The program has leadership support from outside of the organization.	2	5.00	0.00	5.00	2.50	3.54
The program has strong public support.	2	3.00	0.00	3.00	1.50	2.12
The program exists in a supportive state economic climate.	2	2.00	0.00	2.00	1.00	1.41
The program implements policies to help ensure sustained funding.	2	4.00	0.00	4.00	2.00	2.84
The program is funded through a variety of sources.	2	4.00	0.00	4.00	2.00	2.84
The program has a combination of stable and flexible funding.	2	3.00	0.00	3.00	1.50	2.12
The program has sustained funding.	2	1.00	0.00	1.00	0.50	0.71
Diverse community organizations are invested in the success of the program.	2	4.00	0.00	4.00	2.00	2.83
The program communicates with community leaders.	2	5.00	0.00	5.00	2.50	3.54
Community leaders are involved with the program.	2	5.00	0.00	5.00	2.50	3.54
Community members are passionately committed to the program.	2	4.00	0.00	4.00	2.00	2.83
The community is engaged in the development of program goals.	2	4.00	0.00	4.00	2.00	2.83
The program is well integrated into the operations of the organization.	2	1.00	4.00	5.00	4.50	0.71
Organizational systems are in place to support the various program needs.	2	3.00	2.00	5.00	3.50	2.12
Leadership effectively articulates the vision of the program to external partners.	2	3.00	1.00	4.00	2.50	2.12
Leadership efficiently manages staff and other resources.	2	0.00	4.00	4.00	4.00	0.00
The program has adequate staff to complete the program's goals.	2	5.00	2.00	7.00	4.50	3.54
The program has the capacity for quality program evaluation.	2	3.00	4.00	7.00	5.50	2.12
The program reports short-term and intermediate outcomes.	2	2.00	3.00	5.00	4.00	1.41

(table continues)

	N	Range	Min.	Max.	Mean	SD
Evaluation results inform program planning and implementation.	2	1.00	6.00	7.00	6.50	0.71
Program evaluation results are used to demonstrate successes to funders and other key stakeholders.	2	1.00	6.00	7.00	6.50	0.71
The program provides strong evidence to the public that the program works.	2	0.00	6.00	6.00	6.00	0.00
The program periodically reviews the evidence base.	2	2.00	5.00	7.00	6.00	1.41
The program adapts strategies as needed.	2	1.00	6.00	7.00	6.50	0.71
The program adapts to new science.	2	1.00	6.00	7.00	6.50	0.71
The program proactively adapts to changes in the environment.	2	0.00	7.00	7.00	7.00	0.00
The program makes decisions about which components are ineffective and should not continue.	2	0.00	7.00	7.00	7.00	0.00
The program has communication strategies to secure and maintain public support.	2	5.00	0.00	5.00	2.50	3.54
Program staff communicates the need for the program to the public.	2	4.00	0.00	4.00	2.00	2.83
The program is marketed in a way that generates interest.	2	4.00	0.00	4.00	2.00	2.83
The program increases community awareness of the issue.	2	4.00	0.00	4.00	2.00	2.83
The program demonstrates its value to the public	2	4.00	0.00	4.00	2.00	2.83
The program plans for future resource needs.	2	0.00	5.00	5.00	5.00	0.00
The program has a long-term financial plan.	2	3.00	0.00	3.00	1.50	2.12
The program has a sustainability plan.	2	2.00	3.00	5.00	4.00	1.41
The program's goals are understood by all stakeholders.	2	3.00	4.00	7.00	5.50	2.12
The program clearly outlines roles and responsibilities for all stakeholders.	2	3.00	4.00	7.00	5.50	2.12
Valid N (listwise)	2					

Note. $N = 31$, $n = 2$. Scores of 0.00 indicate not applicable or missing data.

Table 4

Descriptive Statistics Original Organizational CSAT Survey by *Questions*

	N	Range	Min.	Max.	Mean	SD
The practice engages leadership and staff throughout the process.	2	2.00	5.00	7.00	6.00	1.41
Clinical champions of the practice are recognized and respected.	2	1.00	3.00	4.00	3.50	0.71
The practice has engaged, ongoing champions.	2	1.00	5.00	6.00	5.50	0.71
The practice has a leadership team made of multiprofessional partnerships.	2	3.00	4.00	7.00	5.50	2.12
The practice has team-based collaboration and infrastructure.	2	2.00	4.00	6.00	5.00	1.41
The practice engages the patient and family members as stakeholders.	2	3.00	1.00	4.00	2.50	2.12
There is respect for all stakeholders involved in the practice.	2	1.00	4.00	5.00	4.50	0.71
The practice is valued by a diverse set of stakeholders.	2	3.00	4.00	7.00	5.50	2.12
The practice engages other medical teams and community partnerships as appropriate.	2	1.00	5.00	6.00	5.50	0.71
The practice team has the ability to respond to stakeholder feedback about the practice.	2	2.00	4.00	6.00	5.00	1.41
Organizational systems are in place to support the various practice needs.	2	3.00	4.00	7.00	5.50	2.12
The practice fits in well with the culture of the team.	2	0.00	6.00	6.00	6.00	0.00
The practice has feasible and sufficient resources (e.g., time, space, funding) to achieve its goals.	2	6.00	1.00	7.00	4.00	4.24
The practice has adequate staff to achieve its goals.	2	5.00	2.00	7.00	4.50	3.54
The practice is well integrated into the operations of the organization	2	2.00	3.00	5.00	4.00	1.41
The practice is built into the clinical workflow	2	2.00	4.00	6.00	5.00	1.41
The practice is easy for clinicians to use.	2	3.00	4.00	7.00	5.50	2.12
The practice integrates well with established clinical practices.	2	3.00	4.00	7.00	5.50	2.12
The practice aligns well with other clinical systems (e.g., EMR).	2	3.00	4.00	7.00	5.50	2.12
The practice is designed to be used consistently.	2	0.00	7.00	7.00	7.00	0.00
The practice clearly outlines roles and responsibilities for all staff.	2	0.00	7.00	7.00	7.00	0.00
The reason for the practice is clearly communicated to and understood by all staff.	2	0.00	7.00	7.00	7.00	0.00
Staff receive ongoing coaching, feedback, and training.	2	0.00	5.00	5.00	5.00	0.00
Practice implementation is guided by feedback from stakeholders.	2	1.00	5.00	6.00	5.50	0.71
The practice has ongoing education across professions.	2	0.00	5.00	5.00	5.00	0.00
The practice has measurable process components, outcomes, and metrics.	2	2.00	5.00	7.00	6.00	1.41

(table continues)

	N	Range	Min.	Max.	Mean	SD
Evaluation and monitoring of the practice are reviewed on a consistent basis.	2	2.00	4.00	6.00	5.00	1.41
The practice has clear documentation to guide process and outcome evaluation.		2.00	4.00	6.00	5.00	1.41
Practice monitoring, evaluation, and outcomes data are routinely reported to the clinical care team.	2	5.00	2.00	7.00	4.50	3.54
The practice process components, outcomes, and metrics are easily assessed and audited.	2	3.00	4.00	7.00	5.50	2.12
The practice has evidence of beneficial outcomes.	2	2.00	5.00	7.00	6.00	1.41
The practice is associated with improvement in patient outcomes that are clinically meaningful	2	2.00	5.00	7.00	6.00	1.41
The practice is clearly linked to positive health or clinical outcomes	2	1.00	6.00	7.00	6.50	0.71
The practice is cost-effective.	2	0.00	7.00	7.00	7.00	0.00
The practice has clear advantages over alternatives.	2	2.00	5.00	7.00	6.00	1.41
Valid N (listwise)	2					

Note. $N = 31$, $n = 2$. Scores of 0.00 indicate not applicable or missing data.

The remaining discussion of descriptive statistics reflects the final data from all participants. I could not evaluate inferential statistical assumptions in this study due to the small sample size. The survey was ordinal and therefore was assumed to be non-normal. I did not perform nonparametric hypothesis testing because meaningful results would not occur using the small sample responses (see Mishra et al., 2019). Instead, the final survey PSAT overall means (with standard deviation reported in parenthesis) were 5.29 (1.84), 95% CI [3.75, 5.81] n=6, and the CSAT overall means were 5.53 (1.77), 95% CI [3.22, 5.91] n=3. The researcher reported the mean scores as whole numbers to be consistent with the scoring by the PSAT and CSAT and with the 7-point Likert scale such that the final reported PSAT and CSAT scores were 5 and 5, respectively. Scores of 5 correspond with true to some extent according to the Likert scale and indicate participants have room for future improvement in sustainability planning and changed clinical practices associated with the evidence-based interventions implemented. The results also

demonstrate the gap in practice since few respondents have implemented an evidence-based project after graduation from a DNP or DNAP program of study.

Like Minnick's work (2019), the survey responses indicated sparsity in interventions implemented in post-graduation practice. The final data collected in the ISS contained 113 responses, including 24 DNAP and 43 DNP respondents. The remaining 46 respondents self-identified as having neither degree type nor met the inclusion criteria, making them unable to continue the survey. The survey included the additional questions: (a) Have you implemented an intervention project in post-graduate practice?; (b) Is your post-graduation evidence-based intervention ongoing or has it ended?; and (c) Select the time which represents that longevity in years of the intervention. Regarding the first question, 21 said yes, and 24 said no. Due to apparent participant drop-out, only nine respondents answered the second question, with four saying their EBIs were ongoing. Three reported the longevity of their EBIs, with two interventions lasting in the 1-2 years range while one intervention lasted 3-4 years. No intervention reportedly lasted beyond four years.

The descriptive statistics on the data collected, inclusive of all efforts for recruitment, lists the final results for the PSAT and CSAT by individual survey questions (Table 5 and Table 6, respectively):

Table 5

Final PSAT Survey Questions Descriptive Statistics

	N	Range	Min.	Max.	Mean	*SD*
Champions exist who strongly support the program.	6	4.00	3.00	7.00	5.83	1.60
The program has strong champions with the ability to garner resources.	6	4.00	3.00	7.00	5.67	1.75
The program has leadership support from within the larger organization.	6	6.00	1.00	7.00	5.17	2.32
The program has leadership support from outside of the organization.	6	7.00	0.00	7.00	4.17	2.93
The program has strong public support.	6	6.00	0.00	6.00	3.83	2.32
The program exists in a supportive state economic climate.	6	7.00	0.00	7.00	4.50	2.88
The program implements policies to help ensure sustained funding.	6	7.00	0.00	7.00	4.17	2.71
The program is funded through a variety of sources.	6	7.00	0.00	7.00	3.00	3.10
The program has a combination of stable and flexible funding.	6	7.00	0.00	7.00	3.67	2.80
The program has sustained funding.	6	7.00	0.00	7.00	3.33	3.01
Diverse community organizations are invested in the success of the program.	6	7.00	0.00	7.00	4.50	3.02
The program communicates with community leaders.	6	7.00	0.00	7.00	4.17	2.93
Community leaders are involved with the program.	6	7.00	0.00	7.00	4.17	2.93
Community members are passionately committed to the program.	5	7.00	0.00	7.00	3.60	2.70
The community is engaged in the development of program goals.	6	7.00	0.00	7.00	3.83	2.48
The program is well integrated into the operations of the organization.	6	4.00	3.00	7.00	5.17	1.60
Organizational systems are in place to support the various program needs.	6	5.00	2.00	7.00	5.17	1.94
Leadership effectively articulates the vision of the program to external partners.	5	6.00	1.00	7.00	4.40	2.61
Leadership efficiently manages staff and other resources.	6	4.00	3.00	7.00	5.17	1.72
The program has adequate staff to complete the program's goals.	6	5.00	2.00	7.00	5.67	2.16
The program has the capacity for quality program evaluation.	6	3.00	4.00	7.00	5.83	1.17
The program reports short-term and intermediate outcomes.	6	6.00	1.00	7.00	4.67	2.25
Evaluation results inform program planning and implementation.	6	6.00	1.00	7.00	5.33	2.16
Program evaluation results are used to demonstrate successes to funders and other key stakeholders.	6	2.00	5.00	7.00	6.33	0.82
The program provides strong evidence to the public that the program works.	6	5.00	1.00	6.00	5.00	2.00

(table continues)

	N	Range	Min.	Max.	Mean	*SD*
The program periodically reviews the evidence base.	6	3.00	4.00	7.00	6.17	1.33
The program adapts strategies as needed.	6	3.00	4.00	7.00	5.83	0.98
The program adapts to new science.	6	6.00	1.00	7.00	5.67	2.34
The program proactively adapts to changes in the environment.	6	1.00	6.00	7.00	6.67	0.52
The program makes decisions about which components are ineffective and should not continue.	6	3.00	4.00	7.00	5.83	1.47
The program has communication strategies to secure and maintain public support.	6	7.00	0.00	7.00	4.50	2.88
Program staff communicates the need for the program to the public.	6	7.00	0.00	7.00	4.17	2.71
The program is marketed in a way that generates interest.	6	7.00	0.00	7.00	4.33	2.42
The program increases community awareness of the issue.	6	7.00	0.00	7.00	4.50	2.51
The program demonstrates its value to the public	6	7.00	0.00	7.00	4.67	2.58
The program plans for future resource needs.	6	4.00	3.00	7.00	5.67	1.63
The program has a long-term financial plan.	6	7.00	0.00	7.00	4.17	3.25
The program has a sustainability plan.	6	6.00	1.00	7.00	5.00	2.53
The program's goals are understood by all stakeholders.	6	4.00	3.00	7.00	5.50	1.64
The program clearly outlines roles and responsibilities for all stakeholders.	6	4.00	3.00	7.00	5.50	1.64
Valid N (listwise)	5					

Note. $N = 31$, $n = 2$. Scores of 0.00 indicate not applicable or missing data.

Table 6

Final CSAT Survey Questions Descriptive Statistics

	N	Range	Min.	Max.	Mean	*SD*
The practice engages leadership and staff throughout the process.	3	2.00	5.00	7.00	6.33	1.15
Clinical champions of the practice are recognized and respected.	3	4.00	3.00	7.00	4.67	2.08
The practice has engaged, ongoing champions.	3	2.00	5.00	7.00	6.00	1.00
The practice has a leadership team made of multiprofessional partnerships.	3	3.00	4.00	7.00	6.00	1.73
The practice has team-based collaboration and infrastructure.	3	3.00	4.00	7.00	5.67	1.53
The practice engages the patient and family members as stakeholders.	3	3.00	1.00	4.00	3.00	1.73
There is respect for all stakeholders involved in the practice.	3	3.00	4.00	7.00	5.33	1.53
The practice is valued by a diverse set of stakeholders.	3	3.00	4.00	7.00	6.00	1.73
The practice engages other medical teams and community partnerships as appropriate.	3	2.00	5.00	7.00	6.00	1.00
The practice team has the ability to respond to stakeholder feedback about the practice.	3	3.00	4.00	7.00	5.67	1.53
Organizational systems are in place to support the various practice needs.	3	3.00	4.00	7.00	6.00	1.73
The practice fits in well with the culture of the team.	3	1.00	6.00	7.00	6.33	0.58
The practice has feasible and sufficient resources (e.g., time, space, funding) to achieve its goals.	3	6.00	1.00	7.00	5.00	3.46
The practice has adequate staff to achieve its goals.	3	5.00	2.00	7.00	5.33	2.89
The practice is well integrated into the operations of the organization	3	4.00	3.00	7.00	5.00	2.00
The practice is built into the clinical workflow	3	3.00	4.00	7.00	5.67	1.53
The practice is easy for clinicians to use.	3	3.00	4.00	7.00	6.00	1.73
The practice integrates well with established clinical practices.	3	3.00	4.00	7.00	6.00	1.73
The practice aligns well with other clinical systems (e.g., EMR).	3	3.00	4.00	7.00	6.00	1.73
The practice is designed to be used consistently.	3	0.00	7.00	7.00	7.00	0.00
The practice clearly outlines roles and responsibilities for all staff.	3	0.00	7.00	7.00	7.00	0.00
The reason for the practice is clearly communicated to and understood by all staff.	3	0.00	7.00	7.00	7.00	0.00
Staff receive ongoing coaching, feedback, and training.	3	2.00	5.00	7.00	5.67	1.15

(table continues)

	N	Range	Min.	Max.	Mean	*SD*
Practice implementation is guided by feedback from stakeholders.	3	2.00	5.00	7.00	6.00	1.00
The practice has ongoing education across professions.	3	2.00	5.00	7.00	5.67	1.15
The practice has measurable process components, outcomes, and metrics.	3	5.00	2.00	7.00	4.67	2.52
Evaluation and monitoring of the practice are reviewed on a consistent basis.	3	3.00	3.00	6.00	4.33	1.53
The practice has clear documentation to guide process and outcome evaluation.	3	5.00	1.00	6.00	3.67	2.52
Practice monitoring, evaluation, and outcomes data are routinely reported to the clinical care team.	3	6.00	1.00	7.00	3.33	3.21
The practice process components, outcomes, and metrics are easily assessed and audited.	3	6.00	1.00	7.00	4.00	3.00
The practice has evidence of beneficial outcomes.	3	5.00	2.00	7.00	4.67	2.52
The practice is associated with improvement in patient outcomes that are clinically meaningful	3	3.00	4.00	7.00	5.33	1.53
The practice is clearly linked to positive health or clinical outcomes	3	2.00	5.00	7.00	6.00	1.00
The practice is cost-effective.	3	0.00	7.00	7.00	7.00	0.00
The practice has clear advantages over alternatives.	3	2.00	5.00	7.00	6.33	1.15
Valid N (listwise)	3					

Note. $N = 31$, $n = 2$. Scores of 0.00 indicate not applicable or missing data.

Topics

There were 14 PICOT questions reported in the incomplete and completed surveys, resulting in 12 useable topics (two identified a university anesthesia program of study and were excluded because they did not pertain to the study). Regarding research question 1, three participants reported their scope of practice topic categories - postoperative, other services, and information technology- however, due to the limited data, I could not correlate a presence or absence of a difference in longevity because only three respondents fully completed the survey.

After I was granted permission to proceed with this part of the analysis and identified the topic tags, the dissertation committee triangulated the information. There was agreement among the three members of the dissertation committee and me regarding the topic tags (Table 7). A few topics fell into two scopes of practice categories:

Table 7

Scope of Practice Categories and Topic Tags

Topic tag	Scope of topic
Ultrasound guided regional	Pain management
Obesity prevention	Other/Wellness
Mom's sobriety	Other/Wellness
PACU anesthesia handoff	Post-procedure
Medication Standardization noncardiac surgery	Policy pre-procedure
Postoperative sedation	Post-procedure
Noise in the operating room	Intra-procedure
Surgical site infection prevention intraoperative	Intra-procedure
Maternal substance abuse	Other/Wellness IT
PACU Anesthesia Handoff	Post-procedure
Medication Standardization Ketamine w/spinal	Policy intra-procedure
PACU Anesthesia Handoff	Post-procedure

Note. $n = 12$

Next, I quantified the categories according to the SOP categories. The most frequent intervention topics were post-procedure handoffs, intra-procedure noise level, surgical site infection prevention, and wellness, with the occurrence of handoff interventions tied with wellness interventions. The list of exact PICOT questions is preserved in the researcher's data file to maintain respondents' anonymity.

Concerning research question 2, the data collection was inadequate to correlate a difference in changed clinical practices by the scope of practice topic. In research question 3, the insufficient data did not provide a meaningful difference in sustainability planning by the scope of practice topic category. Instead, I compared the PSAT and CSAT capacity scores, changed clinical practices score (CCP), longevity, and sustainability planning (SP) scores by topic tags across the three respondents who completed both surveys (see Table 8).

Table 8

Comparison of Topic Tags, PSAT and CSAT Scores, Longevity, and Sustainability Planning

Topic Tag	PSAT	CSAT	CCP[a]	Longevity	SP[b]
Handoff	5	6	6	1–2 years	6
Wellness	6	5	5	3–4 years	7
Information technology	4	4	4	1–2 years	3

[a] Changed clinical practices (CPP) consisted of workflow and integration, implementation and training, and monitoring and evaluation domains from the CSAT.
[b] Sustainability Planning (SP) consisted of the Strategic Planning from the PSAT.

I examined the topic tags individually, manually entering the corresponding respondent raw data from the ISS SPSS (version 28) file to the online PSAT and CSAT. I generated a sustainability report on the three EBI topic tags from Table 3. Although the topic tagged handoff indicated the domain of outcomes and effectiveness were

implemented to the full extent (scoring 7 across all subdomain questions), the subdomain question for engaging the patient and family members as stakeholders indicated a deficit in changed clinical practice (scoring a 1).

The topic tagged wellness had an area of changed clinical practices weakness in monitoring and evaluation (scoring 1). In contrast, workflow and integration, along with implementation and training, were areas of strength (scoring 7 in each). Program evaluation was problematic for the wellness topic in the PSAT as well. Additionally, for the topic tagged wellness, participants reportedly implemented sustainability planning to the full extent (scoring 7).

The topic tagged information technology indicated the most significant overall area for improvement was in organizational readiness regarding feasibility and sufficient resources (time, space, funding) to achieve its goals (scoring 1). Still, the monitoring and evaluation domain was problematic for changed clinical practices, primarily related to practice monitoring, evaluation, and outcomes data routinely reported to the clinical care team (scoring 2). The information technology-specific domain question that the program had a sustainability plan (scoring 3) also indicated that having a sustainability plan was an area that needed improvement. Examining the scores according to topic across the PSAT, CSAT, CCP, longevity, and SP gives a snapshot description of findings in the ISS, despite not being able to answer the dissertation questions fully or infer the results to the entire population of interest.

Regarding the five pillars of the SDGs, results from the program and clinical sustainability assessment tools indicate that the participants rated the pillar of partnership

sustainability means (with standard deviations in parentheses) were 5.15 (2.03), 95% CI [3.74-6.56] merged n=8, which consisted of the CSAT organizational readiness means 5.53 (2.07; organizational teams, cooperation, culture, shared goals) and the PSAT partnership means 4.92 (2.02). Respondents rated sustainability for the pillar of people means 5.22 (1.80), 95% CI [4.16-6.28] merged n=11, which constituted the engaged staff and leadership means 5.73 (1.44), engaged stakeholders means 5.2 (1.74); and partnership means 4.92 (2.02). The domains for the pillar of planet sustainability were 5.34 (1.91), 95% CI [4.64-6.05] merged n=28, taken from the PSAT environmental support mean 5.29 (1.84) and resources such as funding means 4.67 (2.24), and organizational capacitance means 5.14 (1.90), program adaptation means 6.03 (1.40), and strategic planning means 5.34 (1.95), and the CSAT organizational readiness domain means 5.53 (2.07; human, technological, and infrastructure resources). The domains for the pillar of peace sustainability means were 5.64 (1.61), 95% CI [4.85-6.43] merged n=16, which included the sectors of communication means 5.32 (1.52), and strategic planning means 5.34 (1.95) from the PSAT, conjoined with the two domains of workflow and integration plus implementation and training means were 6.13 (1.36) and 6.27 (0.96) respectively from the CSAT. The pillar of prosperity sustainability means were 5.18 (1.94), 95% CI [4.08-6.28] merged n=11, from the PSAT program evaluation; and from the CSAT monitoring and evaluation section means 4.00 (2.27), together with outcomes and effectiveness means 5.87 (1.51). The lowest average domain means were 4.00 (2.27) in monitoring and evaluation and 4.67 (2.24) in funding resource stability, or 4, which is neutral on the 7-point Likert scale. Comparatively, the domains mean 6.03 (1.40) of

program adaptation were highest on the PSAT, whereas the means for workflow and integration, along with implementation and training means, 6.13 (1.36), and 6.27 (0.96), respectively, were highest on the CSAT, scoring 6 or, to a great extent, on the Likert scale. Across individual pillars and the overall SDGs' five pillars collectively, the sustainability score was 5 on the Likert scale, or to some extent. I calculated the average sustainability scores for the five pillars of the SDGs by merging individual responses from relevant PSAT and CSAT domains (see Table 9).

Table 9

Average ISS Five Pillars Sustainability-Merged Domains PSAT and CSAT

Pillar	PSAT Domains Used[a]	PSAT Domain Average Score	CSAT Domains Used[b]	CSAT Domain Average Score	Pillar Likert scale score (1-7)[c]
People	Partnerships	4.92	Engaged Staff and Leadership	5.73	To some extent (5)
			Engaged Stakeholders	5.20	
Planet	Environmental Support	5.29	Organizational Readiness	5.53	To some extent (5)
	Funding Stability	4.67			
	Organizational Capacity	5.14			
	Program Adaptation	6.03			
	Strategic Planning	5.34			
Peace	Communications	5.32	Workflow and Integration	6.13	To some extent (5)
	Strategic Planning	5.34	Implementation and Training	6.27	
Prosperity	Program Evaluation	5.43	Monitoring and Evaluation	4.00	To some extent (5)
			Outcomes and Effectiveness	5.87	
Partnerships	Partnerships	4.92	Organizational Readiness	5.53	To some extent (5)

Note. n = sum of merged domain individual responses

[a]PSAT domains: Environmental Support; Funding Stability; Partnerships; Organizational Capacity; Program Evaluation; Program Adaptation; Strategic Planning

[b]CSAT domains: Engaged Staff & Leadership; Engaged Stakeholders; Organizational Readiness; Workflow & Integration; Implementation & Training; Monitoring & Evaluation; Outcomes & Effectiveness

[c]Seven-point Likert Scale from PSAT and CSAT

The CSAT scores from the respondents indicate the changed clinical practice means were 5.47 (1.90), 95% CI [3.31-7.62] $n = 3$, jointly taken from workflow and integration, implementation and training, and monitoring and evaluation (scores trending 1-7 across the domain questions). The PSAT domain for strategic planning includes the subdomain of sustainability planning, and the means were 5.34 (1.95), 95% CI [3.78-6.91] $n = 6$, for the domain (rating 1-7 across the domain questions). The average scores of 5 on the PSAT and CSAT 7-point Likert scale indicate that changed clinical practices and sustainability planning occurred to some extent for the ISS participants. The domain questions for changed clinical practices and sustainability planning are in Tables 10 and 11.

Table 10

ISS Changed Clinical Practices (Co-mingled CSAT Domain Questions Workflow and Integration; Implementation and Training; Monitoring and Evaluation)

	N	Range	Min.	Max.	Mean	*SD*
The practice is built into the clinical workflow	3	3.00	4.00	7.00	5.67	1.53
The practice is easy for clinicians to use.	3	3.00	4.00	7.00	6.00	1.73
The practice integrates well with established clinical practices.	3	3.00	4.00	7.00	6.00	1.73
The practice aligns well with other clinical systems (e.g., EMR).	3	3.00	4.00	7.00	6.00	1.73
The practice is designed to be used consistently.	3	0.00	7.00	7.00	7.00	0.00
The practice clearly outlines roles and responsibilities for all staff.	3	0.00	7.00	7.00	7.00	0.00
The reason for the practice is clearly communicated to and understood by all staff.	3	0.00	7.00	7.00	7.00	0.00
Staff receive ongoing coaching, feedback, and training.	3	2.00	5.00	7.00	5.67	1.15
Practice implementation is guided by feedback from stakeholders.	3	2.00	5.00	7.00	6.00	1.00
The practice has ongoing education across professions.	3	2.00	5.00	7.00	5.67	1.15
The practice has measurable process components, outcomes, and metrics.	3	5.00	2.00	7.00	4.67	2.57
Evaluation and monitoring of the practice are reviewed on a consistent basis.	3	3.00	3.00	6.00	4.33	1.53

The practice has clear documentation to guide process and outcome evaluation.	3	5.00	1.00	6.00	3.67	2.52
Practice monitoring, evaluation, and outcomes data are routinely reported to the clinical care team.	3	6.00	1.00	7.00	3.33	3.21
The practice process components, outcomes, and metrics are easily assessed and audited.	3	6.00	1.00	7.00	4.00	3.00

Note. $N = 113$, $n = 3$. Scores of 0.00 indicate not applicable or missing data.

Table 11

Average ISS Sustainability Planning (PSAT Domain Questions from Strategic Planning)

	N	Range	Min.	Max.	Mean	*SD*
The program plans for future resource needs.	6	4.00	3.00	7.00	5.67	1.63
The program has a long-term financial plan.	6	7.00	0.00	7.00	4.17	3.25
The program has a sustainability plan.	6	6.00	1.00	7.00	5.00	2.53
The program's goals are understood by all stakeholders.	6	4.00	3.00	7.00	5.50	1.64
The program clearly outlines roles and responsibilities for all stakeholders.	6	4.00	3.00	7.00	5.50	1.64

Note. $N = 113$, $n = 6$. Scores of 0.00 indicate not applicable or missing data.

When examining the lowest and highest quartile information for the PSAT, respondents scored the subdomain questions on the variety of program funding sources and sustained funding the lowest. Alternatively, subdomain questions regarding using the program evaluation results to demonstrate successes to funders and other key stakeholders and adapting the program proactively to environmental changes scored the highest. By contrast, the lowest quartile in the CSAT involved the subdomain question of patient and family engagement as stakeholders, practice monitoring, and evaluation and

outcomes data routinely reported to the clinical care team. However, the highest subdomain question scores tied for cost-effectiveness, staff's understanding of roles and responsibilities at the clinical level, and a communicated reason for the practice change designed for consistent use. Though some differences occurred, the limited number of responses prevented me from statistically discerning a significant dichotomy between program and clinical sustainability relative to the individual five pillars.

Summary

In summary, the ISS raw data scores indicate that participant changes in clinical practices and program sustainability occur to some extent. The participants reported topics fitting in the scope of practice categories of postoperative, information technology, and other (i.e., wellness) categories. The longevity of the reported projects was from 1 to 4 years. The data indicate that participants in the ISS could improve sustainability planning and change clinical practices in future evidence-based doctorate-prepared interventions after graduation. Chapter 5 will provide my discussion, conclusion, and recommendations based on the ISS data collection findings and the statistical analysis.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this cross-sectional, descriptive study was to examine the differences between sustainable EBI topics that doctorate-prepared nurses have led and discover their longevity of interventions, changed clinical practices, and sustainability planning efforts. The sample included 113 participants, 12 of whom met the inclusion criteria and decided to proceed with the survey, with six completing the PSAT and three completing both surveys (the PSAT and the CSAT). Therefore, the statistical analysis to answer the research question was not possible. However, the results supported the gap in practice because few respondents had implemented an evidence-based project after graduation from a DNP or DNAP program of study. Less than half of the interventions implemented post-graduation remain ongoing. Although how long the respondents were in practice remains unknown, the reported longevity of these interventions was predominantly 1–2 years, with no intervention survival past 4 years in this study. The raw data indicated that survey participants' mean agreement on overall sustainability was 5, or true to some extent, for evidence-based projects in the ISS. In my opinion, future doctorate-prepared leaders carrying out intervention sustainability planning could aim for higher overall sustainability in evidence-based implementations, improving patient outcomes, with the goal of sustainability scores reaching 6 or 7 (to a great extent or very great extent).

Interpretation of the Findings

The ISS results extend knowledge about the clinical practice change intervention topics of CRNAs with a doctorate practice degree because it was unknown what

intervention topics these advanced practice nurses were leading after graduation, and comparisons on the longevity or sustainability of interventions that doctorate-prepared nurse anesthesiologists lead were unpublished in peer-reviewed literature. The results indicate that the longevity of participant nurse anesthesiologists' clinical interventions ranged from 1 to 4 years, supporting the literature review that intervention sustainability across health care settings remains highly variable (Nadalin Penno et al., 2019; Shelton & Lee, 2019). The literature review indicated that 40 to 60% of public health programs continued 1 to 6 years after adoption (Cowie et al., 2020; Hodge & Turner, 2016; Scheirer, 2005). Scheirer (2005) noted that 60% of American and Canadian health program sites reported the continuation of at least one component of program implementation, noting the importance of the nature of a program to sustainment (Scheirer, 2013). Hodge and Turner (2016) reported 43% sustainability of program interventions lasting beyond two years in disadvantaged community settings compared to Cowie et al. (2020), who reported 56% sustainability of hospital-based interventions where longevity ranged widely from six months to eight years.

I also evaluated the identified intervention topics from the ISS using a rubric I developed (Appendix C). The rubric descriptions amalgamate the PICOT question format (Riva et al., 2012; Silverman, 2017) with the definition provided on the SDGs five pillars (United Nations, 2015) and my correlations of the subdomains of the PSAT and CSAT (PSAT v2; Washington University, 2013; CSAT; Washington University, 2019):

- Population (People): The doctorate-prepared nurse-led interventions ensured populations of interest by addressing inequalities in healthcare services

(correlates to questions about public, community, and family support, value, and evidential evaluation that the intervention works to improve the lives of people). For example, the people in the ISS EBIs were doctorate-prepared nurses, patients, leaders, champions, staff, colleagues, and families.

- Intervention (Partnerships): The interventions included professional guidelines and inter-professional or inter-disciplinary stakeholder partnerships using local and broader organizational perspectives (correlates to subdomains and questions about partnerships, champions [implementation & training], staff [implementation and adaptation], leadership [process, engagement & integration], stakeholders [process, support, and monitoring], and organization [readiness, monitoring, and evaluation]). For example, the interventions included evidence-based practice, standards, guidelines, and recommendations.
- Comparison (Peace): The interventions advocated just, inclusive, safe, evidence-based health care interventions and policies addressing gaps in health care delivery (correlates with subdomains of workflow and integration, implementation and adaptation, partnerships, and evaluating programs for evidence-based effectiveness). For example, advocating practice change promotes and supports health care and wellness improvements.
- Outcomes (Prosperity): The interventions promoted human health, harmony, well-being, diversity, and inclusion (correlates with questions about the diversity of stakeholders, stakeholder readiness, organizational readiness, staff

readiness, the inclusion of patients and families, and the use of the electronic medical record). One intervention documented information technology integration in a wellness project.

- Timeframe (Planet): Costs and benefits are weighed, minimizing natural resource depletion, preventing waste, and identifying gaps in care using evidence-based guidelines and recommendations to adapt the intervention to practice.

It is difficult to assess how project leaders adapted the interventions for future implementation or practice from the PICOT question. However, intervention adaptation scores were 4–6 on the PSAT (correlates to the language in the questions about program adaptation, cost-effectiveness, and ongoing practices on the CSAT, such as ongoing champions, ongoing education for staff, ongoing coaching, teaching, and training). Ideally, the AACN might amend the PICOT questions of the future to PICOTS, where the "S" would indicate and document the sustainability planning process from the inception of the practice problem.

Strengths of the ISS included adhering to recommendations from sustainability scholars such as (a) using a clear, current, academically accepted definition of sustainability; (b) aligning the study with a scholarly sustainability theoretical framework including concepts and terminology; (c) using valid, reliable sustainability assessment tools to evaluate program interventions and clinical interventions of nurse anesthesiology evidence-based practice, and (d) assessing the longevity of ongoing sustainable interventions. A novel strength was aligning the literature review to the five pillars of the

United Nations SDGs, the dynamic sustainability theoretical framework, and the adult social learning theories. The literature review extended the developing knowledge of the SDGs to the profession of nurse anesthesiology and nursing education and practice.

In the context of the DSF, the findings indicated that there was a high level of agreement among the survey participants (range 0.00–1.0) on program and clinical interventions adapting to changes in the environment (minimum score 6, maximum 7) and being cost-effective (minimum score 7, maximum score 7). Intervention adaptation by nurse anesthesiologists was aligned with the concepts in the DSF and was integral to ongoing sustainability planning. The ISS participant CRNAs demonstrate the SLT concepts as a community of practice. Nurse anesthesiologists agreed (range 0.00–1.0) that they communicate the reason for the intervention (minimum score 7, maximum score 7); adopt clinical interventions that fit well with the culture of their teams; formulate consistently designed practice interventions; and clearly outline the roles and responsibilities of staff; (minimum score 6, maximum score 7). Adult learning theory concepts were evident in the participants who indicated high agreement (range 2.00) that education for the intervention was ongoing across all professions involved in implementing interventions and ongoing coaching, feedback, and training was provided (minimum score 5, maximum 7).

The overall PSAT and CSAT scores indicate higher sustainability scores in program adaptation, program evaluation, workflow integration; implementation and training; and outcomes and effectiveness domains. The domains, including funding, partnerships, and monitoring and evaluation, had the lowest sustainability scores and may

indicate areas of the most probable improvements needed in doctorate-prepared nurse-led EBIs in the ISS. Moderate improvements may be necessary for environmental support, organizational capacity, communication, strategic planning, engaged stakeholders, engaged staff and leaders, and organizational readiness. Participants' scores closely agreed to a great extent on workflow integration, engaged stakeholders, and organizational capacity and agreed to some extent on strategic planning and operational readiness but were neutral in funding stability, partnerships, and monitoring and evaluation domains. Due to the limited number of participants representing 5% of doctorate-prepared CRNAs, I cannot report these findings as a meaningful trend in the population of interest.

Limitations of the Study

As previously mentioned, a significant limitation affecting the generalizability of the ISS was the low response rate during the execution of the study. Though I planned the timing of the ISS not to coincide with holidays or NNAPO or SNAPO surveys, it did fall during peak hospital admissions due to the COVID-19 pandemic, which impacted the practice and allocation of anesthesia personnel. The physical and emotional strains on these practitioners during this time could have limited the overall response rate. The expected survey response rate was roughly 10%, and the professional organization reported a typical survey response rate of 1–3%; the actual survey response rate was 8% (113 respondents divided by 1,365 known CRNA members with a practice doctorate). There were 67 practice doctorate-prepared nurse respondents, correlating with a 5% response rate of the 1365 CRNA members. However, after the inclusion questions, 6% of

the self-identified doctorate-prepared CRNA members who reportedly led evidence-based intervention post-graduation completed the entire survey (three completed survey respondents divided by 45 practice doctorate-prepared survey respondents who implemented EBIs post-graduation). The small sample size and limited number of participants are not representative of the population in the study. The nonprobability sampling was practical and cost-efficient but only represented 0.3% of the doctorate-prepared CRNAs. Raw data were used for descriptive statistics, though not enough data were collected to perform inferential statistics.

Regarding validity and reliability, the data collection method included the PSAT and CSAT survey tools, but few respondents completed both surveys due to inclusion criteria. In general, an online surveyor must be concerned about various data collection aspects such as access control, paging versus scrolling the instructions to the questions, the question layout and phrasing, the answer format, the routing or rules of the survey flow, the interactive features, incentives, and fieldwork time or length of survey collection time (Wolf et al., 2016). The great difficulties in recruitment have caused me to critique my knowledge and application of the online survey design used in the ISS so that future researchers may benefit from these potential limiting factors.

Participants may have viewed the survey as lengthy because two tools comprised the study. Revilla and Ochoa (2017) stated that the ideal length for a web survey is 10 minutes, and the maximum is 20 minutes. Considering the poor response to the ISS 20-minute survey and to better appreciate the value of participants' limited time, I would recommend a shorter online study of this population in the future because lengthy survey

questions increase non-response (Sharma, 2022). In retrospect, and with proper author permission, I could use specific sections of the CSAT and PSAT or the CSAT alone to answer the research questions. Doing this would have dramatically decreased the number of overall questions in the survey. However, Bolt et al. (2014) found that just reducing the number of questions in a longer survey may not improve the response rate, recommending a drastically shortened version of the questionnaire so that some information is obtained rather than no information.

Survey question ordering or layout could have influenced respondents causing lost interest in the survey. Sharma (2022) stated that when there is a loss of interest, such as in the case of a lengthy questionnaire, the bored respondents provide unconsidered and unreliable answers defeating the purpose of the research. Koitsalu et al. (2018) examined the effects of pre-notification, invitation length, questionnaire length, and reminders on participation rate in a randomized controlled trial. They found that prenotification and reminder tactics increased overall participation and information gathered in long questionnaires without risking a lower response rate. Though the ISS used reminders to participate, a survey prenotification with the reminders may have improved the response rate.

The survey response rate could be affected by the years from graduation. Likewise, the poor response rate could affect the reported longevity of EBIs. New graduate practitioner employment situations may have clinical and direct patient care responsibilities that would not permit time for EBI project management or implementation. Participating in EBI projects could be complex and require time

commitments dependent on the work environment and managerial relationships. For example, larger facilities may require approval through DNP project committees and organizational IRB committees, whereas very small facilities may require only the department head or organizational IRB approval. More seasoned graduates may already have time commitments to help enrolled students with their projects. There may be contextual barriers to DNP project leadership post-graduation influenced by graduate training better understood with additional research; Hicks et al. (2014) noted that evidenced-based intervention barriers influenced graduate training and education.

Saleh and Bista's (2017) research findings indicated that participant interests, survey structure, communication methods, privacy, and confidentiality influence online survey response rates. The participants in the ISS were to name the EBI activity or intervention in general terms when they answered the survey questions. Detailing the intervention activities might have deterred some participants from completing the survey if they did not trust that the researcher would keep this information anonymous. More significant efforts could have been necessary to assure the participants that I would not divulge the PICOT questions. Male participants were more likely to respond to surveys if they received reminders, whereas older participants were more likely if promised a reward (Saleh & Bista, 2017). The NNAPO reports that 40 percent of the members are male, and 40-plus-year-old CRNAs represent 63% of the population (American Association of Nurse Anesthetists, 2022). While the ISS provided numerous reminders, a small incentive may have improved the response rate.

One of the inclusion questions at the beginning of the survey asked participants to concentrate on their intervention PICOT questions. The purpose of having them reflect on their PICOT question was to aid them in their topic category identification using the national nurse anesthesiologist scope of practice categories. A secondary reason was to guide them to reflect on one intervention rather than multiple interventions. Some participants could have led multiple EBIs, causing difficulty in deciding which single intervention to use in the survey. Participants with more than one intervention topic might benefit from a routing question to allow them to answer the survey for multiple interventions or improved instruction to only answer on one intervention.

Another problem may have been that participants did not recall their PICOT questions or did not have the time to locate their work. The purpose of remembering the question was to help participants categorize their work into the scope of practice categories, so I could have communicated that the exact PICOT phrasing was unnecessary. Finally, the population of interest in the ISS was nurse anesthesiologists, limiting the data collected. Had I reversed the approach, a greater overall response rate from all practice doctorate-prepared nurses would potentially have been generalizable to the population of interest.

Recommendations

A strength of the ISS was that the study highlights little is known about how many providers, relative to the increasing number of doctorate-prepared CRNAs, self-identify as holding their practice doctorate. I recommend a contemporary study confirming the state of practice doctorates in the CRNA profession. Using the previous

statistics in this study, given that 8% (from the census bureau) of CRNAs (an estimated 4560 of 57,000 NNAPO members) have a doctorate, and 2 % of membership CRNAs have a practice doctorate (1365 of 57,000 NNAPO members), I deduce the other 6 % have non-practice type doctorate degrees. Next, I estimate that a quarter of doctorate-prepared CRNAs may hold a practice doctorate (2% practice doctorate divided by 8% non-practice doctorate), but this remains unknown. To date, the practice doctorate continues to outpace the non-practice type doctorate degrees in the NNAPO population. Confirmation by the NNAPO of the status of CRNAs with practice doctorates would give updated membership degree profiles for future research.

The limited study participation hindered a thorough understanding of the differences in intervention topics led by professional CRNAs. The CRNA profession would benefit from studies discovering EBI topics implemented by peers. The information may enlighten the nursing profession about research study recruitment strategies and gaps in implementation, dissemination, changed clinical practice, sustainability planning, and education to practice. Validating the use of the CSAT in different populations and across the subscales of the instrument might strengthen the instrument's use in the nursing CRNA populations. Further studies that examine the validity and reliability of the CSAT across nurses at various levels of preparation and across various geographic regions would further support the use of the instrument in determining sustainable EBIs.

I appreciate the advantage of the CSAT for future studies because the tool assesses a more descriptive range of the extent to which various clinical intervention

components sustain and adapt rather than a dichotomous determination of yes or no. Therefore, I recommend a similar study as the ISS using only the CSAT. More research is needed to iterate the ISS to gain insight into the progress of sustainable interventions led by CRNAs and other doctorate-prepared nurses. To improve the response rate, I also recommend a smaller number of questions but increasing the number of recruitment surveys. For example, since there are seven domains in the CSAT, future researchers might explain to participants that the survey delivery will take place over seven consecutive weeks – one week for each CSAT domain. Each domain includes five questions. The fewer questions in each survey may have better participation because each survey session has significantly less response burden and would take less time to complete. According to Leeper (2019), survey nonresponse is rising. Factors that might influence response rates include concerns for identity theft, the cost versus benefits, or respondents' frequent surveyal, which causes over-extraction, and subsequently, fewer people are willing to participate.

Few countries other than the United States have nurses who are doctoral-prepared CRNAs (personal communication with the president of an international organization of nurse anesthesiologists); however, the specialty is represented elsewhere and may offer a source of CRNAs for future studies. Adding data from a global nurse anesthesiology sampling may provide generalizability of this study to the profession. Additionally, collecting data from international representatives would reveal similarities and differences across the CRNA population in each country and may also provide a further understanding of the specialty and potentially improve practice.

I recommend expanding sustainable health ideology with doctorate prepare nurses and nursing education programs globally and locally through international tandem projects. The development and extension of global nursing citizens may be furthered through sustainability planning rubrics (Appendix C), concentrating on the five pillars to advance the SDGs in the discipline of nursing. Nurses should include the SDGs' five pillars in professional conversations and competencies. I challenge the profession of nurse anesthesiology to awaken an interest in practice projects, intervention topics, and analyses that fully consider social risk factors related to the SDGs. Nurses who actively listen to and engage with other nurses to share experiences manifest to the world that nurses are crucial to achieving the SDGs.

Implications

The ISS indicates that participant nurse anesthesiologists' four highest sustainability domain scores were implementation and training, workflow and integration, outcomes and effectiveness, and adaptation. The ISS did indicate that nurse anesthesiologists view their EBIs impact patient outcomes and care effectiveness to an extent (scoring 5.8). As valued health care service providers, the profession of nurse anesthesiology must continue to call for additional research identifying and assessing planned strategies optimizing the delivery of sustainable EBIs impacting population health in real-world practice settings, including the five pillars set forth by the United Nations SDGs. According to Malone et al. (2021), the full benefit of EBIs will go unrealized without sustained delivery of interventions over time. The implications for social change include the development of the sophisticated role of nurse educators in

teaching fellow nurses and future nurses sustainable, adaptive EBIs suitable to the changing global healthcare community. To move nurses and the nursing profession into greater engagement with the SDGs and to contribute accordingly, the WHO has indicated that a significant investment in nursing education is needed, highlighting that alignment of nursing curricula with national health priorities as well as emerging global issues will help prepare nurses to progress the SDGs (World Health Organization, 2020b). In a scoping review by Fields et al. (2021), the authors remark that it is not enough for the notion of sustainable development to be an add-on subject and that education is the key to sustainable development principles being scaffolded across nursing curricula to establish awareness, build critical thinking, and promote action. The role of nursing educators may include educator and learner competencies, facilitated learning, learner development and socialization using curriculums, assessment, and evaluation using rubrics. These social change implications create expanded opportunities for nurse educators to influence future doctorate-prepared nurse leaders' daily practice and engage in SDGs scholarship, service, and leadership. Future academic and practice partnerships may significantly contribute to positive social change by maximizing adult learning principles, social learning theory for communities of practice, and the dynamic sustainability framework when preparing doctoral nurse graduates in sustainable intervention planning for their local practice contexts and organizational practice committees. Nearly half of the participants in the ISS reported no post-graduate EBI implementations, revealing an education-to-practice gap in this population where further research could benefit the profession. Almost half of the participants who reported post-graduate intervention implementations said these did not

sustain long-term. Three of the seven CRNA Scope of Practice categories were not selected, leaving a gap in studies addressing intervention topics where future research and practice projects could be centered.

Nurses need professional development on how they, as individuals and the broader discipline, can collaborate in the SDGs and on the importance of researching and collecting empirical evidence to have a seat at the table locally and globally, where stakeholders make decisions regarding the SDGs (Fields et al., 2021). This limited snapshot of the study participants may or may not reflect the current state of sustainability planning in doctorate-prepared nurse-led interventions but could be helpful to educators and leaders who assess the status of curricular needs of future nurse anesthesiology learners leading sustainable change projects. The five pillars of the SDGs are a template doctorate-prepared nurse anesthesiologists leading sustainable EBIs can use to become more familiarized with the SDGs and explore opportunities for unifying people, peace, the planet, prosperity, and partnerships to impact populations' health. The snapshot could also provide information for planning and allocating nursing educator resources to meet these curriculum needs.

Conclusion

The essence of the ISS demonstrated an education-to-practice gap in nurse anesthesiology doctorate-prepared nurses who currently sparsely lead EBI implementation projects post-graduation. The ISS participants were doctorate-prepared nurses who led interventions to improve patient outcomes and effectiveness in health care. However, this health care sector still needs further studies documenting the impact

of these improvements to a great extent. The ISS is the first to recognize in the literature that specialists in nurse anesthesiology practice provide key roles as doctorate-prepared leaders, practitioners, and researchers in improving world health aligned with the SDGs. While the emerging subject matter of the SDGs may not be familiar to most nurse anesthesiology educators, learners, and practitioners, professional and educational leaders have a role in influencing societal development through a corporate SDG agenda. As advanced practice nursing leaders, the CRNA profession needs continued conversations about integrating the five pillars into nurse anesthesiology educational curricula, rubrics, professional standards, and competencies. Nurse anesthesiologists are often the sole providers of anesthesia services in rural settings across America where resources are limited. As doctorate-prepared nurses, these CRNAs can translate the SDG's commitments to end poverty, achieve economic prosperity, and reduce inequalities and injustices while promoting local health and wellness. Global health requires action from nurses within local communities, such as taking on community leadership roles to evaluate and develop local health care aligned with the SDGs. There are vast opportunities for all nurses to adopt educational steps toward incorporating the five pillars of the SDGs as advocates, change-makers, educators, and global citizens. Preparing nursing educators to guide learners about incorporating the five pillars of the SDGs may increase the number of long-term projects in post-graduation practice demonstrating excellence in nurses' role in sustainably impacting patient health outcomes. When the year 2030 arrives, the discipline of nursing could exemplify educating and preparing nurses to reach the United Nations 2030 SDGs.

References

Aarons, G. A., Green, A. E., Trott, E., Willging, C. E., Torres, E. M., Ehrhart, M. G., & Roesch, S. C. (2016). The roles of system and organizational leadership in system-wide evidence-based intervention sustainment: A mixed-method study. *Administration and Policy in Mental Health and Mental Health Services Research*, *43*(6), 991–1008. https://doi.org/10.1007/s10488-016-0751-4

Aarons, G. A., Sklar, M., Mustanski, B., Benbow, N., & Brown, C. H. (2017). "Scaling-out" evidence-based interventions to new populations or new health care delivery systems. *Implementation Science, 12*(1), 111. https://doi.org/10.1186/s13012-017-0640-6

Ament, S. M., Gillissen, F., Moser, A., Maessen, J., Dirksen, C., von Meyenfeldt, M., & van der Weijden, T. (2014). Identification of promising strategies to sustain improvements in hospital practice: a qualitative case study. *BioMed Central Health Services Research, 14*(1), 641. https://doi.org/10.1186/s12913-014-0641-y

American Association of Colleges of Nursing. (2015). *The essentials of doctoral education for advanced nursing practice.* https://www.aacnnursing.org/DNP

American Association of Colleges of Nursing. (2019). *DNP Toolkit.* https://www.aacnnursing.org/DNP/Tool-Kit

American Association of Colleges of Nursing. (2020). *DNP Factsheet.* https://www.aacnnursing.org/News-Information/Fact-Sheets/DNP-Fact-Sheet

American Association of Colleges of Nursing. (2021). *The Essentials: Competencies for Professional Nursing Education.* https://www.aacnnursing.org/AACN-Essentials/Download

American Association of Colleges of Nursing. (2022). News & information: Position statements & white papers. *Practice Doctorate in Nursing*. https://www.aacnnursing.org/News-Information/Position-Statements-White-Papers/Practice-Doctorate

American Association of Nurse Anesthetists. (2019). *AANA professional practice update: A position statement.* https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/crna-advanced-practice-registered-nurses.pdf?sfvrsn=da0049b1_10

American Association of Nurse Anesthetists. (2020). AANA professional practice update: Scope of nurse anesthesia practice. *American Association of Nurse Anesthetists Professional Practice Manual.* https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/scope-of-nurse-anesthesia-practice.pdf?sfvrsn=250049b1_6

American Association of Nurse Anesthetists. (2022). *CRNA Factsheet.* https://www.aana.com/membership/become-a-crna/crna-fact-sheet

American Association of Nurse Practitioners. (2019). *Nurse practitioners' role continues to grow to meet primary care provider shortages and patient demands.* https://www.aanp.org/news-feed/nurse-practitioner-role-continues-to-grow-to-meet-primary-care-provider-shortages-and-patient-demands

Anåker, A., & Elf, M. (2014). Sustainability in nursing: A concept analysis. *Scandinavian Journal of Caring Sciences, 28*(2), 381–389. http://doi.org/10.1111/scs.12121

Austin, L. (1996). *Social change model of leadership development guidebook.* Version III. Higher Education Research Institute.

Bandura, A. (1977). *Social learning theory.* General Learning Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman.

Bandura, A. (2004). Social cognitive theory for personal and social change by enabling media. In *Entertainment-education and social change: History, research, and practice* (pp. 75–96). Lawrence Erlbaum Associates.

Berta, W. B., Wagg, A., Cranley, L., Doupe, M. B., Ginsburg, L., Hoben, M., MacEachern, L., Chamberlain, S., Clement, F., Easterbrook, A., Keefe, J. M., Knopp-Sihota, J., Rappon, T., Reid, C., Song, Y., & Estabrooks, C. A. (2019). Sustainment, sustainability, and spread study (SSaSSy): Protocol for a study of factors that contribute to the sustainment, sustainability, and spread of practice changes introduced through an evidence-based quality-improvement intervention in Canadian nursing homes. *Implementation Science*, *14*(1), 109. https://doi.org/10.1186/s13012-019-0959-2

Boehm, L. M., Stolldorf, D. P., & Jeffery, A. D. (2020). Implementation science training and resources for nurses and nurse scientists. *Journal of Nursing Scholarship*, *52*(1), 47–54. https://doi.org/10.1111/jnu.12510

Bolt, E. E., van der Heide, A., & Onwuteaka-Philipsen, B. D. (2014). Reducing questionnaire length did not improve physician response rate: a randomized trial. *Journal of clinical epidemiology*, *67*(4), 477–481. https://doi.org/10.1016/j.jclinepi.2013.09.012

Borgan Project. (2017a). What is a bilateral organization? https://borgenproject.org/bilateral-organization/

Borgan Project. (2017b). What is a multilateral organization?https://borgenproject.org/what-is-a-multilateral-organization/

Bowie, B. H., DeSocio, J., & Swanson, K. M. (2019). The DNP Degree: Are we producing the graduates we intended? *Journal of Nursing Administration, 49*(5), 280–285. https://doi.org/10.1097/nna.0000000000000751

Bowman, C. C., Sobo, E. J., Asch, S. M., and Gifford, A. L. (2008). Measuring persistence of implementation: QUERI Series. *Implementation Science, 3*(1). 21. https://doi.org/10.1186/1748-5908-3-21

Braithwaite, J., Ludlow, K., Testa, L., Herkes, J., Augustsson, H., Lamprell, G., McPherson, E., & Zurynski, Y. (2020). Built to last? The sustainability of health care system improvements, programmes and interventions: a systematic integrative review. *British Medical Journal Open*, *10*(6), e036453. https://doi.org/10.1136/bmjopen-2019-036453

Bratt, M. M., & Felzer, H. M. (2011). Perceptions of professional practice and work environment of new graduates in a nurse residency program. *The Journal of Continuing Education in Nursing*, *42*(12), 559–568. https://doi.org/10.3928/00220124-20110516-03

Brower, E. J. (2017). Origins of evidence-based practice and what it means for nurses. *International Journal of Childbirth Education*, *32*(2). 14-18.

Buckley, K. M., Idzik, S., Bingham, D., Windemuth, B., & Bindon, S. L. (2020). Structuring Doctor of Nursing Practice project courses to facilitate success and ensure rigor. *Journal of Professional Nursing*, *36*(4), 206–211. https://doi.org/10.1016/j.profnurs.2019.12.001

Calhoun, A., Mainor, A., Moreland-Russell, S., Maier, R. C., Brossart, L., & Luke, D. A. (2014). Using the program sustainability assessment tool to assess and plan for sustainability. *Preventing Chronic Disease*, *11*, 130185. https://doi.org/10.5888/pcd11.130185

Caniglia, G., Luederitz, C., von Wirth, T., Fazey, I., Martín-López, B., Hondrila, K., König, A., von Wehrden, H., Schäpke, N. A., Laubichler, M. D., & Lang, D. J. (2021). A pluralistic and integrated approach to action-oriented knowledge for sustainability. *Nature Sustainability, 4*(2), 93–100. https://doi.org/10.1038/s41893-020-00616-z.

Caniglia, G., John, B., Bellina, L., Lang, D. J., Wiek, A., Cohmer, S., & Laubichler, M. D. (2018). The glocal curriculum: A model for transnational collaboration in higher education for sustainable development. *Journal of Cleaner Production*, *171*(1), 368–376. http://doi:10.1016/j.jclepro.2017.09.207

Centers for Disease Control and Prevention. (2019). *Who we are: Global health strategy 2019-2021*. https://www.cdc.gov/globalhealth/strategy/default.htm

Chambers, D. A., Glasgow, R. E., & Stange, K. C. (2013). The dynamic sustainability framework: addressing the paradox of sustainment amid ongoing change. *Implementation Science*, *8*(1), 117. https://doi.org/10.1186/1748-5908-8-117

Council on Accreditation. (2019). *Scholarly work for practice doctorate nurse anesthesia programs: Current state and guidance* [White paper]. Council on Accreditation of Nurse Anesthesia Educational Programs. https://www.coacrna.org/wp-content/uploads/2020/01/White-Paper-on-Scholarly-Work-Final.pdf

Cowie, J., Nicoll, A., Dimova, E. D., Campbell, P., & Duncan, E. A. (2020). The barriers and facilitators influencing the sustainability of hospital-based interventions: A systematic review. *BioMed Central Health Services Research*, *20*(1), 588. https://doi.org/10.1186/s12913-020-05434-9

Creswell, J. W., & Creswell, J. D. (2018*). Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications, Inc.

Dang, D., & Dearholt, S. (2018). Johns Hopkins nursing evidence-based practice models and guidelines. (3rd ed.). Sigma Theta Tau International.

Das, S., Mitra, K., & Mandal, M. (2016). Sample size calculation: Basic principles. *Indian Journal of Anaesthesia, 60*(9), 652. https://doi.org/10.4103/0019-5049.190621

Doctors Without Borders. (n.d.). Who we are. https://www.doctorswithoutborders.org/who-we-are

Dols, J. D., Hernández, C., & Miles, H. (2017). The DNP project: Quandaries for nursing scholars. *Nursing Outlook*, *65*(1), 84–93. https://doi.org/10.1016/j.outlook.2016.07.009

Dossey, B., Rosa, W., & Beck, D. (2019). Nursing and the sustainable development goals: From Nightingale to now. *American Journal of Nursing*, *5*(119) 44-49. http://doi:10.1097/01.NAJ.0000557912.35398.8f

Eichbaum, Q. (2018). Collaboration and teamwork in the health professions. *Academic Medicine, 93*(4), 574–580. doi:10.1097/acm.0000000000002015

Estabrooks, P. A., Brownson, R. C., & Pronk, N. P. (2018). Dissemination and implementation science for public health professionals: An overview and call to action. *Preventing Chronic Disease*, *15*, 180525. https://doi.org/10.5888/pcd15.180525

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191.

Fields, L., Perkiss, S., Dean, B. A., & Moroney, T. (2021). Nursing and the Sustainable Development Goals: A scoping review. *Journal of Nursing Scholarship, 53*(5), 568–577. https://doi.org/10.1111/jnu.12675

Fleiszer, A. R., Semenic, S. E., Ritchie, J. A., Richer, M. C., & Denis, J. L. (2015). An organizational perspective on the long-term sustainability of a nursing best practice guidelines program: A case study. *BioMed Central Health Services Research, 15*(1), 1-16. https://doi.org/10.1186/s12913-015-1192-6

Franks, R. P., & Bory, C. T. (2015). Who supports the successful implementation and sustainability of evidence-based practices? Defining and understanding the roles of intermediary and purveyor organizations. In K. P. McCoy & A. Diana (Eds.), *The science, and art, of program dissemination: Strategies, successes, and challenges. New Directions for Child and Adolescent Development*, *149*, 41– 56.

Geerligs, L., Rankin, N. M., Shepherd, H. L., & Butow, P. (2018). Hospital-based interventions: A systematic review of staff-reported barriers and facilitators to implementation processes. *Implementation Science*, *13*(1), 36. https://doi.org/10.1186/s13012-018-0726-9

Gordon, B. G. (2020). Vulnerability in research: Basic ethical concepts and general approach to review. *Ochsner Journal, 20*(1), 34–38. https://doi.org/10.31486/toj.19.0079

Hailemariam, M., Bustos, T., Montgomery, B., Barajas, R., Evans, L. B., & Drahota, A. (2019). Evidence-based intervention sustainability strategies: A systematic review. *Implementation Science*, *14*(1), 57. https://doi.org/10.1186/s13012-019-0910-6

Harrison, D., & Ledbetter, C. (2014). Nurse residency programs. *Journal for Nurses in Professional Development, 30*(2), 76–82 http://doi:10.1097/nnd.0000000000000001

Hellstrand, S., Sundberg, L., Karlsson, J., Zügner, R., Tranberg, R., & Hellstrand Tang, U. (2020). Measuring sustainability in health care: an analysis of two systems providing insoles to patients with diabetes. *Environment, Development, and Sustainability.* doi:10.1007/s10668-020-00901-z

Hempenstall, K. (2014). What works? Evidence-based practice in education is complex. *Australian Journal of Learning Difficulties, 19*(2). http://doi:10.1080/19404158.2014.921631

Hicks, T. B., Shahidullah, J. D., Carlson, J. S., & Palejwala, M. H. (2014). Nationally Certified School Psychologists use and reported barriers to using evidence-based interventions in schools: The influence of graduate program training and education. *School Psychology Quarterly*, *29*(4), 469.

Hodge, L. M., & Turner, K. M. T. (2016). Sustained implementation of evidence-based programs in disadvantaged communities: A conceptual framework of supporting actors. *American Journal of Community Psychology, 58*(1-2), 192–210. http://doi:10.1002/ajcp.12082

Hooshmand, M., Foronda, C., Snowden, K., de Tantillo, L., & Williams, J. R. (2019). Transforming health care through meaningful doctor of nursing practice community partnerships. *Nurse Educator, 44*(3), 132–136. http://doi:10.1097/nne.0000000000000577

Hothersall, S. (2018). Epistemology and social work: enhancing the integration of theory, practice and research through philosophical pragmatism. *European Journal of Social Work, 22*(5), 860–870. http:doi://10.1080/13691457.2018.1499613

Illeris, K. (2007). *How we learn: Learning and non-learning in school and beyond.* Routledge.

Institute of Medicine. (2010). The future of nursing: Leading change, advancing health. Washington, D.C.: The National Academies Press.

Institute of Medicine. (2011). Committee on the Robert Wood Johnson Foundation Initiative on the future of nursing, at the Institute of Medicine. Washington D.C.: The National Academies Press.

Jager, J., Putnick, D. L., & Bornstein, M. H. (2017). II. More than just convenient: The scientific merits of homogenous convenience samples. *Monographs of the Society for Research in Child Development*, *82*(2), 13–30. https://doi.org/10.1111/mono.12296

Jagosh, J., Bush, P. L., Salsberg, J., Macaulay, A. C., Greenhalgh, T., Wong, G., Cargo, M., Green, L., Herbert, C., Pluye, P. (2015). A realist evaluation of community-based participatory research: partnership synergy, trust building and related ripple effects. *BioMed Central Public Health, 15*(1). http:// doi:10.1186/s12889-015-1949-1

Johnson, A. M., Moore, J. E., Chambers, D. A., Rup, J., Dinyarian, C., & Straus, S. E. (2019). How do researchers conceptualize and plan for the sustainability of their NIH R01 implementation projects? *Implementation Science*, *14*(1), 50. https://doi.org/10.1186/s13012-019-0895-1

Kershaw, B. (2011). The future of nursing – Leading change: Advancing health. *Nursing Standard, 26(*7), 31. http://doi:10.7748/ns.26.7.31.s40

Ketron, C. J. (2019). What is it all about? Examining the sustainability of the DNP project. *Journal of Doctoral Nursing Practice*, *12*(1), 93–95. https://doi.org/10.1891/2380-9418.12.1.93

Knowles, M., Holton, E., & Swanson, R. (2015). *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). Routledge

Koenig, T., Spano, R., & Thompson, J. (2019). Human Behavior Theory for Social Work Practice. Sage Publications

Koitsalu, M., Eklund, M., Adolfsson, J., Grönberg, H., & Brandberg, Y. (2018). Effects of pre-notification, invitation length, questionnaire length and a reminder on participation rate: a quasi-randomized controlled trial. *BioMed Central Medical Research Methodology*, *18*(1), 1-5.

Kovach, C. R., & Ke, W. (2016). Handling those pesky statistical outliers. *Research in gerontological nursing, 9*(5), 206–207. http://doi:10.3928/19404921-20160902-01

Kreutzberg, A., Reichebner, C., Maier, C., Destrebecq, F., & Panteli, D. (2019). Regulating the input: Health professions. In Busse, R., Klazinga, N., Panteli, D., & Quentin, W., (Ed.). *Improving healthcare quality in Europe: Characteristics, effectiveness and implementation of different strategies.* Organization for Economic Co-operation and Development and World Health Organization. (pp. 103-106). https://doi.org/10.1787/b11a6e8f-en

Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., Adeyi, O., Barker, P., Daelmans, B., Doubova, S., English, M., Garcia Elorrio, E., Guanais, F., Gureje, O., Hirschhorn, L., Jiang, L., Kelley, E., Tekle Lemango., E., Liljestrand, J.,… Pate, M. (2018). High-quality health systems in the sustainable development goals era: Time for a revolution. *The Lancet Global Health, 6*(11), e1196–e1252. http://doi:10.1016/s2214-109x(18)30386-3

Laerd Statistics. (n.d.-a.). Kruskal-Wallis H test using SPSS statistics. https://statistics.laerd.com/spss-tutorials/kruskal-wallis-h-test-using-spss-statistics.php

Laerd Statistics. (n.d.-b.). One-way ANOVA using SPSS statistics. https://statistics.laerd.com/spss-tutorials/one-way-anova-using-spss-statistics-2.php

Laerd Statistics. (n.d.-c.). Spearman rank order correlation using SPSS statistics. https://statistics.laerd.com/spss-tutorials/spearmans-rank-order-correlation-using-spss-statistics.php

Lam, D. P. M., Horcea-Milcu, A. I., Fischer, J., Peukert, D., & Lang, D. J. (2019). Three principles for co-designing sustainability intervention strategies: Experiences from Southern Transylvania. *Ambio, 49*(9), 1451–1465. https://doi.org/10.1007/s13280-019-01302-x

Leeman, J., Calancie, L., Kegler, M. C., Escoffery, C. T., Herrmann, A. K., Thatcher, E., Hartman, M. A., & Fernandez, M. E. (2017). Developing theory to guide building practitioners' capacity to implement evidence-based interventions. *Health education & behavior: The official publication of the Society for Public Health Education*, *44*(1), 59–69. https://doi.org/10.1177/1090198115610572

Leeper, T. J. (2019). Where have the respondents gone? Perhaps we ate them all. *Public Opinion Quarterly, 83*(1), 280–288. https://doi.org/10.1093/poq/nfz010

Lennox, L., Doyle, C., Reed, J. E., & Bell, D. (2017). What makes a sustainability tool valuable, practical, and useful in real-world health care practice? A mixed-methods study on the development of the long-term success tool in Northwest London. *British Medical Journal Open*, 7(9), e014417. http://doi:10.1136/bmjopen-2016-014417

Lennox, L., Maher, L., & Reed, J. (2018). Navigating the sustainability landscape: A systematic review of sustainability approaches in health care. *Implementation Science, 13*(1). http://doi:10.1186/s13012-017-0707-4

Leviton, L. C. (2017). Generalizing about public health interventions: A mixed-methods approach to external validity. *Annual Review of Public Health, 38*(1), 371–391. http://doi:10.1146/annurev-publhealth-031816-044509

Luke, D. A., Calhoun, A., Robichaux, C. B., Elliott, M. B., & Moreland-Russell, S. (2014). The Program Sustainability Assessment Tool: A new instrument for public health programs. *Preventing Chronic Disease, 11*:130184. http://dx.doi.org/10.5888/pcd11.130184

Mackey, A., & Bassendowski, S. (2016). The history of evidence-based practice in nursing education and practice. *Journal of Professional Nursing*, *33*(1), 51–55. https://doi.org/10.1016/j.profnurs.2016.05.009

Malone, S., Prewitt, K., Hackett, R., Lin, J. C., McKay, V., Walsh-Bailey, C., & Luke, D. A. (2021). The Clinical Sustainability Assessment Tool: measuring organizational capacity to promote sustainability in healthcare. *Implementation Science Communications,* 2(1). doi:10.1186/s43058-021-00181-2

McCauley, L., Broome, M., Frazier, L., Hayes, R., Kurth, A., Musil, C., Norman, L., Rideout, K., & Villarruel, A. (2020). Doctor of nursing practice (DNP) degree in the United States: Reflecting, readjusting, and getting back on track. *Nursing Outlook*, *68*(4), 494–503. https://doi.org/10.1016/j.outlook.2020.03.008

Merriam, S., Caffarella, R., & Baumgartner, L. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). Jossey-Bass.

Merriam-Webster. (n.d.a.). NGO. In *Merriam-Webster.com dictionary*. https://www.webster-dictionary.org/definition/NGO

Merriam-Webster. (n.d.b.). Nurse anesthesiologist. In *Merriam-Webster.com dictionary*. https://www.merriam-webster.com/dictionary/nurse%20anesthesiologist

Minnick, A. F., Kleinpell, R., & Allison, T. L. (2019). Reports of three organizations' members about doctor of nursing practice project experiences and outcomes. *Nursing Outlook*, *67*(6), 671–679. https://doi.org/10.1016/j.outlook.2019.05.012

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Moore, J. E., Mascarenhas, A., Bain, J., & Straus, S. E. (2017). Developing a comprehensive definition of sustainability. *Implementation Science*, *12*(1), 110. https://doi.org/10.1186/s13012-017-0637-1

Moore, J. M., Everly, M., & Bauer, R. (2016). Multigenerational challenges: Team-building for positive clinical workforce outcomes. *Online Journal of Issues in Nursing*, *21*(2), 3. https://doi.org/10.3912/OJIN.Vol21No02Man03

Moullin, J. C., Dickson, K. S., Stadnick, N. A., Rabin, B., & Aarons, G. A. (2019). Systematic review of the exploration, preparation, implementation, and sustainment (EPIS) framework. *Implementation Science*, *14*(1). http://doi:10.1186/s13012-018-0842-6

Mudd, A., Feo, R., Conroy, T., & Kitson, A. (2020). Where and how does fundamental care fit within seminal nursing theories: A narrative review and synthesis of key nursing concepts. *Journal of Clinical Nursing*. http://doi:10.1111/jocn.15420

Mukhalalati, B. A., & Taylor, A. (2019). Adult learning theories in context: A quick guide for health care professional educators. *Journal of Medical Education and Curricular Development*, *6*, 2382120519840332. https://doi.org/10.1177/2382120519840332

Nadalin Penno, L., Davies, B., Graham, I. D., Backman, C., MacDonald, I., Bain, J., Johnson, A., Moore, J., & Squires, J. (2019). Identifying relevant concepts and factors for the sustainability of evidence-based practices within acute care contexts: a systematic review and theory analysis of selected sustainability frameworks. *Implementation Science, 14*(1). http://doi:10.1186/s13012-019-0952-9

Nandiwada, D. R., & Kormos, W. (2018). Interprofessional evidence-based practice competencies: equalizing the playing field. *Journal of the American Medical Association Network Open*, *1*(2), e180282. https://doi.org/10.1001/jamanetworkopen.2018.0282

National Academies of Sciences, Engineering, and Medicine. 2021. The future of nursing 2020-2030: Charting a path to achieve health equity. Washington, DC: The National Academies Press. https://doi.org/10.17226/25982

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). *The Belmont Report: Ethical principles and guidelines for the protection of human subjects of research*. U.S. Department of Health and Human Services. https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html

National League of Nursing. (2020). NLN biennial survey of schools of nursing academic year 2017–2018. NLN DataViewTM. http://www.nln.org/full/url.

Nyström, M. E., Karltun, J., Keller, C., & Andersson Gäre, B. (2018). Collaborative and partnership research for improvement of health and social services: researcher's experiences from 20 projects. *Health Research Policy and Systems*, *16*(1), 46. https://doi.org/10.1186/s12961-018-0322-0

Office of Disease Prevention and Health Promotion. (n.d.). Social determinants of health. *Healthy People 2020*. U.S. Department of Health and Human Services. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Ong, A. D., & Weiss, D. J. (2000). The impact of anonymity on responses to sensitive questions. *Journal of Applied Social Psychology, 30*(8), 1691–1708. https://doi.org/10.1111/j.1559-1816.2000.tb02462.x

Osingada, C., & Porta, C. (2020). Nursing and Sustainable Development Goals (SDGs) in a COVID-19 world: The state of the science and a call for nursing to lead. *Public Health Nursing, 37*(5), 799–805. doi:10.1111/phn.12776

Ovretveit, J., Dolan-Branton, L., Marx, M., Reid, A., Reed, J., & Agins, B. (2018). Adapting improvements to context: When, why and how? *International Journal for Quality in Health Care*. https://doi.org/10.1093/intqhc/mzy110

Peace Corps. (n.d.). *About.* https://www.peacecorps.gov/about/

Plante, K., & Asselin, M. E. (2014). Best practices for creating social presence and caring behaviors online. *Nursing Education Perspectives, 35*(4), 219–223. https://doi.org/10.5480/13-1094.1

Proctor, E., Luke, D., Calhoun, A., McMillen, C., Brownson, R., McCrary, S., & Padek, M. (2015). Sustainability of evidence-based health care: research agenda, methodological advances, and infrastructure support. *Implementation Science, 10*(1). http://doi:10.1186/s13012-015-0274-5

Rao, B. J. (2018). Innovative teaching pedagogy in nursing education. *International Journal of Nursing Education*, *11*(4), 176. https://doi.org/10.5958/0974-9357.2019.00114.4

Revilla, M., & Ochoa, C. (2017). Ideal and maximum length for a web survey. *International Journal of Market Research*, *59*(5), 557-565. https://doi.org/10.2501/IJMR-2017-039

Riva, J. J., Malik, K. M., Burnie, S. J., Endicott, A. R., & Busse, J. W. (2012). What is your research question? An introduction to the PICOT format for clinicians. *The Journal of the Canadian Chiropractic Association*, *56*(3), 167–171. https://www.ncbi.nlm.nih.gov/pubmed/22997465

Roberts, L. D., & Allen, P. J. (2015). Exploring ethical issues associated with using online surveys in educational research. *Educational Research and Evaluation, 21*(2), 95–108. https://doi.org/10.1080/13803611.2015.1024421

Rosa, W. E., Upvall, M. J., Beck, D. M., & Dossey, B. M. (2019). Nursing and sustainable development: Furthering the global agenda in uncertain times. *Online Journal of Issues in Nursing*, *24*(2). http://10.0.15.72/OJIN.Vol24No02Man01

Rugen, K. W., Speroff, E., Zapatka, S. A., & Brienza, R. (2016). Veterans Affairs interprofessional nurse practitioner residency in primary care: A competency-based program. *The Journal for Nurse Practitioners, 12*(6), e267–e273. http://doi:10.1016/j.nurpra.2016.02.023

Saleh, A., & Bista, K. (2017). Examining factors impacting online survey response rates in educational research: Perceptions of graduate students. *Journal of Multidisciplinary Evaluation*, *13*(29), 63–74. https://journals.sfu.ca/jmde/index.php/jmde_1/article/view/487

Salkind, N. (Ed.). (2010). *Encyclopedia of research design*. *Spearman Rank Order Correlation.* 1405-1407. Sage. http://doi:10.4135/9781412961288

Schalock, R. L., Verdugo, M., & Lee, T. (2016). A systematic approach to an organization's sustainability. *Evaluation and Program Planning, 56*(1*)*, 56–63. http://doi:10.1016/j.evalprogplan.2016.03.005

Scheirer, M. A. (2005). Is sustainability possible? A review and commentary on empirical studies of program sustainability. *American Journal of Evaluation*. *26*(3):320-347. http://doi:10.1177/1098214005278752

Scheirer, M. A. (2013). Linking sustainability research to intervention types. *American Journal of Public Health, 103*(4), e73–e80. http://doi:10.2105/ajph.2012.300976

Schell, S. F., Luke, D. A., Schooley, M. W., Elliott, M. B., Herbers, S. H., Mueller, N. B., & Bunger, A. C. (2013). Public health program capacity for sustainability: a new framework. *Implementation Science*, 8(1). http://doi:10.1186/1748-5908-8-15

Scholtz, A., King, K., & Kolb, S. (2014). The care model of the future: Supporting APRNs through an innovative transition to practice program. *Journal of Pediatric Health Care, 28*(3), 276–279. http://doi:10.1016/j.pedhc.2013.11.002

Schultes, M.-T., Aijaz, M., Klug, J., & Fixsen, D. L. (2020). Competences for implementation science: what trainees need to learn and where they learn it. *Advances in Health Sciences Education*. Online ahead of print. https://doi.org/10.1007/s10459-020-09969-8

Scoville, R., Little K., Rakover J., Luther K., & Mate, K. *Sustaining Improvement*. (2016). [White paper]. Cambridge, Massachusetts: Institute for Health Care Improvement. (Available on www.IHI.org)

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, *61*(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Sharma, H. (2022). How short or long should a questionnaire be for any research? Researchers' dilemma in deciding the appropriate questionnaire length. *Saudi Journal of Anaesthesia, 16*(1), 65. http://doi:10.4103/sja.sja_163_21

Shelton, R. C., Cooper, B. R., & Stirman, S. W. (2018). The sustainability of evidence-based interventions and practices in public health and health care. *Annual Review of Public Health, 39*(1), 55–76. http://doi:10.1146/annurev-publhealth-040617-014731

Shelton, R. C., & Lee, M. (2019). Sustaining evidence-based interventions and policies: Recent innovations and future directions in implementation science. *American Journal of Public Health, 109(*S2), S132–S134. http://doi:10.2105/ajph.2018.304913

Shih, T.-H., & Fan, X. (2009). Comparing response rates in e-mail and paper surveys: A meta-analysis. *Educational Research Review, 4*(1), 26–40. http://doi:10.1016/j.edurev.2008.01.003

Shirey, M. R., Selleck, C. S., White-Williams, C., Talley, M., & Harper, D. C. (2020). Sustainability of an interprofessional collaborative practice model for population health. *Nursing Administration Quarterly*, *44*(3), 221–234. https://doi.org/10.1097/NAQ.0000000000000429

Silver, S. A., McQuillan, R., Harel, Z., Weizman, A. V., Thomas, A., Nesrallah, G., Bell, C. M., Chan, C.T., & Chertow, G. M. (2016). How to sustain change and support continuous quality improvement. *Clinical Journal of the American Society of Nephrology, 11*(5), 916–924. doi:10.2215/cjn.11501015

Silverman, D. (2017). *Top tip: Let your research question guide your method* [Video]. SAGE Research Methods Video: Practical Research and Academic Skills https://www.doi.org/10.4135/9781526458131

Slaghuis, S. S., Strating, M. M., Bal, R. A., & Nieboer, A. P. (2011). A framework and a measurement instrument for sustainability of work practices in long-term care. *BioMed Central Health Services Research*, *11*(1), 314. https://doi.org/10.1186/1472-6963-11-314

Sousa, V. D., Driessnack, M., & Mendes, I. A. C. (2007). An overview of research designs relevant to nursing: Part 1: Quantitative research designs. *Revista Latino-Americana de Enfermagem, 15*(3), 502–507. http://doi:10.1590/s0104-11692007000300022

Starnes-Ott, K., Arnaud, M., Rooney, L., & Lewis, M. (2020). Using complex adaptive systems theory to guide the transition to DNP nurse anesthesia education. *Journal of Professional Nursing, 36*(3), 123–127. http://doi:10.1016/j.profnurs.2019.10.004

Stiefel, M., & Nolan, K. (2012). *A guide to measuring the triple aim: Population health, experience of care, and per capita cost*. IHI Innovation Series. [White paper]. Cambridge, Massachusetts: Institute for Health Care Improvement. http://www.ihi.org/resources/Pages/IHIWhitePapers/AGuidetoMeasuringTripleAim.aspx

Stoll, S., Janevic, M., Lara, M., Ramos-Valencia, G., Stephens, T. B., Persky, V., Uyeda, K., Ohadike, Y., & Malveaux, F. (2015). Peer reviewed: A mixed-method application of the Program Sustainability Assessment Tool to evaluate the sustainability of 4 pediatric asthma care coordination programs. *Preventing Chronic Disease*, *12*, E214.

Titler, M. G. (2008). The evidence for evidence-based practice implementation. In: R. G. Hughes, (Ed). *Patient Safety and Quality: An Evidence-Based Handbook for Nurses.* Agency for Health care Research and Quality (U.S.); https://www.ncbi.nlm.nih.gov/books/NBK2659/

Trochim, W. M. K. (2020). *Research Methods Knowledge Base* (2nd ed.). https://conjointly.com/kb/

Turner, S. B., & Kaylor, S. D. (2015). Neuman systems model as a conceptual framework for nurse resilience. *Nursing Science Quarterly*, *28*(3), 213–217. https://doi.org/10.1177/0894318415585620

Tun, M. S. (2019). Fulfilling a new obligation: Teaching and learning of sustainable health care in the medical education curriculum. *Medical Teacher*, *41*(10), 1168–1177. https://doi.org/10.1080/0142159X.2019.1623870

Tuzzio, L., Larson, E. B., Chambers, D. A., Coronado, G. D., Curtis, L. H., Weber, W. J., Zatzick, D. F., & Meyers, C. M. (2019). Pragmatic clinical trials offer unique opportunities for disseminating, implementing, and sustaining evidence-based practices into clinical care: Proceedings of a workshop. *Health Care, 7*(1), 51–57. http://doi:10.1016/j.hjdsi.2018.12.003

United Nations Children's Fund. (2020). About us: Frequently asked questions. https://www.unicefusa.org/about/faq#q-what-does-unicef-do

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*, U.N. General Assembly; A/RES/70/1. https://www.refworld.org/docid/57b6e3e44.html

Upvall, M. J., & Luzincourt, G. (2019). Global citizens, healthy communities: Integrating the sustainable development goals into the nursing curriculum. Nursing Outlook, 67(6), 649–657. doi:10.1016/j.outlook.2019.04.004

Von Carlowitz, H.C. (1713). *Sylvicultura Oeconomica, oder HauBwirthliche Nachricht und NaturmäBige Anweisung zur Wilden Baum Zucht.* Leipzig.

Von Thiele Schwarz, U., Aarons, G. A., & Hasson, H. (2019). The value equation: Three complementary propositions for reconciling fidelity and adaptation in evidence-based practice implementation. *BioMed Central Health Services Research*, 19(1), 868. https://doi.org/10.1186/s12913-019-4668-y

Walugembe, D. R., Sibbald, S., Le Ber, M. J., & Kothari, A. (2019). Sustainability of public health interventions: where are the gaps? *Health Research Policy and Systems, 17*(1). http://doi:10.1186/s12961-018-0405-y

Walpole, S. C., & Mortimer, F. (2017). Evaluation of a collaborative project to develop sustainable health care education in eight UK medical schools. *Public Health, 150*, 134–148. doi:10.1016/j.puhe.2017.05.014

Washington University. (2013). Program Sustainability Tool v2, copyright 2013, Washington University, St. Louis, MO. All rights reserved.

Washington University. (2019). Clinical Sustainability Assessment Tool, copyright 2019, Washington University, St. Louis, MO. All rights reserved.

Wiltsey Stirman, S., Kimberly, J., Cook, N., Calloway, A., Castro, F., & Charns, M. (2012). The sustainability of new programs and innovations: A review of the empirical literature and recommendations for future research. *Implementation Science, 7*(1), 17. https://doi.org/10.1186/1748-5908-7-17

Wolf, C., Joye, D., Smith, T., & Fu, Y. (2016). *The SAGE Handbook of Survey Methodology*. doi:10.4135/9781473957893

World Bank. (n.d.). *About us. What we do.* https://www.worldbank.org/en/who-we-are

World Health Organization. (2020a). *About us: What we do.* https://www.who.int/about/what-we-do/who-brochure

World Health Organization. (2020b). *State of the world's nursing 2020: Investing in education, jobs and leadership*. https://www.who.int/publications/i/item/9789240003279

Wunder, L. (2016). Effects of a nontechnical skills intervention on first-year student registered nurse anesthetists' skill during crisis simulation. *American Association of Nurse Anesthetists Journal. 84*: 46-51. https://pubmed.ncbi.nlm.nih.gov/26939388/

Ziefle, K. (2018). Incivility in nursing education: Generational differences. *Teaching and Learning in Nursing, 13*(1), 27–30. http://doi:10.1016/j.teln.2017.09.004

Appendix A: Variables List

Variable	Variable form	Theoretical definition	Operational definition
Independent variables			
Intervention topics	Categorical-nominal	PICOT-based EBI	Scope of practice 1. Preoperative/pre-procedure 2. Intraoperative/intraprocedure 3. Postoperative/postprocedure 4. Pain management 5. Other services 6. Administrator/policy-making/advocacy 7. Information technology
Intervention is ongoing	Categorical-binary		1. Yes 2. No
DNP or DNAP	Categorical-nominal		1. DNP 2. DNAP
Dependent variables			
Intervention longevity	Categorical-ordinal	Long-term use and resulting outcomes over time	1. 6 months to 1 year 2. 1-2 years 3. 3-4 years 4. 5 or more years
Changed clinical practice	Categorical-ordinal		CSAT 7 key domains 1. Engaged staff and leadership 2. Engaged stakeholders 3. Monitoring and evaluation 4. Implementing and training 5. Outcomes and effectiveness 6. Workflow integration 7. Organizational readiness
Sustainability planning	Categorical-ordinal		PSAT 8 key domains 1. Environmental support 2. Funding stability 3. Partnerships 4. Organizational capacity 5. Program evaluation 6. Program adaptation 7. Communication 8. Strategic planning

Appendix B: Author and Open Access Permission to use PSAT and CSAT

From: [redacted]
Sent: Friday, January 15, 2021 4:18:53 PM
To: Robin Anselm [redacted]
Subject: RE: PSAT "Permission to use PSAT and CSAT"

Hello Dr. Anselm,

Thank you for your interest in our tools! You are welcome to use both the PSAT and CSAT, they are licensed under a Creative Commons Attribution-NonCommercial- ShareAlike License. Under this license, users must cite Washington University, St. Louis as the creator of the tools. Our preferred citation wording for the PSAT and CSAT is below.

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Appendix C: Intervention Sustainability Planning Rubric

Guiding Nurse-Led EBIs Topic Alignment With SDGs and PICOT[a]

(P) People – How does the capstone/intervention ensure the population of interest dignity and equality? Fair treatment?

(Example: CRNA SOPs -preoperative, intraoperative, postoperative, other nonsurgical or nonhospital treatment locations, pain management)

Consider ways the capstone might assist populations experiencing poverty, inequalities in services, or other disparities.

(I) Partnerships - Describe the implementation of the capstone/intervention plan through the lens of unity & partnerships.

Did the capstone address "glocal" concepts? Local (community/unit), broader (organizational/regulatory), and global stakeholder requests?

(Example: Consider nurse anesthesiology global/tandem partnerships for Capstone or practice improvement projects)

(Examples of academic and practice partnerships: Champions (implementation & training), staff (implementation and adaptation), leadership (process, engagement & integration), stakeholders (process, support, and monitoring), organizational (readiness, monitoring & evaluation)

(C) Peace - A peaceful, just, inclusive society.

(Example: Compare proactively just and inclusive criteria with and without the nurse anesthesiology capstone/intervention)

Assess advocacy/ policy/ administration status – Is it just and inclusive? Consider safety.

(O) Prosperity - Ensure prosperous, fulfilling, harmonious aspects in health and wellness outcomes.

(Example: Consider the ways nurse anesthesiology capstone/intervention promoted human health and well-being outcomes, particularly diversity and inclusion.) Were information technologies helpful for inclusion?

(T) Planet - Protect our planet's natural resources and climate for future generations.

Examples: Minimize natural resource depletion. Prevent waste.

Longevity - Identify how to adapt the intervention in future capstones or practices. What do ongoing opportunities resemble?

(Consider the costs and benefits, monetary and non-monetary, of the project.)

Scoring: Potential 20 points. Likert Scale (4 points possible for each section)

1 Under-developed

2 Developing

3 Competent

4 Exemplary

[a] The rubric uses guiding principles of the five pillars of the SDGs and PICOT acronym.

Note. From "Transforming Our World: 2030 Agenda for Sustainable Development," by United Nations, 2015. Department of Public Information.

PICOT Acronym

The word PICOT is a mnemonic derived from the necessary elements when asking an evidence-based clinical question – patient, intervention, comparison, outcome, and time

Riva, J. J., Malik, K. M., Burnie, S. J., Endicott, A. R., & Busse, J. W. (2012). What is your research question? An introduction to the PICOT format for clinicians. *The Journal of the Canadian Chiropractic Association*, *56*(3), 167–171. https://www.ncbi.nlm.nih.gov/pubmed/22997465